

# Runes, runic inscriptions and runic writing as primary sources for town development

Elisabeth Maria Magin, M.A.  
Student ID 14243934

Supervised by  
Professor Judith Jesch (University of Nottingham),  
Assistant Professor Christopher King (University of Nottingham),  
Professor Gitte Hansen (Universitetet i Bergen)

School of English  
University of Nottingham

I hereby declare that this thesis is all my own work, except as indicated in the text:

Elisabeth Maria Magin  
28.12.2020



University of  
Nottingham  
UK | CHINA | MALAYSIA



Arts & Humanities  
Research Council



Midlands4Cities  
Doctoral Training Partnership  
Birmingham Coventry Leicester Nottingham

# Acknowledgements

Without Klaus Düwel, this thesis would not exist.

It would not exist, because without assisting Klaus Düwel in his work, I would never have been confronted with the challenge of turning a rune 180° in Word, or many, many other technical questions I was required to solve between 2010 and 2015. A great deal of what this thesis consists of can therefore, unfortunately, not be quoted as literature, that part being my experiences from that time, most of which resulted in the frustrating (for both of us) realisation that there are some things a computer simply *cannot do*. The continuous clashes between what Herr Düwel wanted and what the computer (by extension, I) was able to deliver are the driving force behind this PhD and the source of my interest in just why it is so difficult to do “Digital Humanities”, and do it well.

The next person without whom this thesis would not exist is Professor Judith Jesch at Nottingham, who patiently listened to me prattling on about how computers could be used to support runologist work during a bus ride. She somehow convinced Assistant Professor Christopher King, Nottingham, to accept me as a PhD student, and Professor Gitte Hansen, Bergen, joined my supervisory team as the expert on the Bergen material. I am very grateful for their support over the last five years, in the form of critique, reading materials, access to collections and signing off on ridiculously many forms, not least because they had to deal with a rather stubborn student, who would disappear from the country for months and had a habit of dislocating limbs.

Disappearances to other countries as well as the thesis itself were kindly sponsored by the then Midlands3Cities scholarship (now M4C) and the Arts & Humanities Research Council as well as Senter for Internasjonalisering av Utdanning, so to them as well I owe thanks.

There is a plethora of others I also wish to thank. When disappearing to Norway, I could be sure of a warm welcome at Bryggens museum, Bergen, and to everyone in that building go heartfelt thanks for help, support and lunsj, which I am afraid I still prefer on the sweet side. Furthermore I wish to thank Ruarigh Dale, James Knirk, Kristel Zilmer, Martin Findell, Sigrid Samset Mygland and Sigmund Oehrl, who contributed in various ways, like out-of-print publications, access to material, support and discussions, and so did Terje Spurkland and Knut Helle, who I regret not being able to show the finished result to.

Fellow students from C27, LG31, neighbouring offices and offices in other cities/countries were a greatly appreciated source of support, in particular James Aitcheson, Sam Rosen, Andreas Schmidt, Lance Pursey, Andreas Fischnaller and Monica Enehaug; Sven Martin Kraus, Ingrid Marie Heiene and Balduin Landolt provided valuable in-depth discussion about digital methodology and also a great team to work with for our COVID-crisis digital workshop on Digital Humanities.

Also of great help regarding digital questions were Erin Snyder, Teri Browett, Stacey Hassall-Jones, Doug Cooper and especially Richard Tyler-Jones, whom I cannot thank enough for making

sure the digital side of this thesis was appropriately presented. Remaining errors are entirely my fault. University IT West, who were frequently called upon to fix some issue, and Stephen McKibbin as well as the staff in the School of English office also have my gratitude.

Colin Wright and fellow lecturers I would like to thank for providing me with thought-provoking and entirely-unrelated-to-my-thesis lectures in Tradition of Critique, a welcome break in my weekly schedule for three years.

Friends and house-mates provided emotional support and in some cases a place to stay during travels; Saskia, Hannah, Linnéa, Hannah Eins, Vivien, Aigerim, Diana, Tolganay, Guldana, Annelie, Laila, Katharina and Julia, I am very grateful I could complain to my heart's content to all of you, even in the middle of the night.

My family too put up with me remarkably well, especially when I was incapacitated and on mandatory, yet very much involuntary health leave, and I would like to thank my parents especially for not only always encouraging me to seek out new horizons, but also providing a safe haven when living between three countries got a bit much. Stefan has my thanks for advice on all matters statistical.

I do not know where Andrew gets his confidence in me, but I appreciate it (and him) nonetheless.

In the end, however, it was Klaus Düwel who was mentor, colleague and, at times, honorary grandfather. He always firmly believed that whichever technical problem there was, I could figure out how to solve it. If there is anyone who could rightfully claim that this thesis wouldn't exist without them, it was him, and it is my great regret that I can only posthumously dedicate this thesis to him, in deep gratitude and fond memory.

# Abbreviations

Babelmap	Andrew West (n.d.[a]). <i>BabelMap (Unicode Character Map for Windows)</i> . URL: <a href="http://www.babelstone.co.uk/Software/BabelMap.html">http://www.babelstone.co.uk/Software/BabelMap.html</a> .
DI	<i>Diplomatarium Islandicum</i> (1857–1952). <i>Íslenskt fornbréfasafn, sem hefir inni að halda bréf og gjörninga, dóma og máldaga, og aðrar skrár, er snerta Ísland eða íslenska menn</i> . Hið Íslenska bókmenntafélag.
DN	<i>Diplomatarium Norvegicum</i> (1848–1920). Kommisjonen for Diplomatarium Norvegicum.
KRDB	Runenprojekt Kiel (2016a). <i>Das Kieler Runenprojekt</i> . URL: <a href="http://www.runenprojekt.uni-kiel.de/beschreibung/1/default.htm">http://www.runenprojekt.uni-kiel.de/beschreibung/1/default.htm</a> (visited on 08/10/2018).
MENOTA	<i>Medieval Nordic Text Archive</i> (2020). URL: <a href="https://www.menota.org/forside.xhtml">https://www.menota.org/forside.xhtml</a> (visited on 26/10/2020).
NID	Erik Henrik Lind (1905–1915). <i>Norsk-isländska dopnamn ock fingerade namn från medeltiden</i> . Lundequistska bokhandeln. URL: <a href="https://gubox.app.box.com/s/ydwx7wwlh7i0pn0ulmj1p4kgec060lff">https://gubox.app.box.com/s/ydwx7wwlh7i0pn0ulmj1p4kgec060lff</a> .
NID-S	Erik Henrik Lind (1931). <i>Norsk-isländska namn ock fingerade namn från medeltiden. Supplementband</i> . Lundequistska bokhandeln. URL: <a href="https://gubox.app.box.com/s/n77bk5rb4ykiod9m4quctvj7jb5clu9j">https://gubox.app.box.com/s/n77bk5rb4ykiod9m4quctvj7jb5clu9j</a> .
NIYR VI	Aslak Liestøl and Ingrid Sanness Johnsen (1980–1990). <i>Norges innskrifter med de yngre runer: Bryggen i Bergen</i> . Ed. by James E. Knirk. <i>Norges innskrifter med de yngre runer VI</i> . Kjeldeskriftfondet.
SRDB	<i>Samnordisk runtextdatabas (application)</i> (Sept. 2014). URL: <a href="http://www.nordiska.uu.se/forskn/samnord.htm">http://www.nordiska.uu.se/forskn/samnord.htm</a> (visited on 05/10/2018).
Sverris saga	Þorleifur Hauksson, ed. (2007). <i>Sverris saga</i> . Íslensk fornrit 30. Hið Íslenska Fornritafélag.



# Contents

<b>Acknowledgements</b>	<b>i</b>
<b>Abbreviations</b>	<b>iii</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. Digital Humanities approaches in runology</b>	<b>3</b>
2.1. Databases and (Relational) Database Management Systems . . . . .	5
2.2. Use of databases in runology so far . . . . .	8
2.2.1. Samnordisk runtextdatabas . . . . .	10
2.2.2. Projekt Evighetsrunor . . . . .	14
2.2.3. Kieler Runendatenbank . . . . .	15
2.2.4. Runer fra Bryggen . . . . .	18
2.2.5. Projekt RuneS/RunesDB . . . . .	21
2.3. Digitising runic data – inherent problems . . . . .	21
<b>3. Runes on screen</b>	<b>25</b>
3.1. Runes as a script: historical development . . . . .	25
3.2. Representation of runes in print . . . . .	27
3.3. Fonts and character encoding . . . . .	30
3.3.1. The principles of character encoding and encoding standards . . . . .	31
3.3.2. Fonts, font design and character encoding standards . . . . .	32
3.3.3. Code block Runic . . . . .	33
3.3.4. Runes, graphemes and standardisation . . . . .	35
3.4. Encoding runes and their variations . . . . .	36
3.4.1. Determining the runic variation range . . . . .	37
3.4.2. Determining the code point range . . . . .	38
3.4.3. A potential Rune Encoding Standard . . . . .	39
3.4.4. Encoding doubts, uncertainties, mirror and bind-runes . . . . .	40
3.4.5. Transliterating as a method of representing runes . . . . .	42
<b>4. Core database design</b>	<b>46</b>
4.1. Databases as a tool for runologists . . . . .	46
4.2. The underlying principles of relational databases . . . . .	47
4.3. Database design: entity modelling . . . . .	47
4.4. Basic considerations for a relational runic database . . . . .	48
4.5. Deciphering a runic inscription . . . . .	49

4.6.	From model to database . . . . .	53
4.6.1.	Field types . . . . .	54
4.6.2.	Relationships, primary and foreign keys . . . . .	55
4.6.3.	JOIN tables . . . . .	55
4.6.4.	The vital role of primary and foreign keys . . . . .	56
4.7.	Retrieving information: writing and running queries . . . . .	58
4.7.1.	Example query: Finding Ólafr . . . . .	58
4.7.2.	Query modifiers . . . . .	60
4.7.3.	Wildcards . . . . .	60
4.7.4.	DISTINCT . . . . .	61
4.8.	The core tables of a “model” runological database . . . . .	62
4.8.1.	Inscription . . . . .	62
4.8.2.	Unirunes . . . . .	64
4.8.3.	Transliteration . . . . .	65
4.8.4.	Patterning . . . . .	66
4.8.5.	Normalisation . . . . .	68
4.8.6.	Literature references . . . . .	69
4.9.	Conclusion . . . . .	69
<b>5.</b>	<b>Onomastic analysis</b> . . . . .	<b>71</b>
5.1.	“Mirrors of society”: name-giving as a social practice . . . . .	72
5.1.1.	Expressions of kinship . . . . .	75
5.1.2.	Markers of foreign descent . . . . .	77
5.1.3.	Name use in daily life . . . . .	79
5.2.	Names as indicators of social status: prerequisites . . . . .	81
5.2.1.	Name sources in Scandinavia c. 1100-1400 . . . . .	82
5.2.2.	NID: a critical evaluation . . . . .	83
5.3.	Quantifying names: methodological framework . . . . .	85
5.3.1.	Name occurrence and name-bearer . . . . .	86
5.3.2.	Counting diplomataria names . . . . .	88
5.3.3.	Name patterns in Iceland and Norway . . . . .	90
5.3.4.	Prerequisites for using Pearson’s $\chi^2$ -test . . . . .	90
5.3.5.	$\chi^2$ -test results . . . . .	92
5.4.	Determining the potential social status of idionyms . . . . .	93
5.5.	TAKERUN: Onomastic research tables . . . . .	96
5.5.1.	PATTERNING, SEQUENCES and INSCRIPTIONNAMES . . . . .	97
5.5.2.	NAMEJOIN . . . . .	101
5.5.3.	IDIONYM . . . . .	102
5.5.4.	Data entry . . . . .	104
5.5.5.	Data retrieval . . . . .	107
5.6.	Survey of the names in IDIONYM . . . . .	109
5.7.	Social stratification of the Bergen idionyms . . . . .	111
5.7.1.	Predominantly Icelandic idionyms . . . . .	114
5.7.2.	Predominantly Norwegian idionyms . . . . .	120

5.7.3.	Idionyms in equal use in both diplomataria . . . . .	125
5.7.4.	Idionyms absent in the diplomataria . . . . .	126
5.7.5.	Feminine idionyms . . . . .	129
5.8.	Names as markers of social status and runic literacy . . . . .	130
<b>6.</b>	<b>Qualitative text analysis: runic literacy and usage at different levels of society</b>	<b>132</b>
6.1.	“Sitz im Leben”: the importance of “who” and “why” . . . . .	133
6.2.	TAKERUN: classification labels for runic messages . . . . .	137
6.2.1.	TTAGS: label entity . . . . .	137
6.2.2.	Rune message “types” . . . . .	138
6.2.3.	Rune message “topics” . . . . .	139
6.2.4.	Carver, purpose and situational context . . . . .	139
6.2.5.	TEXTTAGS . . . . .	140
6.2.6.	TEXTS: what counts as one? . . . . .	142
6.2.7.	Implementation difficulties . . . . .	146
6.3.	Idionyms and texts . . . . .	146
6.3.1.	High-status Icelandic idionyms . . . . .	147
6.3.2.	Low-status Icelandic idionyms . . . . .	148
6.3.3.	High-status Norwegian idionyms . . . . .	149
6.3.4.	Low-status Norwegian idionyms . . . . .	150
6.3.5.	High-status pan-Scandinavian idionyms . . . . .	151
6.3.6.	Low-status pan-Scandinavian idionyms . . . . .	151
6.3.7.	Non-status-associated idionyms . . . . .	152
6.4.	Tags and names . . . . .	152
<b>7.</b>	<b>Archaeological analysis</b>	<b>157</b>
7.1.	Town development in spatial terms . . . . .	157
7.2.	The legacy of the Bryggen excavations: normalising old data . . . . .	158
7.2.1.	Excavation methodology . . . . .	159
7.2.2.	Context evaluation . . . . .	163
7.3.	The fire chronology and the dating process . . . . .	166
7.4.	Archaeological object classifications . . . . .	171
7.5.	Runes and objects . . . . .	173
7.6.	Runes, objects and contexts . . . . .	176
7.6.1.	Townspeople . . . . .	177
7.6.2.	Period 2 (ca. 1120-1170) . . . . .	177
7.6.3.	Period 3 (1170-1198) . . . . .	180
7.6.4.	Period 4 (1198-1248) . . . . .	183
7.6.5.	Period 5 (1248-1332) . . . . .	186
7.6.6.	Period 6 (1332-1413) . . . . .	189
7.6.7.	Period 7 (1413-1476) . . . . .	190
7.6.8.	Merchant rune-carvers? . . . . .	191
7.6.9.	Town landscape and development . . . . .	193

<b>8. Conclusions</b>	<b>196</b>
<b>Bibliography</b>	<b>201</b>
<b>Appendices</b>	<b>210</b>
<b>A. Notes on using the appendices</b>	<b>211</b>
<b>B. Inventory numbers</b>	<b>212</b>
<b>C. Chapter 2</b>	<b>229</b>
Additional figures . . . . .	229
<b>D. Chapter 3</b>	<b>234</b>
Additional figures . . . . .	234
<b>E. Chapter 4</b>	<b>248</b>
Code & queries . . . . .	248
<b>F. Chapter 5</b>	<b>249</b>
Additional figures . . . . .	249
Code & queries . . . . .	252
Additional tables . . . . .	259
<b>G. Chapter 6</b>	<b>279</b>
Code & queries . . . . .	279
Additional tables . . . . .	284
<b>H. Chapter 7</b>	<b>289</b>
Additional figures . . . . .	289
Code & queries . . . . .	316
Additional tables . . . . .	327
<b>Glossary</b>	<b>347</b>
<b>Acronyms</b>	<b>355</b>

# List of Tables

B.1. Runic inscriptions reference numbers . . . . .	212
F.1. IDIONYM overview . . . . .	260
F.2. All entries in IDIONYM with calculations . . . . .	269
G.1. Text labels definitions . . . . .	284
G.2. Idionyms and tags . . . . .	286
H.1. Idionyms with broad dates . . . . .	327
H.2. Idionyms by period . . . . .	327
H.3. Idionyms dating to Period 2 . . . . .	329
H.4. Idionyms dating to Period 3 . . . . .	329
H.5. Idionyms dating to Period 4 . . . . .	330
H.6. Idionyms dating to Period 5 . . . . .	333
H.7. Idionyms dating to Period 6 . . . . .	334
H.8. Idionyms dating to Period 7 . . . . .	336
H.9. Invocations and object classifications, Period 2 . . . . .	337
H.10. Invocations and object classifications, Period 3 . . . . .	338
H.11. Invocations and object classifications, Period 4 . . . . .	340
H.12. Invocations and object classifications, Period 5 . . . . .	342
H.13. Invocations and object classifications, Period 6 . . . . .	345

# List of Figures

2.1. Spreadsheet sample 1 . . . . .	6
2.2. Spreadsheet sample 2 . . . . .	6
2.3. SRDB, GUI. . . . .	11
2.4. Querying criteria, Rundatabas . . . . .	12
2.5. Querying inscription text, Rundatabas . . . . .	13
2.6. Query export opened with wrong character encoding . . . . .	14
2.7. Example output Runer fra Bryggen . . . . .	19
2.8. Runer fra Bryggen, GUI . . . . .	20
3.1. Transrunification and transliteration 1 . . . . .	28
3.2. Transrunification and transliteration 2 . . . . .	28
3.3. Babelmap, Code block Basic Latin . . . . .	32
3.4. Runic punctuation encoding table. . . . .	42
3.5. Multivalued rune-shapes. . . . .	45
4.1. Deciphering an inscription . . . . .	51
4.2. Core database entity model . . . . .	53
4.3. Primary and foreign keys . . . . .	57
4.4. <i>Ólafr</i> -inscriptions . . . . .	59
4.5. INSCRIPTION . . . . .	63
4.6. UNIRUNES . . . . .	65
4.7. TRANSLITERATION . . . . .	66
4.8. PATTERNING . . . . .	67
4.9. NORMALISATION . . . . .	68
5.1. Influences on naming . . . . .	73
5.2. Idionym-distribution, grammatical gender . . . . .	84
5.3. DI/DN, mean, median, standard deviation . . . . .	93
5.4. DI/DN, quartiles . . . . .	95
5.5. Onomastic entity model . . . . .	98
5.6. INSCRIPTIONNAMES . . . . .	99
5.7. Different transliterations, name-spelling consistent . . . . .	99
5.8. Different transliterations, different name-spelling . . . . .	100
5.9. SEQUENCES . . . . .	100
5.10. Replacement character. . . . .	101
5.11. Uncertainty sign. . . . .	101
5.12. NAMEJOIN . . . . .	102

5.13. IDIONYM . . . . .	103
5.14. Adding idionym tokens . . . . .	106
5.15. Distribution Category-1-idionyms . . . . .	113
5.16. Predominantly Icelandic idionyms . . . . .	115
5.17. Comparison of idionym distributions, DI/Bergen . . . . .	118
5.18. Predominantly Norwegian idionyms . . . . .	121
5.19. Comparison of idionym distribution, DN/Bergen . . . . .	121
5.20. Pan-Scandinavian idionyms . . . . .	125
5.21. Idionyms not found in DI/DN . . . . .	127
6.1. TTAGS . . . . .	137
6.2. TEXTTAGS . . . . .	141
6.3. TEXTS . . . . .	143
6.4. Qualitative text entity model . . . . .	145
7.1. EXCAVUNIT . . . . .	160
7.2. STRUCTURES . . . . .	161
7.3. STRUCUNIT . . . . .	161
7.4. CONSTRUC . . . . .	162
7.5. CONTEXTS . . . . .	163
7.6. CONUNIT . . . . .	163
7.7. CONLAYER . . . . .	165
7.8. CONEVAL . . . . .	166
7.9. Bryggen fire chronology . . . . .	167
7.10. FIRE . . . . .	168
7.11. PHASES . . . . .	168
7.12. CONFIRE . . . . .	169
7.13. CONPHASE . . . . .	169
7.14. Basic dates building phases . . . . .	170
7.15. OBJECT . . . . .	172
7.16. OBJECTIDENTIFICATION . . . . .	172
7.17. OBJECTCLASSIFICATION . . . . .	172
7.18. OBJECTMATERIAL . . . . .	173
7.19. OBJECTEXTRAS . . . . .	173
7.20. Rune-carrying objects by building phase . . . . .	175
7.21. Rune-inscribed objects by period . . . . .	176
7.22. Relative frequencies, interlocutor/invocation-idionyms . . . . .	194
C.1. Kieler Runendatenbank entity model . . . . .	229
C.2. Query example Kieler Runendatenbank, German . . . . .	230
C.3. Query example Kieler Runendatenbank, English . . . . .	231
C.4. Current databases comparison . . . . .	232
D.1. Runic corpus edition mark-up conventions . . . . .	234
D.2. Character encoding in Gullskoen/Gullhornet . . . . .	235

D.3. Unicode code block Runic . . . . .	241
D.4. Sound values of Gullskoen characters . . . . .	244
D.5. Rune encoding standard overview . . . . .	247
F.1. Example result set 1 . . . . .	249
F.2. Example result set 2 . . . . .	249
F.3. Stem-and-leaf plot, DI . . . . .	250
F.4. Stem-and-leaf-plot, DN . . . . .	251
H.1. Tilvekstprotokoll. . . . .	290
H.2. Tilvekstregister. . . . .	291
H.3. BR-Katalog. . . . .	292
H.4. Pre-printed card example 1 . . . . .	293
H.5. Pre-printed card example 2 . . . . .	294
H.6. Archaeological entity model . . . . .	295
H.7. Icelandic low- and high-status, Period 2 . . . . .	296
H.8. Norwegian high- and low-status, Period 2 . . . . .	297
H.9. Pan-Scandinavian high- and low-status, Period 2 . . . . .	298
H.10. Icelandic high- and low-status, Period 3 . . . . .	299
H.11. Norwegian high- and low-status, Period 3 . . . . .	300
H.12. Pan-Scandinavian high-status, Period 3 . . . . .	301
H.13. Pan-Scandinavian low-status, Period 3 . . . . .	302
H.14. Icelandic high- and low-status, Period 4 . . . . .	303
H.15. Norwegian high- and low-status, Period 4 . . . . .	304
H.16. Pan-Scandinavian high- and low-status, Period 4 . . . . .	305
H.17. Icelandic high- and low-status, Period 5 . . . . .	306
H.18. Norwegian high- and low-status, Period 5 . . . . .	307
H.19. Norwegian low-status, Period 5 . . . . .	308
H.20. Pan-Scandinavian high- and low-status, Period 5 . . . . .	309
H.21. Icelandic high- and low-status, Period 6 . . . . .	310
H.22. Norwegian high- and low-status, Period 6 . . . . .	311
H.23. Pan-Scandinavian high- and low-status, Period 6 . . . . .	312
H.24. Norwegian and Pan-Scandinavian high- and low-status, Period 7 . . . . .	313
H.25. Invocation-inscriptions, Periods 3-6 . . . . .	314
H.26. Idionyms, tokens and count of objects per period . . . . .	315



# 1. Introduction

This thesis sits at the intersection between runology, archaeology and Digital Humanities. Its aim was to develop a basic model for a runological relational [database \(DB\)](#) and test its usefulness by means of running large-scale analyses on onomastic, textual and archaeological aspects of the Bergen runic corpus.<sup>1</sup> These inscriptions, counting at present 678 proper or suspected inscribed objects, make up the largest comprehensive corpus of runic inscriptions in the world. They were discovered in the course of archaeological excavations begun after a fire on the 4th of July, 1955, destroyed four house rows in the old Hanseatic quarter Bryggen in Bergen, Norway. They date between approximately 1100 and 1450; written in the medieval Futhark, they are carved into objects of daily use or specially cut wooden sticks with several flat sides carrying the runes. The texts are of a varied nature, from lewd insults to expressions of personal feelings to business correspondence (Düwel 2008, 156–158).

The runic inscriptions are only a few of more than 100,000 finds on the BRM 0-site; by virtue of the materials discovered and the excellent preservation conditions especially for wooden objects, it permitted scholars to examine the development of the town, called [Björgvin](#) during this time, in almost unprecedented detail. To this day, archaeologists have looked at items of daily life like fishing gear, shoes, jewellery, textile equipment, children’s toys (Olsen 2004; Larsen 1992; Molaug 1998; Øye 1988; Mygland 2007), the town structures (mainly Herteig 1990, 1991; Hansen 2005) and transport (Christensen 1985). As far as the runic inscriptions are concerned, focus was for the most part on establishing reliable [transrunifications](#), [transliterations](#) and [normalisations](#) (for example, but not limited to Seim 1988a; NIYR VI), leaving several hundred unpublished (Zilmer 2020, 66–68).

Published and unpublished runic inscriptions, however, present unique opportunities for conducting comparative analyses in a discipline usually not in any position to be analysing large corpora of data. The onomastic material from these inscriptions alone, which has from the start drawn attention (Chapter 5), can be used to gain insight into the composition of [Björgvin](#)’s rune-carving population, and the variety of different text types in the inscriptions permits glimpses at the topics and concerns the rune-carvers had.

Yet data mining, or bulk analysis, are not typical approaches in runology, and a corpus of the Bergen size is very difficult to analyse as a whole, especially when several inscriptions have not been interpreted or published, not to mention that re-interpreting 678 inscriptions over the course of a PhD project is an impossibility. With technical support, however, new avenues of research open up. This project is inspired by the emergence of runic [DBs](#) since the late 1980s, meant to help and further research by making information about inscriptions more easily and widely accessible, to the runologist community as well as interested laypeople. It was undertaken with the specific goal in mind to examine how runologists have been using [DBs](#) so far, and to identify areas where existing

---

<sup>1</sup>Throughout the thesis, words/expressions appearing in red indicate hyperlinked entries.

models could be enhanced by, for example, different data modelling and thus, rendered more useful for research purposes, including conducting the kind of macro-analyses usually connected to words like “big data”.

The thesis therefore serves two purposes: one, to see what information can be gained from approaching the Bergen inscriptions as a corpus and taking a macro-perspective rather than conducting micro-analyses on single inscriptions; two, evaluating the use of a certain technology for these macro-analyses. The wealth of names appearing in these inscriptions as well as their textual variety and the archaeological data available makes the Bergen inscriptions an ideal case study on which to develop and test a relational **DB** model.

However, no tool should be used without knowing how it is used; that also applies to digital tools. The technical aspects of the underlying technology are therefore paid equal attention as the research outcomes, and the groundwork for understanding how the tool is used for research purposes is laid in Chapter 2. Focus then shifts to a possible solution to the problem of representing runes and their variations adequately in a **DB** (Chapter 3). In Chapter 4, the process of deciphering a runic inscription is translated into a suitable data model, which forms the **core database**; a generic model of a runic **DB** designed as the basic stepping stone for many different research projects, and applicable to runic inscriptions beyond the Bergen corpus.

From there on, chapters are divided into two parts: one part focuses on the actual work of the runologist, the other on how these steps can be adequately represented in a **DB**. Chapters 5 to 7 show how, using the **core database** as a jumping-off point, a **research database** focusing on the onomastic, textual and archaeological aspects of the Bergen inscriptions can be designed and used to examine these different aspects in relation to each other on a large scale. To enable other scholars to test the final **DB** model, **Take Runes (TAKERUN)**, presented in this thesis, chapters and appendices include the required documentation in the form of queries and discussions of why each decision was made at each stage of data modelling. Particular attention is also paid to what is actually being modelled.

Scholarly **DBs** are mostly created not only to store data, but in order to answer research questions. Due to the nature of the data, they are, however, often much more complex than generic **DBs** for e.g. customer management. It is tempting to expect that a scholarly **DB** will be able to do more than simply store and process data – that it will be able to provide “answers”. When **DBs**, in particular in the form of relational **DBs**, are used for research purposes, the definition of “data” however, must shift. Data does not provide answers, neither is it “truth”, even if it is “facts”. It is the scholar’s or scientist’s interpretation of the data that provides the “answer”, and as the discussion in several sections of this thesis shows, for a runological **DB**, it is less important to store “facts” than it is to store prior research. This thesis attempts to provide solutions for how prior research, with all its vagaries and conflicting opinions, can be expressed in a relational data model.

## 2. Digital Humanities approaches in runology

Constantly evaluating the tool/technology in regard to a certain application is not normally done in either runological or archaeological publications; the tool is used to analyse material, but as a tool, it is of no particular interest. By making it the focus of attention, this project situates itself within the field of Digital Humanities as much as it is a runological/archaeological thesis. This field is comparatively young, although using machines to study subjects traditionally located within the Humanities dates back as far as the 1940s. With the advances of technology in the following decades, subjects and approaches became more diverse (Hockey 2004; Hayler and Griffin 2016a).

The term, too, has changed: from “Humanities Computing” (“the automation of every possible analysis of human expression”, Busa 2004, xvi) to “Digital Humanities”, which encompasses more than simply the automation of analysis, although a commonly agreed-upon definition is still being debated. This is not least owing to computers/applications today being used in many projects as a convenient means for cumbersome and time-consuming tasks (writing publications in word processing applications, storing literature references in bespoke literature DB, and more). However, that does not automatically make such projects “Digital Humanities”.

Rather Digital Humanities are about how the digital side of the equation interacts with the humanities side. The resulting clashes, interferences, problems and benefits are an important field of study by themselves. Express attention is therefore not only paid to the products of digitisation and digital research, but to the processes involved in creating said end products. According to Hayler and Griffin (2016a, 11), “digital building is a research method which will produce its own distinct insights”. In other words, digitisation of traditional humanities material (texts, music, art, objects) has to be treated as a scholarly approach to the material in question; distinct from non-computerised methods, but with its own theoretical foundations.

One of the most crucial Digital Humanities premises is that theoretical concerns are already inherent in the act of digitisation. It is never “neutral”, but always relies on preconceived notions and assumptions, which, if not explicitly addressed during the process, will later need to be brought to light by studying the end product (ibid., 2, 11). There is no such thing as “I’ll quickly put together a DB.” Every step of the process includes decisions in favour of one solution to the detriment of other ways of doing it, which in turn impacts on what can be “done” with the resulting digital “thing”.

Amongst those working in the broad field of Digital Humanities, the concept that the tool influences the end product is something of a truism.<sup>1</sup> Therefore, reflection on how the tool

---

<sup>1</sup>The point is strongly made in several contributions in Unsworth, Siemens and Schreibman (2004), and while this volume is sixteen years old, it still holds true, see for example the contributions in Hayler and Griffin 2016b.

shapes and influences the information (to be) digitised is important, and the lack of neutrality in the supposedly objective process of digitisation is an area of research and discussion. It begins with the choice of materials to be digitised, up to and including the choice of tool for data management (Tanner et al. 2016).

While the first is often still a recognisably humanist discussion (what part of a collection should be digitised, what political/ethical concerns should be taken into account), the latter discussion is frequently situated in the somewhat vague territory of interdisciplinary work. In practice, this means intense reflection of how different tools enable or restrict certain kinds of planned analysis. As Hockey (2004, 3) phrases it, “by its very nature, humanities computing has had to embrace ‘the two cultures’, to bring the rigor and systematic unambiguous procedural methodologies characteristic of the sciences to address problems within the humanities that had hitherto been most often treated in a serendipitous fashion.”

The differences between the two approaches may result in scholars ignoring one or the other aspect; the tendency appears to be to ignore the technical aspects (Hayler and Griffin 2016a, 3–4). That results in a problem when working with digitised materials, because while computers were built to manipulate numbers representing symbols, the human user’s ability to do something with the output is restricted and influenced by how the computer processes the data (Laue 2004, 145, 151).<sup>2</sup> Not taking into account these constraints diminishes the value of any insights won by using a digital tool for research.

While knowing how a computer works is not required to use it, when engaging in Digital Humanities projects, it is wise to familiarise oneself with the basics of machine and tool alike.<sup>3</sup> The most important factor to keep in mind is probably that computers are machines that process numerical data by performing mathematical operations on it. The data inside a computer is stored in bits, electronic impulses set to either “on” or “off” (commonly interpreted as 1 or 0), and data is changed by changing the state from “on” to “off” or vice-versa. Long strings of combinations of “on” and “off” represent different pieces of data; a Roman letter for example needs eight bits (8 times on/off = 8 bits = 1 byte, Deegan and Tanner 2004, 490).

On occasion, people argue against using computers for certain tasks, quoting their inflexibility in dealing with the vagaries of humanistic data. Using binary for storing information, however, does not mean that the data stored by these means has to be unambiguous. The project undertaken in this thesis focuses exactly on how ambiguities inherent in runic inscriptions can be stored and represented appropriately by **Relational Database Management Systems (RDBMSs)**.

The tools/technologies used to digitise, curate and retrieve the information we use for research deserve as much attention as the hypotheses and theories we reference (see for example Schreibman, Siemens and Unsworth 2004, xxv). Moreover, since these tools/technologies in many cases literally shape the information in a certain fashion, close attention needs to be paid to how the tool impacts on the data; otherwise, it is too easy to forget the limits of interpretation applied to

---

<sup>2</sup>Or, as Hayler and Griffin (2016a, 5) put it, “[...] tools co-determine their products and the thinking of their users [...].”

<sup>3</sup>“Understanding the capture processes for primary source materials is essential for humanists intending to engage in digital projects, even if they are never going to carry out conversion activities directly. Knowing the implications of the various decisions that have to be taken in any project is of vital importance for short- and long-term costs as well as for the long-term survivability of the materials to which time, care, and funds have been devoted” (Deegan and Tanner 2004, 502).

the results.<sup>4</sup> The final product can only be used with success when users are aware of what went in and how, not only what came out.

The appropriate choice of tool/technology is therefore crucial in any digitisation endeavour, and it should be evaluated during the process to ensure that the ways in which it impacts on the shape of the final product are properly understood. The process of “making”, i.e. the modelling of data according to the underlying principles of **RDBMS** is therefore made explicit and transparent in this thesis by connecting each modelling decision to the equivalent step in the process of analysing and interpreting a runic inscription. Therefore, the possibilities and limitations of the tool on the one hand and the expectations and processes of traditional runologist work on the other need to be examined.

## 2.1. Databases and (Relational) Database Management Systems

As their name indicates, **Database Management Systems (DBMSs)** were developed in order to manage data. Yet while **DBMS** manage **DBs**, they are not the same as a **DBs**, and should not be understood as such, although it is a widespread misuse of the term. A **DB** is defined as “a logically coherent collection of data with some inherent meaning” (Elmasri and Navathe 2017, 35). The term “related” in this case refers to the fact that all data in a **DB** should concern a particular topic; Ramsay (2004, 179) writes that “[t]he purpose of a database is to store information about a particular *domain* (sometimes called the *universe of discourse*) and to allow one to ask questions about the state of that domain.”<sup>5</sup> In other words, every bit of data in the **DB** should be relevant to the questions one wishes to ask.

It is crucial to understand that such questions are “answered” by way of different sets of data being retrieved as required by using the **DBMS**. This is the software, often including a **Graphical User Interface (GUI)**, providing the means for users to interact with the data in the **DB**, and delivering the data to be interpreted by the user in an easy-to-work-with visual form. Both spreadsheet applications and **DBMS** are used for storage, retrieval and analysis of data. They differ in how the data is structured, but both often present data to the user in a tabular format, which can cause confusion, especially because spreadsheets are, on occasion, also referred to as **DBs**. Yet spreadsheets store data in a single, consistently organised structure, where the same piece of data is often stored multiple times; this is called “data redundancy” (ibid., 180). **DBMS**, however, store data in multiple structures organised according to certain principles. For instance, **RDBMS** require data to be stored in “relations”, structured according to principles originally devised by E.F. Codd (Laue 2004, 179), which are broadly based on Set Theory and Relational Algebra.<sup>6</sup>

---

<sup>4</sup>Outside, although adjacent to runology, a good example can be found in historical linguistics; encoding historical documents to render them machine-readable is a laborious process requiring a lot of decision-making, especially when the text is not only to be rekeyed, but also to be marked up to permit more in-depth linguistic analyses (Deegan and Tanner 2004).

<sup>5</sup>His essay on **DBs** is concise, short, to the point and covers every single important aspect, so should be read by anyone with an interest in using them.

<sup>6</sup>Ramsay (2004) provides a great step-by-step example of how to turn a single spreadsheet into a proper relational **DB**.

	A	B	C	D
1	Inscription 1	Transliteration 1	Translation 1	Interpretation 1
2				Interpretation 2
3			Translation 2	Interpretation 1
4				Interpretation 2
5		Transliteration 2	Translation 3	Interpretation 1
6				Interpretation 2
7			Translation 4	Interpretation 1
8				
9		Transliteration 3	Translation 1	Interpretation 1
10				Interpretation 2
11			Translation 2	Interpretation 1
12			Translation 3	Interpretation 1
13		Transliteration 4	Translation 1	Interpretation 1
14				Interpretation 2
15			Translation 2	Interpretation 1
16				Interpretation 2

Figure 2.1. Spreadsheet containing different readings and interpretations of a runic inscription, stacked vertically.

	A	B	C	D	E	F	G	H	I	J
1	Inscription	Transliteration	Translation	Interpretation	Transliteration	Translation	Interpretation	Transliteration	Translation	Interpretation
2	1	1	1	1	2	2	2	3	3	3
3	2	1	1	1	2	2	2	3	3	3
4	3	1	1	1	2	2	2	3	3	3
5	4	1	1	1	2	2	2	3	3	3
6	5	1	1	1	2	2	2	3	3	3
7	6	1	1	1	2	2	2	3	3	3
8	7	1	1	1	2	2	2	3	3	3
9	8	1	1	1	2	2	2	3	3	3
10	9	1	1	1	2	2	2	3	3	3
11	10	1	1	1	2	2	2	3	3	3
12	11	1	1	1	2	2	2	3	3	3

Figure 2.2. Spreadsheet containing different readings and interpretations of a runic inscription, stacked horizontally.

To illustrate, if one were to use a spreadsheet to store runic inscriptions, it might look like Figures 2.1 and 2.2. Since the internal logic of the spreadsheet demands that every row and column be dedicated to one piece of information, trying to input all possible transliterations, translations and interpretations of a runic inscription results in a spreadsheet with a lot of empty spaces and/or a lot of doubled and tripled entries (Figure 2.1). This in turn negatively affects the application's ability to conduct analyses or even simple filtering functions.

The possibility of using one single row for one inscription, and adding all relevant information into the following columns is equally impractical, and even less conducive to comparing data within one column, let alone different columns (Figure 2.2). Either way, a spreadsheet of this kind is impractical to work with.

The data in a relational DB are structured broadly as sets or “entity types”, with data broken up into smaller sets.<sup>7</sup> Importantly, no relationships between entity types are explicitly declared. However, relationships can be created based on matching (joining) data values in entity types. Thus the way entity types can connect to each other represents what Ramsay (2004, 195) calls

<sup>7</sup>While there are other models, this is the most prevalent model used in the humanities (Hockey 2004, 9).



“an entire set of ontological relations capable of generating statements about a domain.”

In a nutshell, in a relational **DB**, **entity types** are structured to reflect aspects of reality. They are used in the humanities because of their ability to create *meaningful* links between data, that contain information about how one part of reality interacts with another part of reality; Ramsay (2004, in particular 178) explains how the relational model is capable of expressing real-life relationships between author, book and publisher.

This makes them vastly more powerful than a simple spreadsheet, although perhaps more confusing for new users, since the process of breaking up data into **entity types** can be difficult; it requires a deep and clear understanding of the **entities** contained in the data and how they interact.<sup>8</sup> Moreover, it is uncommon for users to always see all of the data within the **DB** displayed on the screen. Instead, users of **RDBMS** work with subsets of data retrieved from the data bulk and created as bespoke sets for the aspects users want to investigate.

Subsets are created by using specific commands, written in programming languages developed for the purpose of manipulating, (re-)organising, sorting, filtering, retrieving and analysing data. Since users have to specify which pieces of information they want, and in the process also have to specify which other pieces of information they relate to and how, Ramsay (ibid., 178) considers the relational model to

[...] hold out the possibility not merely of an increased ability to store and retrieve information, but of an increased critical and methodological self-awareness. If the database allows one to home in on a fact or relationship quickly, it likewise enables the serendipitous connection to come forth. Relational databases in humanistic study are, in this sense, not so much pre-interpretative mechanisms as para-interpretative formations.

The most common language currently used by **RDBMS** is called **Structured Query Language (SQL)**. Its basic commands can be expressed using a vocabulary of around 40 words (w3schools 2020). These principle statements enable the management (creation, modification, deletion) of data structures and the management of data (input, update, delete, retrieve). **SQL** is therefore a very powerful tool for data administration, and various **RDBMS** like Microsoft Access, MySQL or Oracle rely on it, although its use may vary slightly between applications. While different **RDBMS** store data in different ways, and are therefore not compatible with each other, by using the same query language, data can still be shared between them.

The storage of data in different relations (tables), which can be combined as the user wishes, renders **DBs** and **RDBMS** extremely flexible, capable of accommodating different types and sets of data, and fairly easy to use. It is however especially their ability to mirror relationships which makes them important for use within the Humanities, and in this thesis, for the storage of runological data. Furthermore, the possibility to combine different sets of data into new subsets, which can then be analysed, permits a much wider range of possible analyses, and therefore, research questions. It is thus no surprise that there have already been attempts at creating runic **DBs**, with the oldest being **Samnordisk Runtexdatabas (SRDB)** in 1987 (Owe 2014). These **DBs** and the premises they were built upon are now discussed.

---

<sup>8</sup>These interactions can, of course, be defined in different ways.

## 2.2. Use of databases in runology so far

These previous runic **DBs**, based to different extents on the relational model, provide valuable information. Examination of how the **DBs** are structured exposes what data runologists consider important, and might suggest some of the assumptions used in modelling the data. Düwel (2008, 16) offers the following, very comprehensive list of aspects considered vital to the interpretation of runic inscriptions, dividing them into two categories, script-internal (*innerschriftlich*) and script-external (*außerschriftlich*). The latter can again be divided into two categories, *observations on the inscription* and *broader cultural context*:

- Script-internal considerations (philological-linguistic analysis) aim to create a coherent, linguistically conclusive interpretation taking into account:
  1. inscription content
  2. linguistic/textual purpose
  3. universal, typological and language-specific rules
  4. communicative situation/type of communication (human-human or human-supernatural)
- Script-external considerations: Observations on the inscription serve to establish the potential purpose by drawing conclusions from where on an artefact it has been carved:
  1. type of object
  2. relationship between the inscription and its carrier (visible or invisible when worn, on object itself or on a part later attached?)
  3. degree of wear-and-tear damage (the same or different for object and runes?)
  4. characteristic “writing” style
- Script-external considerations: Considering the broader cultural context in which an inscription originated helps to further establish a framework of what it may have meant and been used for by the original carver/owner. Essential considerations concern the type of artefact and the uses it may have been put to.
  1. for loose objects: provenance, potential transport route(s) to find spot, use, type of deposition (accidental/purposeful), circumstances of discovery (*in situ*/secondary, inhumation/cremation)
  2. for stationary objects: location and potential removal to a different spot, position (standing up/lying down) and changes thereof, single monument or part of a group, surrounding landscape, connection to other archaeological monuments such as burial(s) (grounds) or deposits

This list does not immediately translate into processable data, though, much less **entity types**. A closer examination of what specific kinds of data are represented by these different categories is therefore in order; the details and practicalities of how they can be structured for use in an **RDBMS** are discussed in Chapter 4. There is an important distinction to be made, however,



and it has to be emphasised at this point that “processable data” does not include the scholar’s background of knowledge, i.e. knowledge about the time period in question, social structures during this time, religious aspects of the culture and so on. For this reason, some aspects of what Düwel refers to as “broader cultural context” are not generally part of the information included in DBs.

“Processable data” instead refers to basic information; within the sciences, data gathered for analysis is often simple and unambiguous, like measurements. The same is not the case in runology, where the information available always carries uncertainties. Therefore “data” should, in this instance, be understood as “a piece of information relating to the inscription”, with the information being very hands-on and practical.<sup>9</sup> This in turn is rooted in what DBs/DBMS can provide for scholars: not answers to research questions, but sets of data for scholars to interpret.

*Script-internal considerations* rely on the actual text of an inscription. The data required therefore consists of the text, either in runes, Roman letters and/or in the form of visual documentation. The whole process including a more in-depth discussion of each step is presented in Sections 3.2 and 3.4.5 and chapter 4; here a short overview will suffice:

A representation in standardised runes is desirable; within this thesis, the process of transcribing the actual rune on an object into a standardised version is referred to as **transrunification**. This expression was chosen in order to forestall confusion, as the term “transcription” is used differently in English and German. Equally desirable is a “translation” of the runes into Roman letters, called **transliteration** (Section 3.4.5). Based upon this, the inscription content can be further specified as words, phrases and sentences indicating a linguistic/textual purpose as well as a communicative situation, the spelling of which is then adjusted to adhere to scholarly traditions (**normalisation**).

*Script-external considerations* are, in part, based on observations and cover every piece of information relating to inscribed objects themselves. While Düwel (2008, 16) mentions type of object, possible provenance, usage, type of deposition as belonging to the broader cultural context, these pieces of information are still processable data, since they do not require a description of complicated cultural history. (An aspect of script-external information that is not easily stored is the transport route, as it relies on other types of information, like the possible provenance of an object versus its find spot. Theoretically this information can still be processed, but it is not the same type as the two pieces of information it relies on; it is a secondary type of data, reliant on what is already known/can be inferred.)

Script-external considerations can be regarded as the kind of information an archaeologist will provide on a find: location, find circumstances, object classifications and dating, be that typological or by other means. A dating can also be derived on the basis of script-internal considerations, and of course every method of dating can produce different results.

Lastly, good data management demands that no piece of information be offered without at

---

<sup>9</sup>Instead of “data”, the term “capta” has been suggested (see the discussion in Nygren et al. 2016, 63); I cannot see the benefit of using a different term provided a clear definition of what “data” constitutes in any given circumstance is available. An interpretation is no less “data” than the physical dimensions of an object, and can be equally subject to discussion concerning reliability and correctness. This is especially the case when talking about archaeological artefacts made of organic substances like leather, which can and will change size depending on conservation method. Such inherent difficulties need to be made explicit, it is not enough to simply call them by another name and assume this clarifies how precisely this piece of data is subject to certain circumstances.

the same time quoting its source; a proper runic DB should not only note down whence a piece of information originally came, but also which changes to the data were made at which point in time.

This short survey of the information required by runologists provides one part of the equation; the other side is how the data will be structured and stored in the tool. Between user and tool, however, there is the **Graphical User Interface (GUI)**. As explained above, a DB is a collection of related data, which in the case of relational DBs, are stored as relations. The interactions between user and data are handled by the DBMS. For instance, the DBMS will handle storage, while presenting the data to users in a chosen format. Often, the interactions provided by the DBMS include a GUI, and the choice thereof can decide whether the tool will actually be used.<sup>10</sup> The criteria I will be looking at when discussing and assessing already existing runic DBs are therefore:

- how much and which information is available about the inscription itself (**transrunification**, **transliteration**, transcription/**normalisation** (including variations thereof), translations into different languages, editions, literature published on the inscription)
- what information about the context of an inscription is made available (archaeological and otherwise)
- data structure and user interface
- search functionality
- export functionality

Currently there are four scholarly DBs of runic inscriptions, SRDB (1987), **Runer fra Bryggen (RFB)** (1993/94), **Kieler Runendatenbank (KDB)** (approximately 1998) and RunesDB (online since 2018). Most of these projects were conceived and begun during the time when personal computers were becoming more common, and software more accessible to non-specialists. It is worth noting as well that all of the projects appear to be aware of the relational model, which by this point in time had been around for about three decades, having first been presented by E.F. Codd at IBM in 1970. However, examining their structure and the way all of these DBs modelled their contents, it is also apparent that they do not follow the underlying principles for relational DB design, and therefore also fail to exploit the full flexibility of RDBMS.

### 2.2.1. Samnordisk runtextdatabas

Launched on January 1st, 1993, but based on an earlier MSDOS-project from 1987 (Uppsala runforum 2018; Owe 2014), the SRDB project aimed to digitally collect all Nordic runic inscriptions, including those found outside of Scandinavia, to permit and benefit research from a variety of disciplines. As such, it was meant to provide a key to published corpus editions. Every inscription is presented in **transliteration**, **normalisation** and translation into English.<sup>11</sup> The DB

---

<sup>10</sup>Text-based commands on a simple terminal with **operating system (OS)**-prompts do not appeal to most end users.

<sup>11</sup>Except for 22 entries in Norwegian (SRDB).

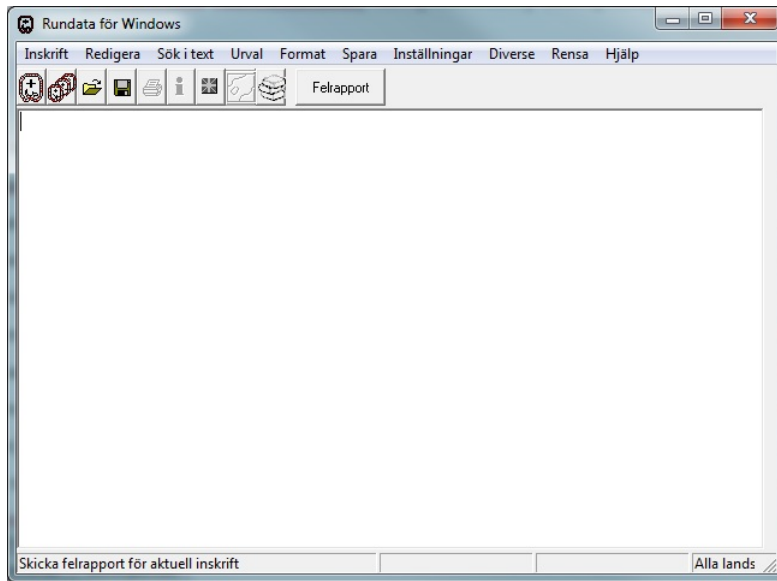


Figure 2.3. SRDB, GUI.

also provides information on dating, find circumstances, location (coordinates), object type, links to pictures and literature references, thereby fulfilling several of the above-mentioned criteria (see Figure C.4).

Via its own application (Figure 2.3, Windows-only), downloadable to personal computers, users can query the data (Figures 2.4 and 2.5) and export it to various formats. The **Graphical User Interface (GUI)** also provides a “Help” section with an introduction on how to use the interface, i.e. how different searches can be run (e.g. in case one does not know the signum of an inscription, which is the main point of reference for searches), and where users can also look up how to insert special characters common in **Old West Norse (OWN)** writing like *ð*, *þ* or *æ*.<sup>12</sup> Help section and interface are available in Swedish and English. However, actually setting up a search within the user interface is quite difficult, even with the search criteria being organised in several drop-down menus.

There are also a number of factors to be taken into account due to how the **DB** is structured. Underlying **SRDB** are six main files, four of which concern script-internal information (RUNDATA.RUN, RUNDATA.NFS, RUNDATA.FVN, RUNDATA.ENG). RUNDATA.RUN contains **transliterations**, whereas the next two contain a **normalisation** into the language spoken in the area at the time of creation of the inscription (NFS) and into normalised **OWN** (FVN). RUNDATA.ENG contains translations into English.<sup>13</sup> RUNDATA.INF and RUNDATA.LIT contain script-external information, e.g. type of object, find spot, literature references (Figure C.4). The information in these files appears to be linked via the inscription signum<sup>14</sup>, mean-

<sup>12</sup>The character codes are erroneously referred to as ASCII-codes. The code point they are referring to is in fact the Unicode Decimal code, as neither *ð* nor *þ* were encoded in the official ASCII character map (*ASCII Codes CP 865 (Nordic languages)* 2018), cf. Section 3.3.1.

<sup>13</sup>While these files do not have extensions that computers immediately recognise, they can be opened in a text editor (Notepad(++), Kate) or even a spreadsheet application (Excel, LibreOffice Calc) without difficulty.

<sup>14</sup>Which can in this instance be called a **primary key (PK)**, cf. Section 4.6.4.

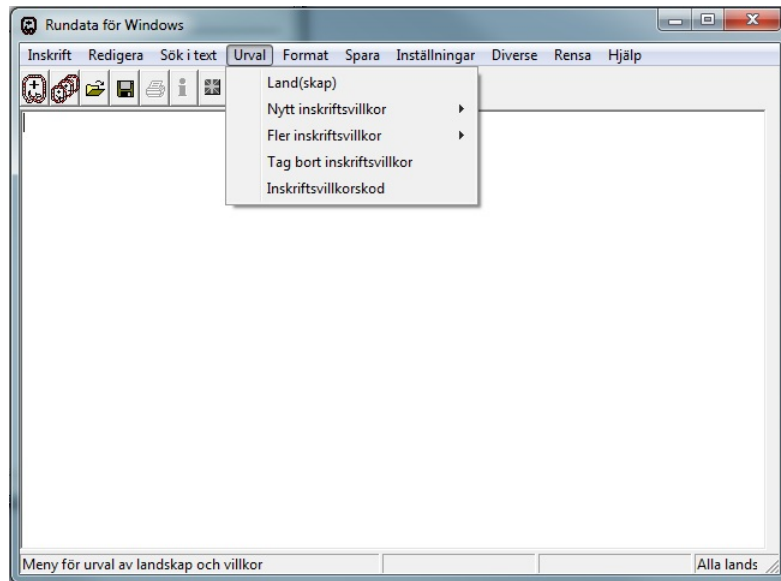


Figure 2.4. Querying for specific criteria in **SRDB**.

ing that whenever a search is run, the **DBMS** collects information on the inscription from all files based on the signum and presents it to the user in the interface.<sup>15</sup>

Going into the details of how data can be retrieved via this interface is beyond the scope of discussion at this stage.<sup>16</sup> What can be said is that the **DBMS** can do some of the tasks outlined in Section 2.1, but it appears the main aim has been to enable filtering data in search of inscriptions answering certain criteria. Updating, as well as deleting, data is impossible, as long as one stays out of the underlying files.

**SRDB** does the filtering part well, however the mechanisms of setting the criteria are not easily understood by users without generic knowledge of retrieving data or runic inscriptions. Setting several criteria and combining them involves using at least two drop-down menus, and keeping in mind how these criteria may limit the pool (Figures 2.4 and 2.5). **SRDB** was created using the programming language Pascal (pers. comm. Marcus Smith), and is therefore not using any of the current query languages, which makes it very difficult to use the data in another **DBMS**. While sophisticated querying is possible with this language (e.g. filtering for inscriptions from one region, containing specific words, using **wildcards**, searching for specific characters), each single query has to be run by itself, with the next one stacked on top of the result set. There are also other complications involved; to receive all results from such a query, it is not enough to run the search itself, one first needs to click another button to complete the list. Queries can also not be written directly into the search bar, they can only afterwards be modified in it – however, once again they can only be modified one by one. As for the result sets of the more sophisticated queries, I have not checked whether modifying queries results in incorrect data output, but it certainly is not impossible.

<sup>15</sup>Except for literature references, which only link to a file with explanations of what the abbreviations mean. Literature references for a single inscription link to a website.

<sup>16</sup>The Help section explains it well, however.

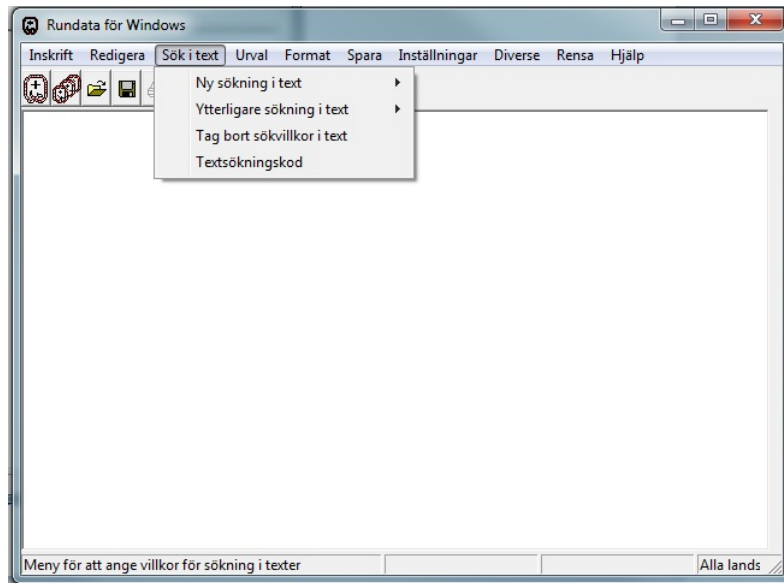


Figure 2.5. Querying in the inscription text in **SRDB**.

It is possible to save result sets and return to working with them when starting up the application again. Unfortunately, the search results, exported into **.rtf** or **.txt**, are by default saved in the application folder on the computer. They then do not appear in the Windows explorer even when “show hidden files” is enabled. If exported to another folder on the computer and navigated to from the interface, **SRDB** appears not to recognise them any longer. This means that search results are not transferable even between computers, unless one copies the whole application folder (and hopes the mysterious hidden file has been copied as well).

Other export functions of the programme include **.csv**-, **.gpx**- and **.shp**-files as well as Google Earth and Maps. They work, however in testing I noticed that occasionally, **.csv**-files will have to be exported twice before the file also includes the text from RUNDATA.RUN. The same appears to be the case for **.shp**-files.

Additionally, and at least in the **.csv**-files, there is no Unicode encoding enabled, instead it appears to be using Windows-1252, which may result in problems when the data is used with other current applications (Section 3.3 for a discussion of different **character encodings**). LibreOffice, for example, one of the most used open-source office suites and as such popular amongst students, uses **UTF-8** as its **Character Encoding Standard (CES)**, resulting in unreadable characters (Figure 2.6).

So while there are a number of export functions, in reality they are tricky to use. The only way to include the information from **SRDB** in my **DB** was to turn the underlying files into properly encoded **.csv**-files, which could be imported into another **DBMS**. Having done this, I can conclude that one of the main problems with **SRDB** is a structural one. The signum, which acts as a **primary key (PK)** within the **DBMS**, is not only composed of multiple values derived from other **attributes** (the first part indicating the find spot area, the second making use of a number from a current runological edition of inscriptions from that area, the third indicating a number of things, cf. section “Signum” in “Help”), but can, and will, be altered when some

N 288 M	uikigr-
N 289 M	✦A (t)rotin^n : um a^lla : fram ✦ o^k ✦u styrk : mik : til a^l^lra go'
N 290 M	✦A ✦ rani ✦ ✦B fu✦orkhniast
N 291 M	✦A hagon r✦ist mig o^g en su✦inen a mig ✦B ba^r✦ a m✦(g)
N 292 M	fu✦o
N 293 M	✦A isakr ✦or(e)-r a mik i ro^ni ✦B -- ✦C isakr ✦D fu✦orkhnisa
N 294 M	fu✦or

Figure 2.6. Characters in an exported .csv-file from **SRDB** having turned into question marks upon being opened with the wrong **character encoding**.

of that information changes. Accordingly, every single time a signum is changed, for example because the edition referred to is replaced, the signum has to be changed in the other files as well – a sure-fire way towards data corruption, as **PKs** *must* represent a *consistent, unique* point of reference in especially **RDBMS** (Section 4.6.4).

Beyond the information requested by Düwel 2008, RUNDATA.INF also contains data hinting at the origins of the project, which started out as a **DB** of the Viking Age inscriptions in Sweden; these mainly tend to be on runestones. Therefore rune-carver, an alternate location (in case the monument was moved from its original location) and stylistic details are included in the file.

Concluding this survey, the first thing that strikes one about **SRDB** is that the range of information provided corresponds fairly well to the demands of runologists, and while the lack of a consistent **PK** is a serious issue, data redundancy is avoided at least in those files pertaining to the inscription contents. Using it, however, is not intuitive, and requires users to have at least a generic understanding of a runologist's work and the data files. Documentation for **SRDB** is commendable, even if non-specialists may find it difficult to understand. The range of information provided is overall satisfactory, yet it lacks a digital, visual representation of the runes themselves (even if links to pictures of inscriptions are provided where possible) and proper literature references to a single inscription, but most importantly, different interpretations, or, more precisely, conflicting scholarly opinions of what the runes read. In some cases, **SRDB** makes use of the character combinations “\$P” and “\$Q” to indicate an alternative interpretation, but this only occurs in a few cases and is not a general phenomenon. Equally, in some cases “/” between two possible solutions is used, but again, it is not a general occurrence.

Therefore it does not fully satisfy the outlined criteria (Section 2.2), as Düwel (ibid., 62) specifically mentions that very few interpretations can by default be regarded as right or wrong, and should therefore be considered whenever a new interpretation is undertaken. While he writes this about runic inscriptions dating to the early time of runic writing, it still holds true for later inscriptions.

### 2.2.2. Projekt Evighetsrunor

Between 2017 and 2020, scholars from the Uppsala runforum (where **SRDB** is maintained) and Riksantikvarieämbetet have worked on transferring the data from the original files into a proper relational model as part of Projektet Evighetsrunor. The most important outcome of this project is the online platform **Runor** (*Runor* n.d.), which combines the digitised parts of the Swedish corpus edition Sveriges runinskrifter and the data from **SRDB** to provide a research platform with up-to-date information on Swedish runic inscriptions (Bianchi 2017). The online platform



displays the results from an underlying relational **DB**, which in turn uses the data from the older **SRDB**-application.

The new relational model addresses some of the issues that were present in the older version; for example, the signum is no longer used as a **PK**, instead APIs are used to uniquely identify the entries. The **CES** was also changed to Unicode, thus improving compatibility. In terms of the underlying structure, however, the system of keeping the different steps of deciphering an inscription were maintained as separate **entity types**; **RUNDATA.RUN** is now designated “readings”, **RUNDATA.NFS** and **RUNDATA.FVN** are combined in “interpretations”, while “translations” uses the data from **RUNDATA.ENG** (pers. comm. Marcus Smith). A bespoke **entity type** “inscriptions” was also introduced into the structure, however the definition of this **entity type** is still not entirely clear, and the data needs to be normalised further (pers. comm. Marcus Smith). The parts of the structure pertaining to the runes and texts themselves have, therefore, not changed.

What has changed significantly is the structure of **RUNDATA.INF**, which was broken up and restructured into a variety of different **entity types**, the survey of which is beyond the present scope of this study, since these parts pertain to script-external considerations like location, potential rune-carver, etc. While important, modelling these script-external aspects of runic inscriptions needs to be done with a view to what the underlying data looks like and where it came from; translating the script-external aspects of the Bergen runic inscriptions into this structure is inadvisable, because as Chapter 7 will show, the same script-external data for the Bergen inscriptions needs to be modelled according to the excavation methodology used during the excavations.

In regard to what the new relational **SRDB/Runor** are supposed to provide, it is “meant to be an encyclopaedic database, in the sense that it doesn’t include anything that is original and only found in that database, but rather provides a way to view and search all the most up to date agreed-upon interpretations from across the runological literature in one place” (pers. comm. Marcus Smith). In other words, the new relational version again and consciously decides against storing different interpretations, although in cases where there is no widely agreed-upon interpretation, XML-encoded text snippets were included, by which it is possible to display conflicting interpretations. These are not, however, treated as separate **entities**. Also, conflicting interpretations which have found no wide-spread approval are once more disregarded; the approach is therefore much the same as in the original **SRDB**.<sup>17</sup>

However, there is both a need and a desire for a representation of a wider range of possible interpretations, which was picked up early on, and **KDB** was in part developed as a follow-on model of **SRDB**.

### 2.2.3. Kieler Runendatenbank

While **SRDB**’ main aim was to collect all Scandinavian runic inscriptions and store them, the **DB** project running from 1993 to 1999 and again from 2001 to 2012 at the University of Kiel had a more specific research aim and a narrower selection of inscriptions. On its website, it is described as a linguistic **DB** of the oldest inscriptions in the Older Futhark (Runenprojekt Kiel 2016c).

<sup>17</sup>Since most scholars will likely still be working with the old application, as recommended by the project itself (Bianchi 2020), and since the underlying structure and data model was not changed with regard to the runological aspects, this study continues to reference the old **SRDB**-files.

Like **SRDB**, it offers a variety of information on each inscription, including different interpretations, archaeological data and literature (Figure C.4). Additionally, it contains information on syntactic structures in inscriptions, the words they contain and various grammatical aspects of the inscription language. Unlike **SRDB**, it marks out potential forgeries. The data itself is stored in a MS Access-**RDBMS** and made accessible via a web-based interface in both German and English, so only a regular browser (Google Chrome, Firefox, Opera) and a stable internet connection are required to use it. The English interface has limited functionality, however.

Structurally, **KDB** is a relational **DB**, with **GUI** and **RDBMS** provided by MS Access and the website utilising JavaScript to display result sets. The **DB** itself contains four related tables, called respectively *Find*, *Interpretations*, *Words* and *Bibliography*.<sup>18</sup> This small number is surprising, as one would expect a relational **DB** storing so many different kinds of information to contain more tables (like **Runor**). The **entity model** provided (Figure C.1) reveals a number of **JOINS** connecting the four main tables, which are a structural necessity (Section 4.6.3). The explanation for the low number of tables as opposed to the amount of data is to be found in the individual tables' structure instead.

*Find* “serves as the basis”, with the field *Find-no* providing both the **PK** of this table and the reference point of the whole **DB** (Runenprojekt Kiel 2016d). Contrary to expectation, it does not only contain information on the find/object itself, but also information on the inscription, the geographical location of the object and the various types the object can be classified as, which is reminiscent of **RUNDATA.INF**.<sup>19</sup>

The next table, *Interpretations*, stores **transliterations** (Reading), **normalisations** (Interpretation) and Translation in separate columns, very similar to the structure displayed in Figure 2.2. **SRDB** stores each of those in their own file, which is compliant with **data normalisation** rules meant to reduce data redundancy. Further data integrity and redundancy issues appear in the form of *Interpretations* also containing information concerning the dating of the inscription and its language (Runenprojekt Kiel 2016e).

Comparing the approach to data modelling of **KDB** to that of **SRDB**, there can be no doubt that the latter's structure is much more in keeping with the principles underpinning the relational model. Granted, *Interpretations* in **KDB** provides previous interpretations from scholars who have already worked with the inscriptions, and gives concise information on these, which **SRDB** does not, thus escaping some of the issues of having to store conflicting interpretations. The structural issues in **KDB** are nevertheless so severe that **SRDB** is the more functional model. These issues open up for various possibilities of corrupting data and hindering proper processing, for example when there is only one **entity type** storing interpretations, necessitating a table structure similar to Figure 2.2.

The most extensive table by far is *Words* with 34 columns. Whether this table would have been

<sup>18</sup>Which, inexplicably, are in German referred to as “files” (Datei) instead of “table” (Tabelle) or “**entity type**” (Entitätstyp), either of which would be more correct and in keeping with the technical terms; this is particularly misleading because any **DB** built in MS Access only consists of one “file” that the user can see. It is true that within said file, all data is stored, but the use of “file” in this definition is still highly confusing. Equally, “indexes” appears to be used to describe **PK**-columns, whereas actually, every **PK**-column is an index, but not every index column stores **PKs**.

<sup>19</sup>All tables with their fields are accessible at [http://www.runenprojekt.uni-kiel.de/beschreibung/7/default\\_eng.htm](http://www.runenprojekt.uni-kiel.de/beschreibung/7/default_eng.htm).



better broken up into smaller ones is difficult to establish for someone without the same kind of linguistic background; even lacking the training, there is a chance though that the relational model does not provide the best structural principles to deal with them. Similar analyses have been undertaken by scholars working with manuscripts, resulting in the [Medieval Nordic Text Archive \(MENOTA\)](#) Standard for encoding (*Menota Handbook 3.0. Guidelines for the electronic encoding of Medieval Nordic primary sources* 2019 based on *TEI: P5 Guidelines* 2020), which permits the marking up of single words and characters to a degree that is difficult to achieve with a relational DB.

*Bibliography* provides literature references for each inscription, and unlike [SRDB](#), in this case only the references concerning the inscription in question are presented. According to the German version of the website, only literature since 1960 was entered into the table (Runenprojekt Kiel 2016b), although Runenprojekt Kiel (KRDB) states that literature from the early 19th century up to 2009 is included.

Theoretically, the relationships between the tables, visible in Figure [C.1](#), should provide a lot of flexibility in terms of potential queries. But while [KDB](#) provides the required different interpretations of runic inscriptions that [SRDB](#) lacks, it is much more limited in search functionality. As a matter of fact, users can only define search criteria regarding specific aspects of an inscription, otherwise they are limited to using preconfigured queries (Figures [C.2](#) and [C.3](#)).<sup>20</sup> While these were obviously chosen with regard to what users might generally want to know, with the exception of those relating to words and syntax, the queries still do not go beyond what [SRDB](#) can do, if handled properly. With queries in [SRDB](#) being stackable (even if that is a complicated process), the search functionality of [SRDB](#) is, in fact, better than that of [KDB](#).

The export functionality is non-existent; it is only possible to copy-paste from the website. This process is however impeded by the fact that in the displayed result sets, the [PKs](#) connecting the entries (Find-no) is not shown, instead the whole list is re-numbered. If one is looking to compile a larger data collection for several inscriptions, a lot of copy-pasting and manually connecting entries will be involved, whereas [SRDB](#) permits users to connect entries via the (admittedly problematic) [PKs](#).

These restrictions in querying [KDB](#) are most likely due to the aforementioned problematic data structure. It is striking how many different types of data one table in [KDB](#) contains, as opposed to [SRDB](#), where only one file can be reasonably said to store different types of data (RUNDATA.INF), an issue that was resolved in [Runor](#).<sup>21</sup> This all the more surprising since [KDB](#) relies on a proper [RDBMS](#), and splitting data into smaller sets by applying [data normalisation](#) rules and defining proper [entity types](#), which would have resulted in a more flexible structure and increased functionality, would not have been an issue.

It must also be mentioned that, even if [KDB](#) provides more information on the single inscription, its use is similarly difficult as the use of [SRDB](#), although for different reasons. The web interface may be easier to access and [OS](#)-independent, but queries can neither be stacked nor saved, ultimately limiting users to the research questions the [DB](#)-designers had in mind. These

<sup>20</sup>For example “Types of inscriptions” or “Inscriptions on a type of object”, however the latter is only available in the German version.

<sup>21</sup>This could be blamed on inscriptions in the Older Futhark being more difficult to interpret and therefore, resulting in more contradicting interpretations, but as Chapter 5 will show, this is by no means uncommon for younger inscriptions either.

are mainly questions of a grammatical and syntactic nature, as implied by the heavy importance placed on the *Word*-table. But again, not all queries concerning the syntactic structures are available in both German and English.

In conclusion, while **KDB** has implemented the concept of conflicting interpretations of one inscription and further developed the idea of **SRDB** by including the possibility of searching for specific linguistic structures, it still suffers from the problem that the relational model was only in part properly implemented. The lack of **data normalisation** poses serious issues for data integrity and retrieval, and in combination with the web interface severely limits the functionality and usefulness of the **DB/DBMS**.

## 2.2.4. Runer fra Bryggen

Instigated in January 1993, the project *Computerising the runic inscriptions at the Historical Museum in Bergen* was not aimed at a generic presentation of the Bryggen inscriptions to begin with, although it ended up being “the first generally available overview of all the material from the Bryggen excavations up until 1996 with a transcription and normalization” (*Runic inscriptions from Bryggen in Bergen* 2002).

Technically, that makes it the most important **DB** for this thesis, as it also uses the Bergen inscriptions as an example corpus. Originally **RFB** was aimed at developing a **transliteration** system based solely on the graphic form of the runes instead of **transliteration** traditions (*RuneType. The Rune Typology Project* 2002); funded for three years, it appears to have run for longer than that; the website was still maintained in 2003, and the publication on their particular methodology appeared in 1998 (Ore, Tweedie and Dougan 2018).

The **DB** originating from this project appears to have been more of a side-product of the typology project, as the lack of a complete list of all Bryggen inscriptions necessitated cataloguing them before starting on the analysis of the runes (Haavaldsen and Ore 1995-2003). To begin with, HyperCard was chosen to help build the collection in 1993, but the data was transferred into Claris Filemaker Pro in 1994, which appears to have remained the **DBMS** for the duration of the rest of the project. There also appear to have been several revisions of the data before actual analyses began (Ore 2002; Haavaldsen and Ore 1995-2003).

The aforementioned data mainly originates from the paper card archive principal runologist Aslak Liestøl compiled when he was first working with the Bryggen inscriptions, although the original cards seem to have only been consulted in cases where the copy kept at the Historical Museum in Bergen was insufficient (Haavaldsen and Ore 1995-2003). In addition, information from for example NIYR VI and other publications available at that point in time was added, which also includes information from unpublished masters and doctoral theses.<sup>22</sup>

As a number of the Bryggen inscriptions were considered to be unpublishable by the project members, one reason for designing a **DB** was “[t]he wish to make a catalogue of the ‘unpublishable inscriptions from Bergen’” (Haavaldsen and Ore 1995-2003). I can attest that the information on Liestøl’s cards tends to vary quite a bit; at times he offers **transrunifications**, on most occasions he provides a **transliteration**, sometimes a **normalisation**, rarely a translation. Comments can also be found on those cards, pertaining mostly to the inscription, but also the object and other

---

<sup>22</sup>A complete bibliography is available at Haavaldsen and Ore 1995-2003.

Resultater fra søk i runeinnskrifter fra Bergen	
Bergensnummer:	B004
NIYR-nummer:	
Bergensemuseumsnr.:	BRM000/03028
Andre nummer:	brnr1547
Datering:	Etter 1332.
Gjenstand:	Hodeskalle av hvalross med utskjæringer.
Funnsted:	Bryggen.
Transkribert tekst:	io(an)a
Normalisert tekst:	Jóhann á
Publisert:	Liestøl, (64) Spurkland (91)
(Foto) Aslak Liestøl	b004-detalj.jpg
(Foto) Aslak Liestøl	b004.jpg
Søkeresultater fra: 24.10.18 - 23:42	

Figure 2.7. Information available on a randomly chosen runic inscription.

observations. Since the variation is so great, it is impossible to clearly outline what kind of information is available. It appears however that only **transliterations** and **normalisations** have made it into **RFB** (Figures 2.7 and C.4), along with some archaeological information and, in some cases, black-and-white photographs (mostly of insufficient quality to recognise the runes). The available information is in no way properly normalised, however, lacking for several inscriptions, outdated (especially datings), and only meaningful if the user already has solid knowledge of the Bryggen excavations and the excavation techniques used.

Therefore I have noted down that information on particular aspects of the inscriptions is available in Figure C.4, but this has to be taken with a grain of salt. Some of that information is more or less encoded in the wording (“under bolverk” for example implies a secondary deposition, Section 7.2.2) or actually included in the preface of the catalogue, and will not appear in the search result.

Finally, while most of the documentation (not as extensive as in the case of **SRDB**, but still carefully presented) is available in Norwegian as well as in English, the actual data on the inscriptions is not. Knowing Norwegian is therefore a prerequisite to making sense of results.

There is no **entity model** or any other information provided about the structure of the **DB**, but judging by the **GUI** (running PHP server-side, Figure 2.8), it may be supposed that it is little more than a spreadsheet containing the basic information outlined above. While find place and object are presented as searchable fields, they do not appear to work, and perhaps their existence is explained by early plans to include Swedish and Danish runic inscriptions in the **DB** (*RuneType. The Rune Typology Project* 2002). Search results can be sorted by different fields, and the interface allows combining different search criteria by using AND and OR operators. Yet the search functionality does not work well, not at all when using “Search all fields”, “Transcribed text” and “Normalized text”. “Bergen index #” as well as “NIYR #” work as required, however “B” needs to precede the actual number in the former field for the **DBMS** to be able to retrieve something. Using the **wildcard** character “?” works as well, but again only in the aforementioned working search fields. In many cases, especially when looking for inscriptions one already has a

**Search in runic inscriptions from Bergen**

(Wild card character '?', ?3? will retrieve B003, B030 and all others with a '3' in them)

Introduction to the search form

Search all fields:

Transcribed text:

Normalized text:

Bergen index #:

NIYR #:

Find place (Norwegian):

Object (Norwegian):

Max found documents to display: 200 ▾

Sorting the found documents: Bergen # ▾

☒ AND / ☐ OR between the fields

Figure 2.8. RFB web GUI.

vague knowledge of, it is actually easier to use the catalogue in Haavaldsen and Ore 1995–2003.

All things considered, the GUI is only useful for those who already know either reference number.<sup>23</sup> As in the case of KDB, there is no download functionality available, but again, copy-pasting from the website itself is an option.

In the case of RFB, the DB structure is probably less interesting than what was apparently attempted with the data. Although not available online, physical measurements of 221 individual runes were taken from ca. 50 inscriptions, and these processed with the help of the DB, resulting in a cluster analysis of runic signs from Bryggen (Ore, Tweedie and Dougan 2018). To my knowledge, this is the first attempt at mechanically processing rune forms with the intent to provide “a typology of runic forms based on graphic criteria” (*RuneType. The Rune Typology Project* 2002). If the project had continued after 1998, when the first report on the findings was published (Ore, Tweedie and Dougan 2018), it would potentially have been possible to reach the other two goals of the project as well, namely to “develop and evaluate computer based methods for reading difficult and damaged runic inscriptions” and “develop and test computer based methods for studying form variations of runes” (*RuneType. The Rune Typology Project* 2002). Unfortunately, despite the authors’ proposals for future projects, nobody appears to have taken up their approach. Equally unfortunate is the fact that there is only a screenshot of the Filemaker Pro GUI provided as a reference for how the section of the DB containing these measurements was actually set up (ibid.), and it gives little clue what the underlying structure looks like.

As merely a means of support for the proper project, RFB was supposed to be superfluous within a few years to begin with (Haavaldsen and Ore 1995–2003), and the data on which the graphemic analysis was based, meant to be publicly available (Ore, Tweedie and Dougan 2018). Neither appears to have happened, and no further projects appear to have taken up the line of investigation pursued by the original project. In terms of usefulness, RFB is probably the least

<sup>23</sup>While the BRM-number, which is the archaeological reference, is presented in the catalogue, it is not shown in the search results, and also incomplete.

useful of all **DBs** presented so far; in terms of making use of mechanical data processing in order to help decipher runic inscriptions, the project has however brought forth interesting ideas and managed to prove that these can work. It can be understood as a precursor to the discussion about the difficulty of representing runes digitally in Chapter 3.

### 2.2.5. Projekt RuneS/RunesDB

Having been under construction since 2010 (?), *Projekt RuneS*, financed by the Akademie der Wissenschaften zu Göttingen, has built another runic **DB**, called *RunesDB* (*Projekt RuneS* 2018). This project is in many ways a continuation of the *Kieler Runenprojekt*, and the data is likewise accessible via a web interface, with MySQL providing the **RDBMS** and TYPO3 the interface (personal communication).

While it should have been included in this thesis, the website does not provide any information on the actual data structure within the **DB**, and inquiries from my side did not receive a reply. Considering which data is available on the inscriptions and how it is entered, suggests however that the underlying data structure applies the same **entity model** as **KDB**, and *RunesDB* can therefore be neglected until further information becomes available.

## 2.3. Digitising runic data – inherent problems

Taken together, the existing runic **DBs** provide a fairly comprehensive overview of what already exists and how useful it is in terms of benefiting research, but also an overview of the topics runologists are interested in. Most often runic inscriptions are, by virtue of being text, subject to linguistic, textual and, in a broad sense, historical analyses. **SRDB** was meant to provide an overview and a starting point; **KDB** is very clearly aimed at linguistic and textual analyses; **RFB** was intended as a starting point for typological analyses of runic characters. Their design is tied in equal measure to the technological resources available/chosen and the overall research questions they were built to help answer. This by itself is not necessarily a drawback, as the advantages of **RDBMS** lie mainly in their customisability. But since each **DB** was built around a particular research question, they are also each lacking something included in another.

The main reason for the situation being what it is, is well explained by Findell (2014, 80), who remarks that

(r)unology [...] is an eclectic field, drawing on a range of disciplines including linguistics, archaeology, art history, literary and cultural history. Specialists in each of these areas bring to bear their own particular interests, methods and theoretical backgrounds in the effort to understand both the inscriptions and the cultural contexts in which they were created.

This diversity of scholarly backgrounds and methodological approaches is reflected in every publication of runic inscriptions, and requires extensive knowledge about various fields of scholarship on the part of the runologist, as well as a great amount of flexibility in any tool they are going to employ. **RDBMSs** are singularly well-suited to map and explore ontological relations

between different types of information concerning runic inscriptions, but as the survey also shows, the approach to data modelling differs vastly between the DBs.

The argument could be made that the different research questions these DBs were built for render comparison moot, as each of the tools is meant to serve different needs. I disagree and instead contend that each DB is at least in part built according to runological methodology. Deciphering an inscription is not a single, smooth act; from the first identification of the runes to a final evaluation of the inscription's purpose, the process of deciphering a runic inscription requires several steps and draws heavily on other disciplines.

However, the most basic of these steps, to which layers of interpretation are slowly added as the runologist considers more and more aspects of the inscription's content and meaning, remain the same:

1. identify the runes;
2. transliterate the runes into Roman letters;
3. normalise speech items represented in runes to the standardised version of the appropriate language.

Each of the presented DBs mirrors these steps (minus the first, the intricacies of which are discussed in detail in Chapter 3), yet they model the resulting data in different ways. This, in turn, exposes how preconceived notions about data and its nature have impacted data modelling and therefore, the range of research questions scholars can reasonably expect each DB to help them with. To understand the issue, it is essential to examine what kinds of data are discussed here, an issue already referred to above (page 8).

The main issue and point of criticism of SRDB, which could also be aimed at RFB, is the lack of alternative interpretations, an issue which KDB sought to rectify. But runologists do not only disagree on rune identification, transliterations and normalisations. Archaeologists, from their side of the debate, also have something to say on various matters concerning runic inscriptions. In fact, archaeological considerations concerning the rune-inscribed object (since most runic texts are carved into a hard surface rather than written down on parchment/paper) are often equally important as linguistic or rune-typological considerations, not least because controversies about an inscription may already start at the question of dating.

Such controversies are typical and one of the main driving forces of humanities research, which in turn renders it absolutely mandatory that the tool chosen to curate a large collection of runic inscriptions be capable of representing these controversies. In the early days of Digital Humanities, including controversial opinions might have presented an issue on account of limited storage space. Today, the storage capacities available are in excess of what would be required to store all interpretations of all known runic inscriptions in the world.

But storage is not the issue here; rather, the question is one that marks the start of many digitisation projects: the not-at-all neutral and very important question of what information and which interpretations to include.<sup>24</sup> While data in a runic DB may not be considered "facts", what

---

<sup>24</sup>While their examples are taken from very different areas and focus more on clashes of interest between different stakeholders, Tanner et al. (2016) still makes the very useful point that the choice of what to digitise is, in itself, already a statement.



is very much a fact is that almost any piece of information concerning a runic inscription can change; dating, reading, interpretation, even the physical dimensions of the object may change owing to conservation issues.

In other words, runic data is very mutable. Yet data modelling in the existing DBs implies, at least for some aspects, that the data is not subject to change and further research; that it is, in fact, a set and certain value. It is in the data structures that this finality is expressed, resulting in the major issue that Nygren et al. (2016, 63) mention in regard to maps, graphs and tables, namely the apparent finality of the digital representation.

In SRDB and RFB, it is the lack of alternative transliterations and normalisations, in SRDB also RUNDATA.INF, which does not follow the principles of data normalisation either. In KDB, similar issues appear not only in regard to transliterations, but when, for example, different object classifications are stored in three columns in *Find* instead of being split apart and stored elsewhere.

Three columns may appear quite generous, but clearly show the inadequacy of storing data this way. Anyone acquainted with the number of archaeological classification systems knows that one and the same object can be classified by several different typologies (which may also impact on the relative dating of objects). When the number of classifications allowed is limited by the design of the DB, however, some data must be disregarded, and these decisions must be justified in much the same way a theoretical approach must be justified. Yet the greater issue is created by these conflicting pieces of data not being included, not even being allotted space in the data modelling process. The resulting DB can be mistaken to represent the “truth” – in itself a problematic concept, but even more problematic in this context.

Tanner et al. (2016) discuss these issues in relation to digitisation of museum collections, but their observations can be transferred to information available about runic inscriptions. Runologists today are faced with ca. 6500 runic inscriptions, many of which were interpreted more than once, some even dozens of times, with a huge amount of literature supporting or decrying certain interpretations, not to mention the other aspects just discussed, which are equally subject to further research and by no means “facts”.

The data models underlying the currently available runic DBs do not allow for all of these aspects to be represented to the extent they exist in research. This contradicts research principles, which demand that every new interpretation, or attempt at it, has to take older interpretations into consideration. Besides being academic tradition, it is also a practical necessity; as Paysan and Düwel (2020) were recently able to show, runic inscriptions can be altered by the process of conservation and ageing further afterwards. Therefore runologists frequently return to older photographs, drawings and interpretations, especially when looking at inscriptions that have long been known, to check their own interpretation against those. That it is rarely easy to tell which is the best one, and therefore impossible to conclude and present a final solution, does not matter.

Equally, an older dating based on a typology that has gone out of use may not be correct anymore; when trying to find all literature pertaining to an inscription, it may nevertheless be of great importance to know that this inscription carrier was classified by this typology. Runology needs to consider research from so many different disciplines that using only one particular conclusion from one of them distorts the research picture. All of the pieces of information on an inscription are still data, and being data, they should be stored and processed.<sup>25</sup>

---

<sup>25</sup>Compare Tanner et al. (2016, 17), “Research benefits accrue when we invest in deepening our understanding of the

These inherent ambiguities in the data clash to a certain extent, not so much with the underlying principles of **RDBMS**, but perhaps more the desire of runologists to have at least a few certainties at their disposal. Moreover, owing to the complicated real-life circumstances, adequately storing all of these ambiguities requires an uncommonly high level of consistency and structure in the storage tool to retrieve meaningful results.

The currently existing models cannot answer that demand, at least not to the full extent they could. Instead, they concentrated on modelling ambiguities for those aspects mattering in the research project they were built for. That does not make them bad **DBs**, but it does restrict the extent to which the data collected can be re-used to answer different research questions.

The demand to include more and diverse data in one's analyses has created an increasing need for easy-to-use, powerful tools for managing and administration of data also in the humanities. If every runologist has to first create their own datasets from scratch or has to re-encode already existing data, valuable time is lost. Additionally, there is no guarantee that the resulting dataset can be re-used by someone else either. In a small field like runology, this also means a loss of resources – time and information.

A desirable solution would therefore be to combine the best approaches in data modelling from the existing **DBs** and create a model that structures *all* available data in such a way as to make it possible to store *all* relevant pieces of information.

With runology traditionally reliant on various disciplines, it is difficult to determine what a **DB** model for the generic runologist – if such a person even exists – should look like (Lerche Nielsen 1997). At the current stage, it will most likely prove impossible to create a **DB** model answering to everyone's needs. On the other hand, by analysing the data that appears in all existing **DBs**, it is possible to find a baseline with regard to the essential information every runologist needs about an inscription, and turn this into a basic model for a relational runic **DB**. Such a “baseline”, or core **DB** model, also has to fulfil another expectation. It needs to be flexible enough to be built upon and expanded in two senses:

First, when new inscriptions are discovered, which is always a certainty.

Secondly, when new data on known inscriptions is uncovered – which again requires a different approach to data modelling than the ones so far applied.

Before proceeding to an outline of what an appropriate relational model could look like, there is one basic issue which needs to be addressed first. This issue, which so far has not been mentioned much, is the representation of the actual signs. Runes are notoriously difficult in that respect, and this problem is discussed in the next chapter.

---

world and build upon the intellectual legacy of previous generations. Digitised resources continue to transform the research process. The researcher can now ask questions that were previously not feasible. They can engage in new processes of discovery and focus their intellect more on analysis than data collation. Digitised resources transform the research process.”



### 3. Runes on screen

Digitisation projects often have different goals, and depending on those, the theoretical approach and tool/technology chosen can vary significantly. Where textual sources are concerned, the main aim is often to create a digital representation of the original. How this is achieved depends on what scholars want to get out of it. The primary difference is whether the aim is to capture machine-viewable or machine-readable text.<sup>1</sup>

The former can generally be achieved by taking a high-quality digital image of the source text; such a digital facsimile edition is less costly and easier to distribute than paper prints, and can also be used for purposes of “virtual reunification”, where collections now spread across the world are brought back together virtually (Deegan and Tanner 2004, 491). The text on those images, while readable for the human looking at it, is not readable for the computer, however. It is therefore impossible to search for particular keywords or conduct analyses of how often specific phrases appear in one text (which can, for example, be used for authorship studies). If a digital representation of text has to be machine-readable and -searchable, a different approach is needed.<sup>2</sup>

Runic inscriptions pose serious problems for digitisation already at this stage. While not explicitly mentioned in the last chapter, the most striking disadvantage of the DBs presented is the lack of actual runes, discounting (links to) pictures (representing the machine-displayable/viewable side of things). Yet RFB was devised with a view to comparing the shapes of different runes in order to find clusters and develop a typology base on those (*RuneType. The Rune Typology Project* 2002). In fact, the shape, form and variations of runes have been the topic of several scholarly publications, the last being Palumbo (2018), and are an integral part of every examination of a runic inscription.

To properly understand the issue, it is necessary to delve into the intricacies of how runes developed as a script, how computers display script and the process of character encoding.

#### 3.1. Runes as a script: historical development

Runes were actively used as a writing system for approximately 1700 years between the 1<sup>st</sup> and 19<sup>th</sup> century AD. They are an alphabetic or phonemic script, i.e. each sign (often referred to as grapheme) in the repertoire supposedly represents one or more phonemes (for example Waldispühl 2013).

Runes were used for a variety of languages and changed over the course of time, as did peoples' use of the system itself. In Scandinavia, the runic writing system underwent two major developments; first the Older Futhark, in use between approximately the 1<sup>st</sup> and 8<sup>th</sup> century AD and containing 24 signs, lost 8 runes, becoming the Younger Futhark with only 16 signs. Around

---

<sup>1</sup>Deegan and Tanner (2004, 492-494) discuss this in-depth.

<sup>2</sup>See Tanner et al. (2016, 32) for a very good explanation.

the same time the spoken language develops from Proto-Scandinavian (also called *Proto-Norse*, *Old Nordic/Scandinavian* or *Urnordisch*, *Altrunisch* in German) to Old Norse, with **OWN** (Norway, Iceland and Greenland after the settlement) and Old East Norse (Sweden, Denmark). Both dialects contain more speech sounds than Proto-Scandinavian, but the number of signs for expressing these in writing is decreased instead of increased (discussed, for example, in Spurkland 2005).

In the second development, the Younger Futhark was expanded by new signs to better express the variety of **phonemes**, and diacritic signs help differentiate multivalued runes (signifying more than one sound value). The use of diacritic signs was however not imperative, and neither was the use of the new signs, so especially medieval inscriptions can prove confusing (Düwel 2008, 88-94; Spurkland 2005, 150-151).

Additionally three more or less distinct runic writing systems developed, called *long-branch*, *short-twig* and *staveless* runes (Seim 1998, 43). Rune-carvers could use the character repertoire of one, two or all three of these systems within one inscription, although the latter is not common. Long-branch and short-twig runes seem to appear together fairly frequently (Seim 2013, 179-184), however, there is, to my knowledge, no study of the frequency of these occurrences.<sup>3</sup>

It is clear that the development of runic writing is somewhat more complicated than that of the Roman script. To avoid confusion, scholars generally refer to distinct systems as “rune rows” or “futhark/fupark”. The latter is used to differentiate between “older” and “younger” Futhark, the former for referencing individual character sets, like the long-branch rune row, or even a rune row on a particular object.<sup>4</sup> Although they are, as far as current scholarship was able to establish, separate systems, the signs are still similar enough to count as variations of the Older Futhark, and several runes are used in more than one of the subsystems (Seim 1998, 44). As a matter of fact, the runes of different runic rows may in many cases simply be considered variations upon an underlying “idea” (Section 3.3.4).<sup>5</sup>

For runologists, this presents a serious obstacle: one and the same sign may signify different sounds in another system, and it is not always clear which (sub)system prevails in an inscription, especially during the transitional periods from Older to Younger and medieval Futhark (for example Seim 1998, a survey of futhark-inscriptions from Norway dating to the Viking Age and Middle Ages; see Barnes 2012, 19 for a more general discussion). Yet to properly interpret runic inscriptions, identifying the writing system is crucial. In the case of an independent dating of the inscription carrier, this will provide a clue to rune row and language used. Then again, “[t]he criterion most often used for dating a runic inscription is the language in the inscription” (Spurkland 2005, 131); i.e. the runologist has already made a decision which runic row and language(s) the inscription is written in and interpreted it accordingly. This approach can easily turn into a circular conclusion.

Since several runes are used in more than one rune row, the combination of signs often determines the rune row. In some cases, reaching a conclusion is impossible, as inscriptions can be

<sup>3</sup>“Cryptic runes”, where the rune in question is indicated by a code, also appear (Nordby 2018).

<sup>4</sup>The term “futhark” being equivalent to Greek “alphabet”, referencing the first six letters of both Older and Younger Futhark, f-u-þ-a-r-k, like “alphabet” references the first two letters  $\alpha$  and  $\beta$ . The term itself is a modern invention; historical evidence for what the Germanic peoples called their writing system is lacking (Seim 1998, 10).

<sup>5</sup>Barnes (2012) and Seim (1998) discuss the distinguishing criteria of the three rune rows, particularly long-branch and short-twig.

so short that only signs belonging to either system appear. In such instances, runologists tend to look more closely at the shape of each rune in hopes of finding distinguishing characteristics. This results in another problem. As a script, runes probably developed through contact with the Roman script; yet unlike Roman letters, runes appear to have been designed to be carved into hard materials, wood, stone, bone or metal. The largest number of runic inscriptions can be found on runestones in Sweden. They occasionally appear in manuscripts, where they fill gaps in the Roman alphabet (like the letter þ, pronounced /θ/), or are used as abbreviations; in some cases they are also presented in connection with scholarly essays on runes, and the manuscript *Codex Runicus* is written completely in runes (Düwel 2008, 189-196).

Yet runes were never accepted as a standard script for manuscript writing and, later, the printing press. Additionally, with runes being an epigraphic script (i.e. being carved into some hard material rather than written on paper with ink), the object's material, the skill of the rune-carver and conditions such as lighting, movement while carving and other external circumstances have likely influenced the shape being carved (Düwel 2008, 16; Seim 2013, 159). The signs may well have been damaged over the course of time, too, thereby creating doubt about their status as runes or shapes where in the beginning there was none.

Consequently, it is much more difficult for runologists to agree on what we take for granted where Roman letters are concerned – a standardisation of rune-shapes, and the ability to determine meaningful deviations from this standard.

## 3.2. Representation of runes in print

For a digitisation project, such as the creation of a **DB**, careful consideration is therefore in order. Is representation of runic inscriptions in the form of machine-viewable text desirable, or would it be more convenient to (also) have machine-readable text available?

A solid argument can be made in favour of choosing machine-viewable text only, which prevents having to deal with the difficulties inherent in trying to standardise runes. This approach has a significant downside however, namely the wide variety of surfaces runic inscriptions are carved into. Over the course of this project, I experimented with using Reflectance Transformation Imaging and photogrammetry as well as 3D-photography on the Bergen inscriptions. The results, while in some cases promising, still show that digitising runic inscriptions, even only those carved into wooden sticks, requires the parallel use of several different approaches, which is costly, time-consuming, and the end result needs a lot of storage space.

While still extremely desirable, this sort of digitisation is a team effort and should, in a best-case scenario, be conducted by trained specialists. The resulting wealth of digital images then also needs to be curated to be of use for more than one person, which in turn requires careful consideration of how this should be done. In short, it was simply not a feasible undertaking for a PhD project.

The other (and in an ideal world, complementary) solution is to render the runes machine-readable, so the **DB** can offer at least some approximation of what the runes look like on the original. This requires standardisation of the actual signs, with the additional benefit that runologists are already used to this process, since any printed representation of runes is necessarily standardised. The process is often referred to as “transcription”, although it is on occasion con-

Figure 3.1. **Transrunification** and **transliteration** example 1 (Seim 1998, 363).

Figure 3.2. **Transrunification** and **transliteration** example 2 (Seim 1998, 363).

fused with “**transliteration**” (replacing the rune with a Roman letter signifying the same speech sound). In her doctoral thesis, where she tries to establish a typology of rune shapes based on medieval futhark-inscriptions, Seim (1998) refers to it as “normalisering” (**normalisation**), while the result is referred to as “trykkruna” (print rune) or “idealkruna”. As mentioned previously, this thesis refers to the process of standardising runes for print or digital storage as “**transrunification**”.

Whatever its name, this process is made more difficult by the fact that while there is general agreement that some aspects of the rune-shape probably have no bearing on its supposed sound value and cannot be counted as variations proper, runologists cannot always agree on which of these can safely be ignored. Most publications, as a first step in the examination of a runic inscription, therefore choose to offer a description of each single sign to outweigh the disadvantages of standardisation. Yet while there are certain commonly used terms for describing the formal appearance of a rune, these are by no means properly codified and vary between scholars and languages (see Waldispühl 2013, 75; for various attempts at formalising the description see for example Antonsen 1975, 6-9; Nowak 2003; Seim 1998; Spurkland 1991; Barnes 2012, 18-20; comprised in a matrix in Düwel 2008, 5-6).

Further disagreements concern the acceptable level of standardisation, although Seim (1998, 49-50) points out that the degree of standardisation of the actual rune depends on the aim of the study in question. From this perspective, there cannot be a “right” amount of standardisation that suits everybody.<sup>6</sup> Seim (1982, 1998) consequently establishes two levels of standardisation answering to different scholarly demands; these and their purpose are discussed later (Section 3.4.1).

Yet there is a further complication. Along with the development of certain conventions for standardising runes, **transrunifications** encode further information, with the conventions in part based on those of text-critical manuscript editions of texts (Seim 2013, 154, with reference to Haugen 2013, 118). Figures 3.1 and 3.2 offer two examples of **transrunifications** with additional

<sup>6</sup>Perhaps in order to avoid this debate, the runic corpus editions from some countries have eschewed **transrunifications**, instead falling back on **transliterations**. Norwegian corpus editions however always present **transrunifications** (Seim 1998, 32).

signs.<sup>7</sup> These have a different significance as indicators for scholarly observations. Thompson (1981, 91) presented an overview of the conventions established by different corpus editions at the time, and while he does not reference **transrunification** conventions, they converge to some extent with the **transliteration** conventions (Figure D.1). His findings and developments since then in short:

In **transrunifications** – where they are customary – square brackets often signify a lacuna within or a broken-off inscription, with hyphen-minus (Figure 3.2) or question mark (Figure 3.1) standing in for a suspected rune which can be guessed at or is so damaged it cannot be identified with certainty. Ellipsis (with or without square brackets) can be used for the same purpose, especially when the number of missing signs is unknown. Brackets around a rune (Figure 3.1) are more ambiguous; the publication itself needs to be consulted in order to find out what they signify.<sup>8</sup> The most common way to signify uncertainty in **transrunifications** is a dot below the rune (Seim 1998, 25–26), as is the case in Figures 3.1 and 3.2.

Unfortunately this presents its own problems. Seim (*ibid.*, 25–26) discusses the convention, concluding that it is difficult to establish, even with information provided by the author, whether the dot is meant to signify “special rune” (meaning that based on experience, the scholar would not expect that particular rune in this spot) or “debatable identification of rune” without consulting the description of the actual signs. Part of the confusion, she writes, stems from the fact that even in corpus editions like NIYR VI where the use of dot is explicitly explained by the author(s), there are inconsistencies in the actual use, an observation I can confirm (NIYR VI, vi, 1; Seim 1998, 20). As a further complication I would add that in publications where not only the identification of the right rune, but also the specific variation of that rune is of importance, the dot can take on yet another meaning: whether the particular shape is identifiable without doubt.

All things considered, dotting a rune is by no means as clear-cut as it first appears to be. That runes with dots underneath are also a challenge where typesetting and layout are concerned, does not appear to be more than an afterthought for Seim; in the context of this thesis, however, it becomes an issue (Section 3.3.1).

A challenge in terms of typesetting and layout is also presented by a particular feature of runic script commonly referred to as “**bind-runes**”. These are ligatures between two or, on occasion, even three runes, comparable to Roman letter ligatures like æ or œ. They are common in runic inscriptions, but to my best knowledge, no publication of runes nor any runic **font** developed so far contains a full range of standardised versions of **bind-runes**.<sup>9</sup> The common custom is instead to indicate the **bind-rune** by using a character tie.

Aside from the technological issues this convention causes (Section 3.3), there is another problem: while Roman letter ligatures are meant to represent a specific sound somewhere between the two sounds the ligature is made up of (æ for example signifies an /æ/-sound found in German and the Scandinavian languages), **bind-runes** do not represent a sound in between the two runes.

---

<sup>7</sup>Runic script knows neither brackets of any form nor dots below the character (diacritic dots in runic script will always appear tied in with the rune, whether sitting in the middle of the stave (†) or in the space created by a branch/pocket (ʀ, ʁ)) nor punctuation as used in Roman script.

<sup>8</sup>In **SRDB**, they are set around characters which interpretation is doubtful; then again, **SRDB** only offers **transliterations**, not **transrunifications**.

<sup>9</sup>Various new fonts, for example by Mindy MacLeod or Odd Einar Haugen, are trying to incorporate **bind-runes** to a greater extent, but they are not yet publicly available.

They instead appear to be a kind of time-space-and-work-saving measure by utilising the same stave to attach two different runes to. **Bind-runes** can therefore not be formed by a rune without a full stave, like **ʀ**; neither is **ʀ** ever found as a **bind-rune**. Common combinations are on the other hand **ʀ** and **ʀ** or **ʀ**, where the branch of **ʀ** can be attached to the stave of **ʀ** or **ʀ** without distorting the shape of either.

This does, however, not mean that the runes should be read in said order. They can be read **ʀ** or **ʀ**, **ʀ** or **ʀ**, without any indication as to which order is intended in any given case. It is only by the process of deciphering the inscription that runologists decide on the order that makes most sense linguistically. Representing them as **ʀ** or **ʀ** is therefore, technically, prejudicing the interpretation, provided the aim of a **transrunification** is to standardise the runes without changing the original impression.

Yet another distinct feature of runic script are “**Wenderunen**”. These are runes turned back-to-front or upside-down (or both) compared to the general direction of writing in an inscription (which can be written and read left-to-right and right-to-left, although the prevalent custom appears to be left-to-right, especially in later inscriptions). The difficulty of representation in print (or digitally) for these runes varies depending on what the mirror shape looks like. **ʀ** turned upside-down or mirrored is more of an obstacle for printing purposes than mirrored **ʀ**, which looks exactly like **ʀ**. Some publications, like the new edition of the South Germanic inscriptions in the Elder Futhark, solve the problem by using the available signs and indicating the writing direction as a whole or for the single sign with an arrow (Düwel, Nedoma and Oehrl 2020), but some runic **fonts** also offer reversed and rotated runes (for example Futhark A, **Gullskoen**).

The main problem with **Wenderunen** in this thesis however consists of how to represent them digitally, especially in cases where the **Wenderune** of one rune is identical to the common representation of another rune, as is the case with **ʀ** and **ʀ**. In many cases it is not clear whether the **Wenderune** appears as a kind of “spelling accident”, was chosen with a specific purpose in mind or is even perceived to be a variation of the more commonly used rune (see for example Seim 1998, 107).

Text digitisation projects like **MENOTA** often aim to provide as close a digital representation of the original text as possible, meaning that they offer a facsimile and diplomatic reading of the original text alongside a normalised version (MENOTA; Evans 2016, 47). Yet runes are not only difficult to encode because of various opinions on the level of standardisation of the single sign, but also because the conventions established in print publishing encode more information about the single sign than simply what it looks like: they encode scholarly concerns and observations, and it would be very desirable to also be able to encode these in a digital representation.

The most difficult and impactful decision in the digitisation process of runic inscriptions is therefore which digital representation to choose. Yet it is already disproportionately complicated to encode the runes by themselves, much less the scholarly mark-up, owing to how symbols are encoded in binary.

### 3.3. Fonts and character encoding

As discussed in Chapter 2, computers perform mathematical operations on information encoded in electronic impulses indicating either “on” or “off”. Compared to humans, that puts them at



a vast disadvantage in dealing with the real world. While we rely on visual, auditive and tactile information, computers have none of that. To find a piece of information, they need a unique reference enabling it to identify this information, best provided in strings of 0 and 1. This also applies to a single letter (Laue 2004, 147).

Humans, on the other hand, do not do well with information solely provided as numbers, and long strings of binary seldom achieve more than give them a headache. They do better with shapes they can recognise, so somehow, something has to translate between computer and user. In the case of script, **character encoding** and **font** work together to provide each side of the interaction with the kind of information it can best process, with the **character encoding** providing the technological infrastructure and the **font** providing the visuals.

### 3.3.1. The principles of character encoding and encoding standards

Representing any letter in binary and processing it has from the start presented problems (for example Laue 2004). The first **Character Encoding Standard (CES)** was the ASCII standard; it was subsumed into modern **CES**, which kept the original ASCII encoding to maintain backwards compatibility. But in principle, every modern **CES** works in the same way as the original ASCII (Laue 2004, 147; Deegan and Tanner 2004, 494). In simplified terms: space on the computer – bytes – is dedicated to storing numerical combinations, which in turn encode a graphical representation of a sign. ASCII started out as a seven-bit encoding, was developed into an eight-bit encoding (both making use of 1 byte storage space), and has since been extended and enlarged in coding standards like ISO/IEC 8859 and Unicode, which in UTF-32 makes use of no less than 32 bits (equalling 4 bytes of storage space).

While there is a variety of **CES** to choose from, amongst them Windows-1252 and ISO-8859-1 (also referred to as Latin-1), the one referenced and used here is **UTF-8**, mainly because it is the most used **CES** worldwide, and also because it is almost fully compatible with either of the other **CES**.<sup>10</sup>

One **GUI** allowing users to access the Unicode character map is *BabelMap (Unicode Character Map for Windows)*. Figure 3.3 provides an example; as can be seen, the code point references are created by combining the vertical digit/hexadecimal with the horizontal digit/hexadecimal. Thus, each character is assigned a unique value, which is named so **font** designers know where to put which graphical representation.

If the **font** chosen does not provide a visual for the code point, or the computer is unable to translate the **CES** of a file, empty squares or question marks will appear (Figure 2.6, page 14).<sup>11</sup> Traditionally and to retain backwards compatibility, the first 200-something code slots of Western **CES** are reserved for the range of symbols from ASCII. As technology progressed and processing power increased, other scripts were gradually added to the new **CES**.

It is crucial to understand that Unicode *only* provides the unique identifier for a symbol/character, and the required infrastructure for storing graphical representations of characters. The

---

<sup>10</sup>This refers to usage on the web rather than personal computers.

<sup>11</sup>To avoid confusion, the computer still does not perceive the alphanumerical code of the code point as letters and numbers. Instead the **CES** provides an intersection “translating” the letters and numbers making up the code point “name” into “on” and “off”.



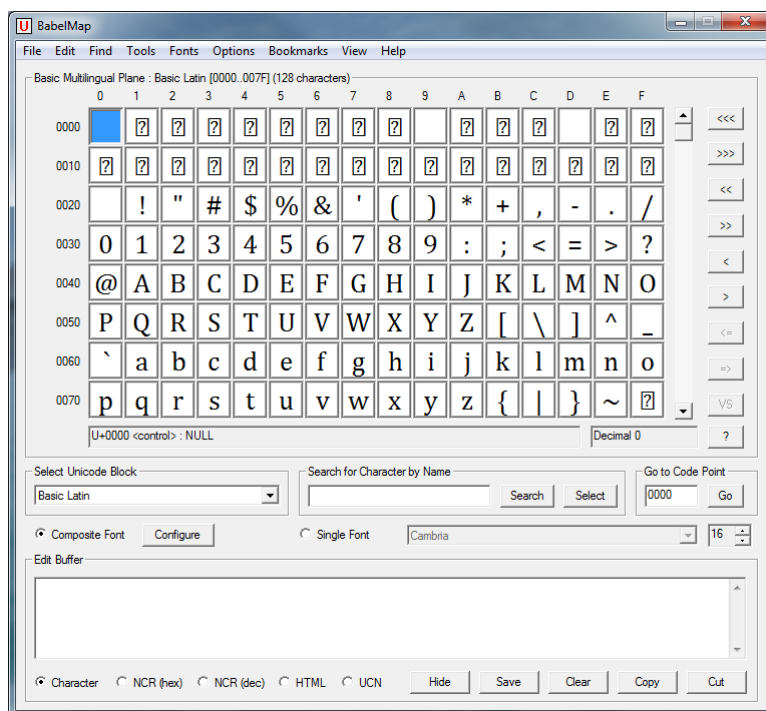


Figure 3.3. Screenshot of BabelMap, code block Basic Latin, font Cambria 5.97.

representation of a character is left to **fonts** and their designers (Section 3.3.2). As of today, version 10.0, Unicode provides 137,439 code points for an equal number of signs originating from 146 scripts, thus by far exceeding the visual representations that can be stored in **font** files, which frequently forces users to make use of different **fonts** for different scripts.

Each script has its own code block, meaning a range of code points designated to housing signs from this script only. Since 1999 and version 3.0, Unicode also has a code block for runes, simply called “Runic”. It covers code point 16A0 to 16FF, with space for 96 characters, 89 of which are taken, leaving 7 empty code points for future additions. This code block and its range of signs will be the basis for the **CES** developed here.

### 3.3.2. Fonts, font design and character encoding standards

Since **CES** merely provide a framework by regulating which character is assigned which unique identifier, it is up to **fonts** to provide the character to display, by providing the scalable *image* attached to this unique identifier. Only this image is visible to users, yet regardless of the chosen **font**, the **CES** in the background ensures that the underlying code always stays the same. Users thus only choose a different way to *display* said code. To the computer, A continues to be 0041, whether it is displayed as A, A or Ȧ. Likewise, the binary string will continue to be 01000001 no matter the shape displayed.

**Fonts** can therefore with justification be called nothing more than “dress(ed) code”. The only instances where different characters will be displayed are those where a file is opened using the wrong **character encoding** (Figure 2.6). Most **character encodings** therefore strive to retain com-

patibility with other popular encodings by using the same code points for the same characters. Users only realise something is wrong if making use of the particular code points where there are differences.

This creates problems with using runic **fonts** in a **DB**. Figure D.2 exemplifies this using the two fonts *Gullskoen* and *Gullhornet*, both designed specifically for the Norwegian runic corpus editions in the late 1980s. At the time, the standard was still 8-bit ASCII, affording space only for 256 characters as a whole, opposed to UTF-8's 137,439. If runes were to be displayed on a computer screen, there was therefore no other choice but to use the code points available and replace the images of the characters supposed to be at particular code points with runes. Today, with code block Runic available in a variety of **CES**, this is not required any longer, yet several available younger runic **fonts** still do not make use of this code block, and continue to replace images.

In documents (.doc, .docx, .odt) the potential harm is comparatively small, as it mainly results in annoyance on the user side when the Roman letters are presented instead.

In a **DB**, making use of **fonts** using unique identifiers meant for Roman letters for runes has much more destructive consequences since the computer needs a consistent reference point to find any kind of information. This cannot work when the same code, for example 0041, actually encodes *two different pieces of information*. For example, if *Gullskoen* is used to represent the runes in an inscription in a **DB**, users searching þ will also get all results for "A". This happens because the computer returns every record containing the code 0041 regardless of the graphical representation and *Gullskoen* is using the same unique identifier for a different graphical representation.

Obviously, this is not what users want. Some **DBMS** like MS Access support displaying different parts of a **DB** in a particular **font**. Theoretically, this approach could work if the tables were kept carefully apart and users were very conscious of what table they are running queries on. It does not solve the underlying problem though, that two very different pieces of information are connected to the same unique identifier.<sup>12</sup>

Moreover, it is not uncommon for Roman capital letters to appear in runic inscriptions as part of the text. As a matter of fact, the very first runic inscription on the Meldorf fibula may well be in Roman capitals rather than runes. It is impossible however to search for runic inscriptions without Roman capitals or runic inscriptions also containing Roman capitals if the computer doing the searching considers ʏ as M.

If runes are to be stored as machine-searchable text in a **DB**, the most sensible way to do so is therefore by utilising the Runic code block and the unique identifiers it provides.

### 3.3.3. Code block Runic

In the context of this thesis, (digital) representation of runes must be discussed in advance of the creation of a runic **DB**, as no runic **DB** can be expected to answer the needs of runologists without being able to store the runes themselves, preferably in a way that enables runologists to search for and look up particular runes and variations thereof. This chapter therefore focuses on possible

---

<sup>12</sup>Additionally, this displays the whole table in this **font**, including information that users would prefer to be able to read without deciphering runes.

solutions to the issues the representation of runes in DBs creates. This requires a discussion of the issues with the current code block Runic in Unicode.

Seeing as the Older Futhark consists of only 24 characters, the Younger of 16 and the Anglo-Saxon Futhorc of 32, the 96 code slots allotted to Runic seem plenty. Yet a look at Figure D.3, an overview including the visual representations from two currently widely used fonts, the problems become evident; differences in how single runes are rendered are striking, but there is also a variety of issues with the choice of runes represented.

1. The range of signs ignores the fact that runes were not a standardised script, used in several different regions and with at least three major stages of development, not counting the Anglo-Saxon runes, which are nevertheless present in Unicode. Owing to this, none of the standardised rune rows as presented in runic handbooks is represented in full.
2. The character designations chosen would in more than one case be contested by runologists, such as “Icelandic yr”. Ascribing a particular type of rune to a specific region is uncertain business at best, and scholarly discussions like the one conducted between Seim (1989) and Hagland (1988b, 1989) illuminate the problems clearly.
3. Runes appearing at most two or three times within the whole runic corpus like runes from the Franks Casket are included, taking up code points that could have been assigned to more common variations. Figure D.3 also shows that while these runes have been added, no font designer has yet created a visual representation for those, nor for K, SH and OO.
4. Runes used within different runic rows are coded as separate runes, although their visual representation is the same and used interchangeably (compare 16BD, 16C2 and 16C4).
5. Runes used to express different sounds after the collapse of the 24 signs of the Older Futhark into the 16-sign Younger Futhark do not reflect this in their name (16C1).
6. **Wenderunen** are not considered, despite the fact that this is a fairly common phenomenon in especially older inscriptions. To correctly visually represent these runes, one is forced to use a differently coded sign, as is the case for 1 and ʀ, ʁ and ʔ, ʕ and ʁ, thus confusing a machine-run search.

Overall, there appears to be no consistency in which runes were chosen/left out.<sup>13</sup> This does not provide the best premise for proper encoding of runic characters in a DB, and it becomes very clear why the choice of the right tools plays such an important role in digitisation projects and has so much influence on the end product.

At this stage, the question is if this, one may call it haphazard, collection of runes in Unicode is the alternative to using a bespoke runic font, is it not better to use the font and find solutions for the technical problems going with this?

In the short run and in comparatively small projects, using several different fonts to represent different variations of runes may work fairly well. It does not work on a larger scale owing

---

<sup>13</sup>A further grievance, for which Unicode cannot be held responsible though: some fonts supply the runes with serifs, a feature which is not present in runic writing in general.

to the unfortunate combination of peculiarities on the side of runic script and the technological requirements on the other. But there are different levels of standardisation of runic signs (Section 3.2), and based on these different levels of standardisation, it is possible to find common ground between runes on the one and computers on the other side. It necessitates a short discussion of the levels of abstraction involved in the standardisation of runes.

### 3.3.4. Runes, graphemes and standardisation

Unfortunately the same peculiarities making runes so difficult to machine-code, render it also almost impossible to conduct large-scale examinations looking for patterns to provide better suggestions for how it could be done. Studies of rune shapes often attempt to discern whether variations in the way the same “basic” rune shape is carved also represent a difference in pronunciation.

Seim (1998) already points out that to worry about how to transliterate a rune means to prejudice what should in the first instance be an objective representation of an observable sign. Following Dyvik (1996), she argues in favour of keeping the two levels of analysis apart by first establishing a typology based on rune shapes and then developing a consistent **transliteration** system based on it (Seim 1998, 22-23).<sup>14</sup> To a certain extent, the solution I developed for the purpose of properly representing variation in rune shape follows this approach, although I would hesitate to consider it a proper typology.

Comparing the range of characters in Figure D.2 to that in Figure D.3, it is obvious that the **Gullskoen** and **Gullhornet** fonts contain more characters than the 96 code slots in the Runic code block can accommodate (**Gullskoen** stores 154, **Gullhornet** 121 glyphs; numbers based on Babelmap’s information tool). This wealth of graphical representations is owed to the standardisation of actual runes into “print runes” or “ideal runes” being undertaken with varying levels of abstraction, each of which depends on how many of the graphic features of actual runes are considered relevant, similar to developing an artefact typology.<sup>15</sup>

Waldispühl (2013, 71-73) presents one possible approach, defining the different levels of abstraction as

- Graph (*graph*): the actual sign;
- Graphtyp (*graphtype*): a group of Graphen resembling each other but notably distinct from other groups; formal characteristics need to be generalised in order to form these groups;

---

<sup>14</sup>She mentions the possibility of using said **transliteration** system in order to encode rune shapes for a medium unable to store runes proper. Published a year before Runic was included in Unicode 3.0, her wish may well stem from issues experienced while using **rune** fonts. She rejects the system suggested by Spurkland (1991), which would use random signs or numbers to indicate the rune shape, and instead opts to provide information about generic types by using Roman capitals in her **transliteration** while acknowledging that this will only indicate two out of any number of generic types (Seim 1998, 23, 26).

<sup>15</sup>Spurkland (1991) and Seim (1982, 1998) both attempted to develop a rune typology based solely on graphic features for the Bergen inscriptions; other graphemic analyses focus on different corpora, for example Nowak (2003) on the Migration period bracteate inscriptions or Waldispühl (2013) on the South Germanic inscriptions in the Elder Futhark.

- Graphtypenklasse (*graphtype class*): a yet more generalised group of Graphtypen showing similar characteristics; it can include one or more different Graphtypen.<sup>16</sup>

By this definition, any **font** by default operates on the level of Graphtypen or Graphtypenklassen simply because no runic **font**, to my knowledge, attempts to represent every single rune shape within a corpus.<sup>17</sup>

In contrast, the range of characters in the Unicode code block Runic – with a few exceptions – is designed to accommodate Graphtypenklassen rather than Graphtypen. This is not surprising since **character encodings** do not encode shape variations of characters from other scripts either, and it would be both inconsistent and pointless to treat runes differently, given that variations of the character's shape are supposed to be provided by different **fonts**.

This theoretical foundation provides a basic framework for judging the different levels of abstraction of digital representations of runes. It does not solve the runologists' dilemma of being unable to store different Graphtypen while retaining uniqueness for encoding purposes, though. Another intersection between **font** and **character encoding** is required.

### 3.4. Encoding runes and their variations

Code block Runic has proven largely unusable for the purposes of graphemic research into runic writing; **fonts** are problematic in terms of reliable data retrieval; and runologists are used to being provided with additional information encoded visually in **transrunifications**. On the other hand, there are computers with their binary encoding, and all this entails. A system equally satisfactory for the human and the computer side needs to:

- permit a search for all Graphe from one (or more) Graphtypenklasse(n)
- permit a search for all Graphe from one (or more) Graphtyp(en)
- allow those runes to be traced back to the object(s) they appear on
- use a minimum amount of code
- be consistent in how different variations (like rounded/un-rounded pockets) are coded
- be based on Unicode as the current main **CES**
- allow for events such as uncertainty in identifying the proper Graphtyp, damaged runes, lacunae that frequently appear in runic inscriptions.

The Runic code block must for several reasons provide the basis. The Bergen inscriptions, being the example corpus for this thesis, will serve as the data basis to be encoded. They conveniently have their own bespoke **font**, which will be used to exemplify how variations of runes can be encoded using the Runic code block without having to resort to using other characters' slots.

<sup>16</sup>See Seim (1998, 31-32, 51) for her use of "rune", "runetype" and "ideallrune" for similar concepts.

<sup>17</sup>It would be a pointless endeavour, too; Graphe are the equivalent of handwritten Roman letters.

### 3.4.1. Determining the runic variation range

The **Gullskoen** font contains 154 glyphs, exceeding the 96 character range of the Runic code block by 48 code points; it offers several different variations of the same rune, including **Wenderunen**. One possible solution is to map the glyphs from **Gullskoen** onto the Runic code points. Doing so would however create a similar problem as mapping them onto the code points reserved for Roman letters. Additionally, 48 glyphs from **Gullskoen** would have to be excluded, rendering the whole endeavour somewhat pointless.

As the first step in creating an intersection between **Gullskoen** and the code points provided by Unicode, the Graphypen represented in the **font** therefore need to be sorted into the larger, more abstract category of Graphypenklassen. During this process, it is important to account for the following features of runic writing: Graphypen which, when mirrored, equal another Graphypen and Graphypen which might belong to more than one Graphypenklasse.

Instead of using the approach that Seim (1998, 59-70) took, I choose a different approach closer to Waldispühl (2013). Based in part on visual features and in part on the ascribed sound value, the whole range of the **Gullskoen** Graphypen is split up into 18 Graphypenklassen, which are in turn tied to what Seim refers to as “futhark-enhet”. The framework is provided by Haugen (2000).<sup>18</sup>

1. ƿ ƿ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
2. ƿ ƿ ǀ ǀ ǀ ǀ ǀ ǀ
3. ƿ ƿ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
4. ƿ ƿ ǀ ǀ
5. ƿ ƿ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
6. ƿ ƿ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
7. ƿ ǀ \* \* \* \*
8. ƿ ƿ ǀ ǀ ǀ ǀ
9. ǀ ǀ ǀ ǀ
10. ǀ ǀ ǀ ǀ ǀ ǀ ǀ
11. ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
12. ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ
13. ǀ ǀ ǀ ǀ ǀ ǀ ǀ ǀ

<sup>18</sup>The choice of which Graphypen to turn into **font** characters was loosely based on Seim (1982), but the **font** itself is not meant to present any kind of typological survey over the Bergen runes. The single characters are instead listed in alphabetical order and the respective runic subsystems they appear in, including which sound value they supposedly represent, see Figure D.4.

14. Ƴ Ʒ Ɔ ǀ ǁ ǂ
15. ǃ Ǆ ǅ ǆ Ǉ
16. ǈ ǉ Ǌ ǋ ǌ
17. Ǎ ǎ Ǐ ǐ Ǒ
18. ǒ Ǔ ǔ

Visual features were for the most part the deciding factor when sorting the runes into Graph-  
typenklassen. The distribution of the different shapes into these 18 groups can certainly be  
contended on varying grounds; however, there is no logic in assigning A the unique identifier  
0041 either. This grouping merely serves as a basis, the only crucial requirement being that each  
Graphtyp only sorts into one Graphtypenklasse.

### 3.4.2. Determining the code point range

Next, the Unicode code point in the Runic code block representing each Graphtypenklasse was  
determined. The issues concerning Runic were outlined above; choosing one of the medieval rune  
rows (long-branch or short-twig) was therefore impossible. Still a complete 16-character-rune  
row can be put together:

1. 16A0 Runic Letter FEHU FEOH FE F
2. 16A2 Runic Letter URUZ UR U
3. 16A6 Runic Letter THURISAZ THURS THORN
4. 16AE Runic Letter O
5. 16B1 Runic Letter RAIDO RAD REID R
6. 16B4 Runic Letter KAUN K
7. 16BC Runic Letter LONG-BRANCH-HAGALL H
8. 16BF Runic Letter SHORT-TWIG-NAUD N
9. 16C1 Runic Letter ISAZ IS ISS I
10. 16C6 Runic Letter SHORT-TWIG-AR A
11. 16CC Runic Letter SHORT-TWIG-SOL S
12. 16D0 Runic Letter SHORT-TWIG-TYR T
13. 16D2 Runic Letter BERKANAN BEORC BJARKAN B
14. 16D8 Runic Letter LONG-BRANCH-MADR M



15. 16DA Runic Letter LAUKAZ LAGU LOGR L
16. 16E3 Runic Letter CALC
17. 16AF Runic Letter OE
18. 16D5 Runic Letter OPEN-P

Where possible, a code point with a neutral designation was preferred to a code point referring to a runic subsystem. In cases where the code point description references the Older Futhark (and is visually represented as a rune ascribed to the older period in more than one **font**), a code point from one of the younger subsystems was chosen. This decision was however mainly motivated by the dating of the Bergen inscriptions.

With Graphtypen sorted into Graphtypenklassen and the main code point reference for each group chosen from Runic, it is now possible to modify the system to represent shape variations within a **DB**.

### 3.4.3. A potential Rune Encoding Standard

At this stage, it is possible to represent the Graphtypenklassen by using this system, but not the Graphtyp. To retain this option, the code point representing the Graphtypenklasse needs to be combined with a second code point indicating the Graphtyp. The easiest solution was to adopt a numerical system. In practice, the whole system is designed as a matrix like other **CES**: the vertical axis provides the Graphtypenklasse, while the horizontal axis provides the Graphtyp-digit (Figure D.5).

Since some Graphtypenklassen contain more than 9 Graphtypen, two digits were allotted to the Graphtyp. This is a technical necessity to be consistent in the number of characters used for encoding a particular item. If some of the runes are only encoded by two signs, others by three, running queries becomes more difficult, as one then needs to take into account that the Graphtypenklasse-rune can be followed by either one or two spaces (see Section 4.7.3).

This approach also has the benefit of leaving some 90 code points for potential future additions to the system. Graphtypen were added to the groups as they appear on the character map, with the exception of two particular numerical codes: 00 and 99.

00 signifies a Graphtyp so far not represented in **Gullskoen**, while 99 (in accordance with common practice in statistical evaluations) was set aside as a reserved code. Potential uses of the 99-code could include: reconstructed rune (commonly indicated by brackets in **transliterations**, Figure D.1) or no classification possible.

Using this composite code point method, it is now possible to uniquely identify not only Graphtypenklassen, but also different Graphtypen. Figure 3.1, for example, becomes the following string of characters (disregarding the diacritic markers and brackets):

ſ01 N01 þ08 ð01 R02 ʀ04 \*03 †03 l01 '01 ? ʀ01 ð02 ? ʟ01

Each rune is represented by three characters: one rune from the Runic code block, indicating the identified Graphtypenklasse, and two digits indicating its Graphtyp. Either information is

encoded by symbols with a unique identifier not used to also represent a different sign. This enables the computer to identify, for example when querying a **DB**, the single instances for each of those symbols. This way, it is both possible to only query for the Graphtypenklasse (by querying for the rune) or to specify which Graphtyp the rune should be. In the second case, the computer will look for this particular string of characters, and return all results with this combination.

This is already a vast improvement over using a **font** or the Runic code block by itself. There can be no misunderstandings about which graphical representation users are looking for, yet it is possible to also represent variations of rune-shapes that the range of Runic would not permit representing. The system can, however, be expanded beyond that to also represent the additional information traditional, printed **transrunifications** often include: the doubts, uncertainties, mirrored and **bind-runes** indicated by dots and character ties.

#### 3.4.4. Encoding doubts, uncertainties, mirror and bind-runes

Including print conventions encoding certain scholarly judgements concerning a rune (Section 3.2) in a digital representation of an inscription would be convenient; it is not as easy to encode them. Character and ligature ties as well as the dot below are specific types of characters, housed in the “combining diacritic markers” and “general punctuation” blocks. Their special properties allow them to modify the other characters situated around them, and displayed it looks like they are added on top of these. In code, however, they are inserted in between the unique identifiers of the other characters, making them singularly unsuitable for use in the coding system proposed here. They would have to be added after the Graphtyp number of the preceding and Graphtypenklasse rune of the following rune. Displayed, the character/ligature tie would then tie the last digit of the Graphtyp and the rune of the following Graphtypenklasse together, which does not make much sense.

There is also the question to which character in the sequence the dot should be added. Theoretically, an encoding system like the one presented could work on the same principle as printed **transrunifications** and simply attach the diacritic marker to the Graphtypenklasse rune. But it should be considered here as well that there are at least four possible meanings to the dot below (cf. Section 3.2). These are:

1. Graphtypenklasse identified, Graphtyp identified (in which case the dot is absent)
2. Graphtypenklasse identified, Graphtyp doubtful
3. Graphtypenklasse doubtful, Graphtyp identified
4. Graphtypenklasse doubtful, Graphtyp doubtful

Option 3 should be understood to mean “if Graphtypenklasse is x, then Graphtyp must be y” rather than “the Graphtypenklasse cannot be identified, but the Graphtyp can”, which is illogical. In a publication, only the description clarifies which of the above cases the dot signifies in any given instance, or if it is supposed to indicate a surprising rune at a surprising position in an inscription.

The unclear meaning of the dot is an argument against sticking to this convention, not to mention the technical issues. There is another option though. Instead of expanding the code for only

the doubtful Graphen, the code is expanded for all runes to include determination letters (DL), and not only one, but two of them, one assigned to the Graphypenklasse rune and the second to the Graphyp number. This way, it is even possible to encode the distinctions enumerated above without having to resort to a verbal description, and by attaching the DL marker to both parts of the alphanumerical code, there can be no doubts about which part of the identification it refers to.

As for the characters chosen for this purpose, they would preferably be within the ASCII range, but never used in any runic inscription known. The choice was therefore made to use the Roman letters “a” and “b”, which fulfil both criteria. “a” serves as the marker for “identified”, “b” as the marker for “doubtful”. The complete code string for one rune in an inscription therefore looks like

GR – DLR – GN – DLG<sup>19</sup>

This brings the number of code points for encoding a single Graph up to five, which is admittedly cumbersome. Yet while the representation is not as immediately obvious as in printed editions, the system manages to encode all of the pertinent information, even at a higher level of specificity (since the uncertainty can be directly pinned to the debatable aspect at two different levels).

For my test runs, I decided to make use of the five-alphanumerical-system; if that level of detail is not required, however, a three-alphanumerical-system is sufficient to express the graphic variations of runes.

There are, however, three peculiarities of runic script which still present difficulties, also in this system, runic punctuation, **Wenderunen** and **bind-runes**. So far, neither has a consistent representation in any **font**, nor in Unicode, although **Wenderunen** can theoretically be displayed by simply using the corresponding visual representation. Technically, that still creates a problem with using the same symbol for two different signs.

Of these three peculiarities, runic punctuation (which is not the same as Roman punctuation) was the easiest to encode. Applying the same principle as with the runes, I chose three code points from Runic and added numbers to the various punctuation marks (Figure 3.4).

As far as **bind-runes** are concerned, I chose to use a symbol that does not appear in runic inscriptions to signify that two or three runes occur as a **bind-rune**: <sup>1</sup>. Instead of insinuating itself on top or below the neighbouring characters, <sup>1</sup> is recognisably different and easy enough to spot, as well as to query for. It is inserted between the DLG of the preceding rune and the GR of the following rune, for example in:

†a03a†\a04a†a03a†a01a†a03a†a02a†a01a†a03a

This is one example from the 176 Bergen inscriptions I encoded to test this system, predominantly from NIYR VI and Seim (1998). Admittedly, in terms of a proper visual representation of the original Graph, it lacks the clarity of a **font** or a printed **transrunification**. Yet while I

---

<sup>19</sup>GR = Graphypenklasse Rune, DLR = Determination Letter Rune, GN = Graph Number, DLG = Determination Letter Graph.

Unicode			00	01	02	03	04	05
16EB	RUNIC SINGLE PUNCTUATION	·		·				
			·00	·01	·02	·03	·04	·05
16EC	RUNIC MULTIPLE PUNCTUATION	:	:	:	:	:	:	:
			:00	:01	:02	:03	:04	:05
16ED	RUNIC CROSS PUNCTUATION	+		+				
			+00	+01	+02	+03	+04	+05

Figure 3.4. Runic punctuation encoding table.

lacked the time and technical skills, it is possible to program a **GUI** that translates these character strings and the information they encode into visual representations like **transrunifications** in print. Additionally, I considered it more desirable to be able to encode the information than to be shown a perfect visual representation of a rune, especially since the flexibility of this encoding system allows the user, for example, to examine N-grams, determine frequencies of certain variations within a given corpus and in general, conduct pattern analyses on runes and their varying shapes. In the end, there was not enough room in the present project to actually make use of the possibilities this encoding system offers, but this proves that it is by no means impossible to turn runic Graphen into machine-readable and -searchable text, which by itself opens up completely new opportunities for research into runic variations and use.

One last problem with encoding still remains: **Wenderunen**. To understand why they constitute such an issue, the most common way of representing runes in print publications needs to be discussed.

### 3.4.5. Transliterating as a method of representing runes

“**Transliteration**” describes the process of rendering the signs of one writing system into those of another, in this case runes into Roman letters (Seim 1998, 20). Since the shape of the signs can be vastly different, the common denominator between the two scripts tends to be the sound value(s) each sign is connected to, often referred to as **phoneme**. Yet no two writing systems are perfectly aligned, as each of them was developed to satisfy the demands of a specific language. There is therefore always the question of which speech sound in one language corresponds to which speech sound in another language, and by extension, sign. This is usually referred to as **grapheme-phoneme relationship**. Since **transrunifications** can be unsatisfying despite best efforts, many scholars resort to immediately transliterating the runes into Roman letters (ibid., 20). Spurkland (2005, 17) in fact recommends it for “everyone can read what we are reading in the inscription.”

Runic **DBs**, as well, have so far refrained from representing runes, certainly in part due to encoding issues.<sup>20</sup> Convenient though this solution may seem, it has severe drawbacks. Linking

<sup>20</sup>This does not mean that the additional information encoded in **transrunifications** gets lost; uncertainty in **translit-**

two signs from different writing systems together by means of the common denominator “**phoneme**” is difficult enough, but considering the time span and the wide geographic distribution of runic inscriptions as well as the language changes taking place, it is not unreasonable to expect that the use of single signs for specific sound values varied (as it does in modern languages using Roman script).

The emergence of no less than three different systems during the younger period only compounds the problem, as some runes within one system encode a different sound value in another. Most importantly, the **phoneme** paired with a rune is to some extent an unknown factor seeing as there are no living speakers of any of the languages represented in runic inscriptions. Rune-**phoneme** relationships are based on written sources about **OWN** pronunciation, mainly the *First Grammatical Treatise*, and reconstructed sound values (Düwel 2008, 197-202; Spurkland 2005, 6, 10). This was written in Iceland sometime during the 12<sup>th</sup> century; strictly speaking, it can therefore only be regarded as reliable for the rune-**phoneme** relationships of that time, not necessarily the earlier systems.<sup>21</sup>

Even if one accepts the pronunciation described in the *First Grammatical Treatise*, the rune-**phoneme** relationship does not always correspond to the Roman letter-**phoneme** relationship, partly because runes were designed for use in a different language, which made use of **phonemes** that do not occur in ancient Latin, and instead drops some that do. Secondly, even when the relationship corresponds to some extent, like **ᚲ** and **u** both expressing the sound /u/, the development of runic writing over time changed the sign repertoire drastically, resulting in **ᚲ** at different stages in time representing every sound from /u/ to /o/, /y/, /w/, /v/, and in some cases even /f/. Lastly, since runes as a script have gone out of use, the reconstruction of rune-**phoneme** relationships by scholars can and occasionally is fiercely debated: “[...] a discussion of the interpretation of a runic inscription will very often turn on the relationship between sign and phoneme. The question often boils down to this: what phoneme can justifiably be identified with a particular rune in a given circumstance?” (Spurkland 2005, 18).

There is no intrinsic relationship between Roman letters and the sound(s) they represent either; readers of runological publications have to be familiar with the different native languages of the scholars in order to correctly reconstruct the speech sound in question. In many cases, there is not much of a problem since runologists tend to originate from Germanic-speaking countries with similar pronunciation. Still, these problems should not be underestimated, and scholars like Seim (1998) and Spurkland (1991) have uttered criticism and attempted to provide a more reliable framework for a **transliteration** system based on rune shapes instead of probable sound values (Seim 1998, 20). The last attempt to codify the **transliteration** process to a greater extent was undertaken by the CAS project in Oslo in 2013-14, but no result has been published yet.<sup>22</sup>

---

erations is marked in the same fashion as in **transrunifications**, see Thompson (1981). Unlike **transrunifications**, **transliterations** are usually printed in bold lettering (Seim 2013, 153; for exceptions see Thompson 1981, 91). Caution needs to be exercised however; a dot underneath a transliterated Roman letter may also signify that the scholar is doubtful whether the rune should be transliterated with this Roman letter.

<sup>21</sup>Although it is for the most part accepted as a general reference point for other periods as well, its authority reinforced by rune poems listing all known runes with a word, the first sound of which corresponds to the **phoneme** of the rune, the “acrophonic principle” (Düwel 2008, 197-202).

<sup>22</sup>The crux of the matter is, of course, that to get at the meaning of a runic inscription, runologists have to establish which words are used in the text, and how they relate to each other. The reference frame used to decode these messages are (partly) reconstructed languages, most of which rely on a complicated system of sound changes

Changes in the runic script itself as well as in the use of its repertoire of signs and the incompatibility issues between runic and Roman script are good reasons for runologists to base analyses on an examination of the original signs, respectively the combination of them within a given inscription. Considering that specific runes are treated as indicators for changes in the writing system, changes in the **grapheme-phoneme relationships**, and are also in some cases suspected to be connected to “schools” of runic writing or regional traditions (Antonsen 1975, 6; Barnes 2012, 19; Düwel 2008, 15), tracking a specific rune and its variants through the whole runic corpus in order to establish its geographic and chronological distribution becomes a matter of scholarly interest.<sup>23</sup> In fact, since the interpretation and dating of an inscription may well hinge on the runes and their combination, this is of extreme importance to scholars since “rune-carvers were somewhat remiss in dating their inscriptions” (Spurkland 2005, 132).

At first glance, the problem of runes being used several times in different scripts, but signifying to the best of current scholarly knowledge different sounds, is a very different problem than the representation of **Wenderunen**. At the level of encoding, it is not. Runes are, in a way, unique identifiers for speech sounds, and if one and the same rune can be used to express several different speech sounds, from the point of view of encoding, there is a problem. **Wenderunen** are a problem exactly because the same graphical representation can potentially signify two different sounds:

1 and ʀ, depending on interpretation, can be transliterated as either /t/ or /l/, and the same applies to several other runes. At the level of geometric shape, a **Wenderune** may look like another rune. Still, it is not the same symbol, and being able to encode that information as well could potentially prove important. Using the current rune **character encoding**, this is not possible in **transrunifications**. Neither is it possible to properly encode that some runes have changed their sound value over the course of time, or that they, by default, can represent several different speech sounds.

Yet is it really necessary to *also* encode potential sound value in **transrunifications**, considering the graphical representation already has to represent *Graphtypenklasse*, *Graphtyp* and, in the five-alphanumerical-system, interpretational specifics? There is only so much information a graphical representation can be expected to carry, and since **transliterations** anyway already serve to represent the assumed sound value of the rune in question, encoding it again in **transrunifications** seems rather like a waste of time. Additionally, it is only at the level of interpretation that **transliterations** represent that sound value even becomes important. Before that, a rune is a graphical representation of an as-of-yet indeterminate speech sound – this applies to multivalued as well as **Wenderunen**.

I therefore made the decision to not create specific code points for **Wenderunen** looking like other *Graphtypen* in my encoding system, instead relying on the **RDBMS**’s ability to query for information from more than one table. In other words, and as Chapter 4 will show, it is entirely possible to query the **DB** for an inscription which shows, for example, 1 in its **transrunification**,

---

indicating how the words in a sentence relate to each other (still prevalent in modern Icelandic and German; sound changes are also still present in modern English, for example in irregular verbs). Since very little is known for sure about the actual pronunciation of these reconstructed languages, scholars tend to rely on the spelling – which in turn tends to rely on how said words are spelled in manuscripts. These, with very few exceptions, use Roman script. To compare the spelling between manuscript and runic inscription and decode the sign sequence in question, one or the other therefore needs to be transliterated into the respective other system.

<sup>23</sup>For example the runes used on the island of Gotland in the Baltic Sea (Düwel 2008, 94).

Unicode	Overlap			
16A0	𐌵	𐌵	𐌵	
		𐌵07	𐌵02	
16A6	𐌶	𐌶		
		𐌶10		
16BC	𐌷	𐌷	𐌷	
		𐌷04	𐌷03	
16C1	𐌸	𐌸		
		𐌸01		
16C6	𐌹	𐌹	𐌹	𐌹
		𐌹03	𐌹02	𐌹09
16D2	𐌺	𐌺		
		𐌺04		
16D8	𐌻	𐌻	𐌻	
		𐌻01	𐌻02	
16E3	𐌼	𐌼		
		𐌼07		

Figure 3.5. Multivalued rune-shapes.

but transliterates this specific rune as **l**. This necessitates an extra level of complexity in query formulation; yet the whole point of encoding rune variations at all was to be able to find all inscriptions in which a certain graphical representation appears with comparatively little effort on the side of the runologist, and to provide them with the best equivalent of a graphical representation possible. It is hardly unreasonable to expect that they then take a closer look at the result set and make an informed judgement about whether specific occurrences are **Wenderunen**.

To render matters less complicated, I have however noted down which runes from the Bergen corpus have a tendency to signify a different sound value than the one their Graphtypenklasse generally implies, so that it is easier to find them in Figure **D.5** (Figure 3.5).

With this issue resolved, it should be clear how the runes and their varying shapes were encoded for use in this project, and how the technological limitations have shaped the solution. The next step is to start modelling the rest of the data that no runologist can work without.



## 4. Core database design

As outlined in Section 2.2, previous DBs, although they rely on **transliterations** to represent inscriptions digitally, modelled their content in different ways. Building upon that, this chapter strives to combine the benefits and eliminate the drawbacks of past approaches, if possible. Yet analysing every single structural decision made in prior DBs is not the aim either; the chapter focuses instead on modelling the data resulting from the first step in Düwel's list (Section 2.2), script-internal considerations, and more precisely, modelling the process from text on object to normalised text. By doing so, it is possible to develop a generic, all-purpose model of a runic DB, which can later be expanded as different research questions demand.

Chapter 3 explains in detail how the actual runes can be represented in a DB, the digital equivalent of the **transrunification** process. **Transliteration** and **normalisation** are the next important steps (Section 3.2); Section 2.2 outlines how existing DBs model these steps: **SRDB** uses different files to store **transliterations** and **normalisations**, whereas **KDB** and **RFB** keep them in the same table/spreadsheet in separate columns. While **SRDB** is therefore the most flexible, its drawback is that it most often only offers a single **transliteration/normalisation**, while **KDB** aimed to store several. The possibility to store more than one interpretation is an important factor (Section 2.3), since the question of the “right” interpretation of an inscription can, in many cases, never be answered with finality. The new model therefore needs to combine the flexibility of **SRDB** with the wealth of data found in **KDB**.

In turn, this requires analysing the ontological relationships between these pieces of data, best by conducting an in-depth analysis of how runologists actually arrive at their interpretations.

### 4.1. Databases as a tool for runologists

**RDBMS**, when used in runology and for the purpose of research, are highly customisable and flexible tools. In many ways, a relational scholarly DB is a constantly expanding digital note book making use of advanced cross-referencing, tagging and information tracking, enabled by structures conforming to relational theory. Other applications like GIS can use this structured data, thus opening up further possibilities of analysis; it also permits different levels and stages of analysis (micro/macro).

The flexibility of the system depends on the data structure, though, and the reason why **SRDB** is currently the best all-purpose runic DB is that for the most part, it most closely follows the principles underlying **RDBMS** (Section 2.2.1).

## 4.2. The underlying principles of relational databases

**DBs** are built to provide information about a domain (Ramsay 2004, 179); there is never just one piece of information at the heart of this domain; instead, it is an interconnected network of information with ontological relationships. To properly represent these, **RDBMS** follow certain principles, which in turn impact on:

1. how data is structured as tables (relations);
2. how the data in the tables creates relationships;
3. how the data is handled using these relationships.

The concept of relational **DBs** is based on set theory (Harrington 2009, 85-86). Venn diagrams are often used to visualise the formulae and in very simple terms, it is about collections of objects defined by and sorted into different sets by their **attributes**. Sets can overlap (**attribute** applies to some objects in one collection plus some in another), but do not have to (**attribute** only applies to objects in one collection). Mathematically, these can be expressed by

$$\begin{aligned}A \cap B \\ A \neq B\end{aligned}$$

Following this concept, items (**entities**) to be stored in a relational **DB** are grouped into sets of data (**entity types**), which overlap completely, in part or not at all, which in turn defines their relationships to each other. Ramsay (2004) uses authors, books and publishers as an example; the problem with academic research data is generally that there are many ways of grouping items into sets, and the choice defines what can be done later with the data. In **DB** design, the process of establishing these sets is referred to as **entity modelling**, since the items are referred to as **entities** and their sets as **entity types**.

## 4.3. Database design: entity modelling

In principle, **entity modelling** only means drafting a schema showing all information to be stored in the **DB**, including how the different kinds of information interact with each other. Yet it is exactly the combination of “all information” and “how does it interact” that requires examining how the different aspects of one domain relate to each other, a process called “**entity-relationship analysis**”.

The functional relationships between these aspects reveal what the **entity model** can look like, and how the different **entity types** (sets, groups) are to be connected, for example: *written by*, *published by*, *work with* express the ontological relationships between authors, books and publishers (Ramsay 2004). In the **entity model**, they represent a mini-world relevant to the user, who might want to examine, for example, the publishing history of several famous works of fiction. Thus the **entity model** provides a conceptual overview of how different aspects of data relate to each other in the real world.

This conceptual schema is then mapped into relations in the **DB** by determining which data counts as one set, and what information about the single items is required for the research planned. In the last step, the **DB** is created using an **RDBMS** to define specifications of relations and field types, which will hold the actual data. Once finished, the **RDBMS** can then be used to extract information about single pieces or larger sets of data.

Yet depending on what one is trying to do, **entity models** can look very different. For example, in **SRDB**, the different **entity types** are represented by the files the **DBMS** relies upon. **RUNDATA.RUN**, containing **transliterations**, is an **entity type** distinguished from **RUNDATA.NFS** and **RUNDATA.FVN** by some feature that all its **entities** share, but that none of the contents of **RUNDATA.NFS** and **RUNDATA.FVN** share – in this case, **transliterations** are distinguished from **normalisations** by virtue of not being orthographically normalised.

In **KDB**, **transliterations**, **normalisations** and translations (**RUNDATA.ENG** in **SRDB**) are all stored in *Interpretations*. They are distinguished by being stored in different columns, but being stored in the same table, from a data structure perspective, they are **attributes** of an interpretation instead of separate **entities** distinguished by their **attributes**.

To determine which structure works better for the resulting data, the following section examines how those different pieces of data come into existence.

#### 4.4. Basic considerations for a relational runic database

Usually, runic inscriptions are carved into a carrier of some kind, an object. Object and inscription are, however, distinct, not least for the reason that the object may well carry more than one inscription, one and the same inscription may be found on more than one object, or continue on another object (although that is usually only the case when the original carrier has been damaged and broken). “Object” and “inscription” are therefore neither synonymous nor may they be regarded as the same **entity type**. It is at the definition of “inscription” though that **entity modelling** first becomes difficult; there is a long-standing debate between runologists about what an inscription is:

Sometimes in runological literature the term “inscription” describes one actual row of runes which are considered to “belong together”, meaning that one or more lines or statements are considered an **entity**, and are seen as having been carved at the same time. One object can thus be said to show several inscriptions. [...] The assumption that one object carries several inscriptions presupposes that the runic sequences are at least physically divided from each other, often also that they must be individual inscriptions, according to other indicators like the types of runes used or different carving methods. Sometimes, however, the term is used for all runes on one object which may well be physically separated, without regard to whether or not they have been carved at the same time or belong together (Seim 1998, 10–11, my translation).

Deciding on a case-by-case basis is not an option, in part because it would anticipate the actual interpretation of the text, something which should follow, not precede the mere factual entry in

the DB.<sup>1</sup> But moreso, it is a structural problem from an **entity modelling** perspective: there are frequently many possible readings of an inscription, including conflicting opinions on whether there are one or more “inscription(s)” on the same object. For the sake of clear data structures, there needs to be a common point of reference each part of an inscription can be linked to, whether it is a continuous flow of text or different texts coincidentally assembled on the same object.

Yet using the object itself is problematic as well. Broken objects, even when they clearly used to be one, may have been assigned different inventory numbers before researchers realised they belonged together, thus requiring a decision which inventory number should be used as the unique identifier. More importantly, they may also have been found in different contexts, which in turn impacts on spatial analyses, so retaining their unique identifiers is important for analyses.<sup>2</sup>

In this case, modelling reality is difficult, at least when the interpretation is taken into account. But the actual reality looks like this: objects are physically distinct; if they once were part of the same **entity**, they belong together, and this can be expressed by introducing an **entity type** representing the object as a whole, marked by a unique identifier, while the parts of it are stored in a different **entity type** with their own unique identifiers. The ontological relationship between those two **entity types** is then: “pieces x, z belonged to object y” or “object y consisted of pieces x, z”.<sup>3</sup>

Where inscriptions are concerned, determining the number of textual **entities** on an object is very much part of the interpretation process; the physical reality is that even if there are three distinct texts, they are still on the same object. “Inscription”, at this stage of **entity modelling**, is therefore defined as “every rune on an object”, and it is considered distinct from textual **entities**, which are reunited or separated at a much later stage of the process (Section 6.2.6).

## 4.5. Deciphering a runic inscription

With “inscription” defined as all runes appearing on an object, the next item of interest for the runologist is the actual text of an inscription. As Chapter 3 illustrates, said “text” is not the result of a simple transcription of what the runologist sees, but the result of a runologist’s decisions in the process of deciphering an inscription, resulting in the aforementioned contradictory results. If the **entity model** is to mirror reality, it must therefore model this process.

Yet there is, so far, no officially acknowledged way of “reading” a runic inscription. Each runologist has their own way of doing it, and it is hard to describe the process in itself (Barnes 2013). Nevertheless, I have attempted to represent roughly what is going on in a flowchart (Figure 4.1), and drawn on **SRDB**’ approach, which correctly models the different steps by using separate files to store the results. The first **entity type** is therefore defined as the result of what can be called “identifying the runes”, followed by equating them with “ideal” forms; in practice, the character sequences encoded according to the **character encoding** in Chapter 3, in this thesis

---

<sup>1</sup>See Seim (2013): “Vi skiller mellom det å *lese* en innskrift og å *tolke* den. Det er to ulike prosesser som det er viktig å holde fra hverandre.”

<sup>2</sup>The Bergen objects to a large degree share the same overarching inventory number, but the single pieces of a broken object are numbered by themselves and ultimately stored as single items (see Section 4.8.1).

<sup>3</sup>This would only have applied to one object in this thesis, and was therefore not put into practice.

referred to as “**transrunification**” to avoid confusion. The **entity type** is called **UNIRUNES** (unicoded runes).

While it may be argued that it would be best to include this kind of information in the object or inscription **entity type**, I disagree on four accounts.

1. Being able to store different interpretations is crucial for a runic research **DB**.
2. Owing to the demands of data integrity and to avoid data redundancy as well as practical reasons, it is not feasible to store them in column after column in **transrunification**; it unnecessarily bloats the table and renders searches difficult and unreliable (Section 2.1). In a relational **DB**, it would also only be possible to do so by designating a certain number of columns to conflicting **transrunifications** (see Figure 2.2), which brings one back to the issue of, at some point, having to make a decision on which **transrunifications** to keep and which to discard, or of designating an inordinate number of columns to account for potential new additions. This approach impacts negatively on data retrieval and is therefore to be avoided at all costs.
3. By using an **RDBMS**, entries are connected via their **primary key (PK)/foreign keys (FKs)**, thus preserving the connection between inscription and **transrunification**, as well as a clean structure and data integrity, while at the same time offering the possibility to store as many **transrunifications** as required; there is no limit to how many **transrunifications** can be connected to one **inscription**.
4. Considering each **transrunification** as its own **entity** and entering it as such instead of a column-based storage solution also solves another problem runologists sometimes struggle with, namely how to represent conflicting identifications of a single rune.

Provided each **transrunification** is its own **entity**, one does not have to resort to using slashes and enter, for example, ƿ/ʀ in order to save space and not have to add another column (like, for example, **Runor** still does; instead, these variations are encoded using XML in one single cell). Instead, two distinct records are entered, one ƿ, the other ʀ. Using the system introduced in Section 3.4.3, the uncertainty of the identification can easily be included as well by marking each entry with “b”:

- 1) ƿb00b
- 2) ʀb00b.

In combination, this encoding system and single-item-based entry permit a much more precise representation of the research product, the **transrunification**, than the current solutions working with backslashes, parentheses and square brackets ever could. That is not necessarily to say that they are easier to understand by a human; but they are *clear-cut* in terms of *data* – which is what matters in a **DB**.

In addition to considering each **transrunification** as its own **entity**, they were also broken up into smaller **entities** according to which side of the object they appear on. Again, this mirrors physical reality (the runes appear on different sides of the objects, Chapter 1).

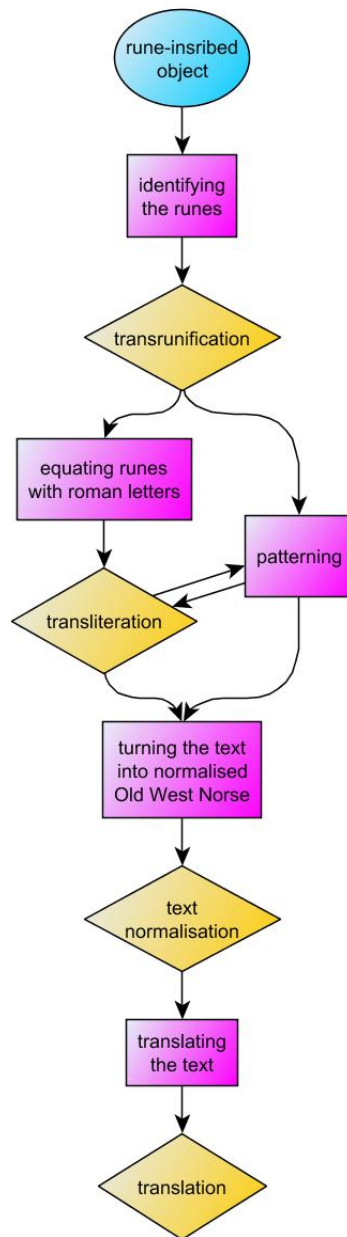


Figure 4.1. Process of deciphering a runic inscription; yellow represents the outcome of a process, pink rectangles represent processes.

Different **transrunifications** logically mean a variety of **transliterations**, since these are the result of a rune being turned into a Roman letter according to its suspected sound value (Section 3.4.5). Since the sound values can differ quite significantly depending on which rune row in question is used in the inscription, or in which order the runes occur, **transrunifications** can often be transliterated in many different ways. This indicates that there should be two **entity types**, because again, storing all possible **transliterations** for one **transrunification** would require an indeterminate number of columns. It is therefore more logical to treat them as two **entity types**.

The next step and **entity type** following **transrunification** and **transliteration** should, theoretically, be **normalisation**. Upon closer examination, though, I found that there is a process taking place beyond simply equating runes with Roman letters. I am calling this process “**patterning**”, because what happens is that runologists are looking for familiar patterns in the text. Generally, these patterns are words – sequences of runes carrying semantic meaning, as do names, formulae but also nouns, verbs and so on. Based on what they believe they recognise, runologists “pattern” an inscription – establish it is written in **OWN**, contains two names and a formula, and shows some non-lexical (“unpatternable”) sequences (an example of what this looks like in practice is provided in Section 4.8.4).

Runologists may base their **transliteration** on patterns they recognised in the **transrunification**, or they may only be able to recognise patterns after transliterating; this differs between runologists, and also from case to case. Thus **patterning** can take place right after the **transrunification**, or between **transliteration** and text **normalisation**. It represents its own **entity type**, as it is a process distinct from both transcribing and transliterating.

Once **patterning** has taken place, and character sequences potentially representing meaningful linguistic utterances have been identified, most scholars will turn the text derived from the **transliteration** process into normalised **OWN** and/or Latin, a process I called “**normalisation**”, which is its own **entity type** as well. Translations into modern languages, although included in **SRDB** and **KDB** are, at present, not included in the **entity model** presented here for a variety of reasons, but can easily be added as yet another **entity type**.

To recap, the process of deciphering a runic inscription consists of the steps **transrunification** – **transliteration** – **patterning** – **normalisation**, with **patterning** taking place either between **transrunification** and **transliteration**, or after **transliteration**, or perhaps even at either stage. In contrast to other items listed by Düwel (2008, 16), this process takes place *every* time a runologist works with an inscription; in cases where they do not create a **transrunification**, **transliteration** or **normalisation** themselves, they use those created by previous scholars. These steps also need to take place before any other interpretation can be undertaken, like for example determining the purpose of the inscription or its cultural context. They are therefore the basis for everything else, and as such, need to be included in every relational runic **DB**. As this survey has shown, it is also advisable to treat them as separate **entity types**. Their ontological relationships can be expressed in words (following the example in Ramsay 2004):

Runes on an object (**entity type**) are transcribed into a **transrunification**.

**Transliterations** equate runes in **transrunifications** with Roman letters according to corresponding sound values.

**Patternings** identify linguistic structures in **transrunifications/transliterations**.

**Normalisations** apply certain orthographic rules to **transliterations** to render them more readable.



The **entity model** presented in Figure 4.2 expresses these ontological relationships between the different steps of the process.

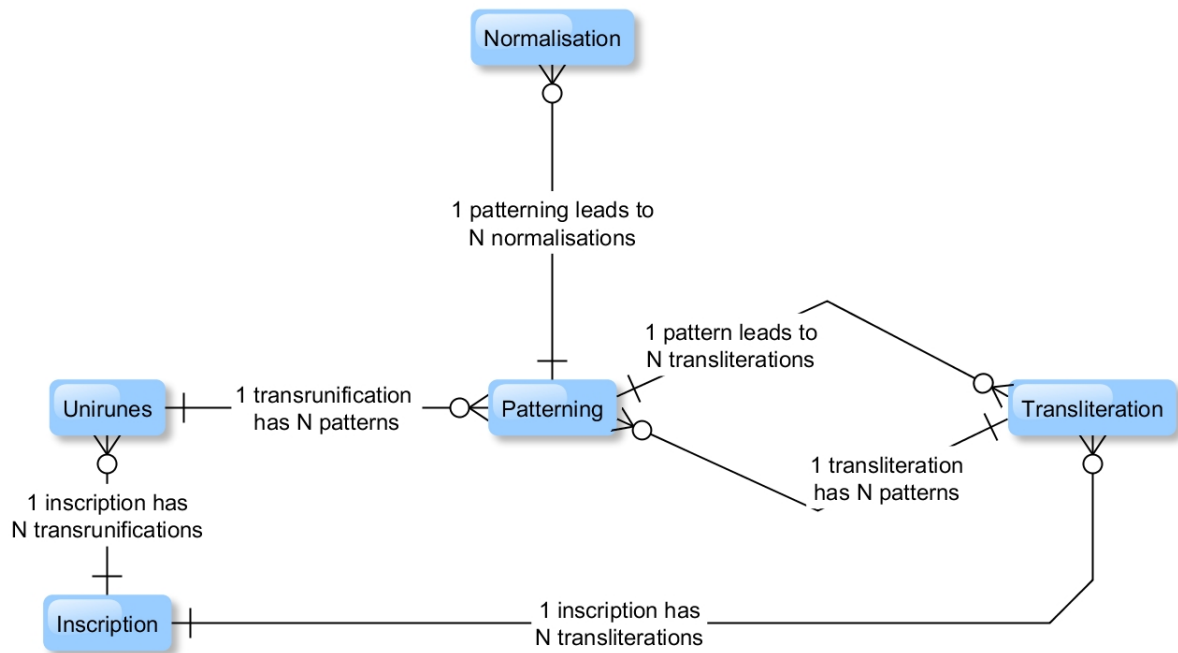


Figure 4.2. The core tables of a runological DB. In cases where no underlying **transrunification** could be identified, **transliterations** were connected directly to inscriptions. Ideally, every **transliteration** should link back to the underlying **transrunification**.

When the process of deciphering an inscription is considered not as a single action, but as a process consisting of several steps (as, indeed, most transcribing of texts into digital text is, see Tanner et al. 2016), it becomes clear that **transrunifications**, **transliterations**, **patterning** and **normalisations** are actions distinguished by a) what data they are based upon, and b) what their output represents.

This is also a good example as to why it is frequently so difficult to translate research data into an **entity model** or use it in an **RDBMS**: to identify the **entity types** and their functional relationships, intense reflection on what one is actually *doing* is required.

## 4.6. From model to database

Developing an **entity model** for the research data is only the first step in the process of building a **DB**, however. With the conceptual outline, the next step is to “translate” the abstract steps into storage structures. This part of the process is often referred to as “data model mapping”, in turn followed by physically designing the **DB** using the chosen **RDBMS**, after which the research data can finally be entered. At this stage, instead of talking about **entity types**, the physical structures are generally referred to as relations/tables.

For the data model mapping process, an understanding of how the data is going to be stored is essential.

### 4.6.1. Field types

The term field type refers to the possibility of defining which format to store data in, for example text, number or date. While an **RDBMS** will still work without the **DB** containing anything but text fields, for storage and retrieval purposes, it is advisable to make use of other field types as well, as again, this helps prevent data corruption. The field type for each **attribute** should be carefully chosen to match the data. A selection of important field types is presented below, however it is by no means exhaustive and gives the respective names for field types for MS Access as well as other **SQL**-based **RDBMS**, since MS Access has its own terminology.<sup>4</sup>

- **AUTONUMBER**: The field type **AUTONUMBER** automatically adds a unique number to each entry. It is often used to assign **PKs** in MS Access. In MySQL, the field type would be **INT** with auto increment turned on. Using **AUTONUMBER** can be an easy way to quickly ensure unique **PKs** are given to new entries, but it can be preferable to assign **PKs** by hand.<sup>5</sup>
- **NUMBER** or **INT**: If a field is supposed to contain numeric values, it should be defined as a **NUMBER** or **INTEGER** field. It might not seem practical at first, however when **PKs** are made up of numbers, it can be useful to assign it as a field type to the **PK**- as well as **FK**-columns in other tables. It does not eliminate the possibility of entering a wrong value, but it at least limits typos to the ten number keys.
- **BOOL** or **BOOLEAN**: This field type is often interpreted as meaning yes or no. Actually, **BOOL** translates to “on (true)” or “off (false)”. **BOOLEAN** fields are used as a simple method of indicating whether the statement at the top of the column is true or false for one **entity**, for example whether an object carries a runic inscription. **BOOLEAN** can also be used to reflect ambiguities in the material; for example, in **OWN** naming traditions it is not always clear whether a name is an **idionym** or a by-name. Some names can be used for either gender, while with others, it is not clear whether or not they are genuinely Scandinavian or borrowed, in part or completely, from other languages (Section 5.1.2).<sup>6</sup>
- **TEXT** or **VARCHAR**: These fields contain text. This field type is very useful for bits of information like comments on an entry that do not fit in anywhere else. The actual number

---

<sup>4</sup>Depending on which **RDBMS** one chooses, several of the field types might not be accessible. SQLite for example, as the name suggests, is a stripped-down version of full-blown **SQL DBMS**, and is very restricted in terms of functionality, although it should be said that the operations required for a runic **DB** should be well within its limits. Consulting the documentation that comes with every properly developed **RDBMS** is the best course of action when deciding what system to use.

<sup>5</sup>This is not recommended, but can be a useful shortcut.

<sup>6</sup>As a rule, every time I chose **BOOLEAN** as field type, it was for the reason that something could be both or, in fact, contained both, as is the case with “language of inscription” in **PATTERNING**. Several inscriptions contain both Latin and **OWN** words, some others unintelligible parts which nevertheless are combined with legible and interpretable words and sentences. Ticking all available **BOOLEAN** fields ensures none of these inscriptions will be forgotten in analyses.

It is perfectly possible to also return only results that say *Non-Lexical* and do not contain any proper text, or any of the combinations imaginable without having to sort them by hand.

of characters can be set individually for each TEXT/VARCHAR column, although a TEXT column can never exceed 255 characters.

- MEMO or VARCHAR: The Bergen material contains quite a few inscriptions consisting of more than 255 signs (although since they are broken up by object side, they generally do not exceed 255). MEMO and VARCHAR allow up to 65,536 alphanumerical characters to be entered, making this field type more suitable for the actual text of any runic inscription, including **transrunifications**.

While field types can be changed later on, it is in the best interest of the scholar to consider which field type might be most appropriate for storing which kinds of data. It helps the process of normalising data for input later on, but also forces the scholar to acquaint themselves intimately with their data.

Once **entity types** and **attributes** are established, the functional relationships between **entity types** need to be represented by connecting **entities**.

#### 4.6.2. Relationships, primary and foreign keys

In the **entity model**, the connections between **entity types** are expressed by describing their functional relationship (works for, was written by, published). In practice, relationships should only be established between tables that contain directly related information, such as for example an object and the context it was found in. It helps to imagine a hierarchy or network when thinking about how relationships naturally flow: an object *is found in* a grave *is located in* a cemetery *was examined during* an excavation *located in* a municipality *in* a country.

This reflects the real world hierarchy; the relationship is established via the **entity types** and their relationships. There is a slight technological problem, however: A relational DB can *only* model **one-to-many relationships (1:N-relationships)**. This means that one **entity** in one table may relate to zero, one or more **entities** in another table, but the **entities** in the second table *must not* relate back to more than one **entity** in the original table. These two tables then share a **1:N-relationship**. When retrieving result sets, the **RDBMS** selects one inscription from one table, identified by its **PK**, and connects it to, for example, several **transrunifications** from another, equally identified by their respective **PKs**. This prevents confusion and data corruption.

Unfortunately, the real world more often than not consists of **many-to-many relationships (N:M-relationships)**. For example, an inscription often contains more than one word, and several words appear in more than one inscription. These words and the respective inscriptions are in an **N:M-relationship**. Linking these directly from one to the other table would result in multiple duplicate results when a query is run. Still, all occurrences of all words need to be connected to all inscriptions that contain them, but in such a way that when a query is run later, entries are not multiplied into the endless. In such cases, **N:M-relationships** are modelled using an intermediate relation to create two relationships: 1:M and N:1.

#### 4.6.3. JOIN tables

The main function of **JOIN** tables (sometimes also called “junction”) is to prevent this type of data duplication by breaking down **N:M-relationships** into **one-to-one relationships (1:1-**

relationships). In practice, a JOIN is often made up of no more than one PK from each participatory table, for example the PK of the inscription and the PK of the specific word appearing in it. Thus words are linked to inscriptions and vice-versa. To further ensure data integrity, the combination of these two PKs can then be used as a compound PK in the JOIN; the combination can then only be entered once.<sup>7</sup> To understand this properly, the next section deals with the importance of PKs.

#### 4.6.4. The vital role of primary and foreign keys

The question of how relationships are actually represented in a DB may have come to mind while reading the previous sections. They are created, quite simply, by using the unique identifiers from one table as reference points in another table. It was mentioned earlier that to retrieve information from a computer, for example to display a particular letter, unique identifiers are required (Section 3.3.1). RDBMS, too, require a unique identifier for every single entity/record stored within the DB. These are called primary key (PK) and are vital in data storage and retrieval.

To put it very simply, PKs form *common, consistent* points of reference between the entity types in a DB. A PK is unique for each entry and only ever assigned once per table. If a record is deleted, any new records will not fill up the space thus created, but will continue along whichever format was chosen as PK.

Once the PK from one table is entered into a specific column reserved for this purpose in another table, it becomes a foreign key (FK). In other words, a FK is nothing but an attribute in one entity type, where the entity type uses a PK from another entity type to link the two records together. FKs, in contrast to PKs, can appear as many times as they need to; thus one object can be linked to several transrunifications, one transrunification to several transliterations and so on. The PK of one item and the FKs associated with it are what creates the relationship between the tables. Whenever data is retrieved from more than one table (i.e. an INNER JOIN is announced), users must state which PK and FK columns shall be matched against each other (Section 4.7.1). It is thus possible for the RDBMS to compare these columns and select only the records where keys match.<sup>8</sup>

Edition numbers, signa and other ways of identifying runic inscriptions in written editions are therefore not good choices as PKs. For one, all editions have different ways of using letters in combination with numbers, so there is no consistency. For the other, inscriptions on the same object may be given different signa in different editions<sup>9</sup>, and thus accidentally be added as two separate entries into the “objects inscribed with a runic inscription” table, which we must remember does not equal “single textual entities as perceived by runologist”.<sup>10</sup>

Adequate PKs may be letters or numbers or any combination thereof, but in order to retain

---

<sup>7</sup>If the word appears several times, that option should not be chosen.

<sup>8</sup>On a practical note, this makes it advisable to always use the same column name for the PK column and any columns in other tables referring to it. Simply naming the PK field “ID” is fairly confusing, not for the RDBMS, but for the user.

<sup>9</sup>Or even the same, see N693-694 in NIYR VI.

<sup>10</sup>A different definition of the entity type would make this valid; for the reasons why I defined this entity type and inscription differently, see Section 4.4.

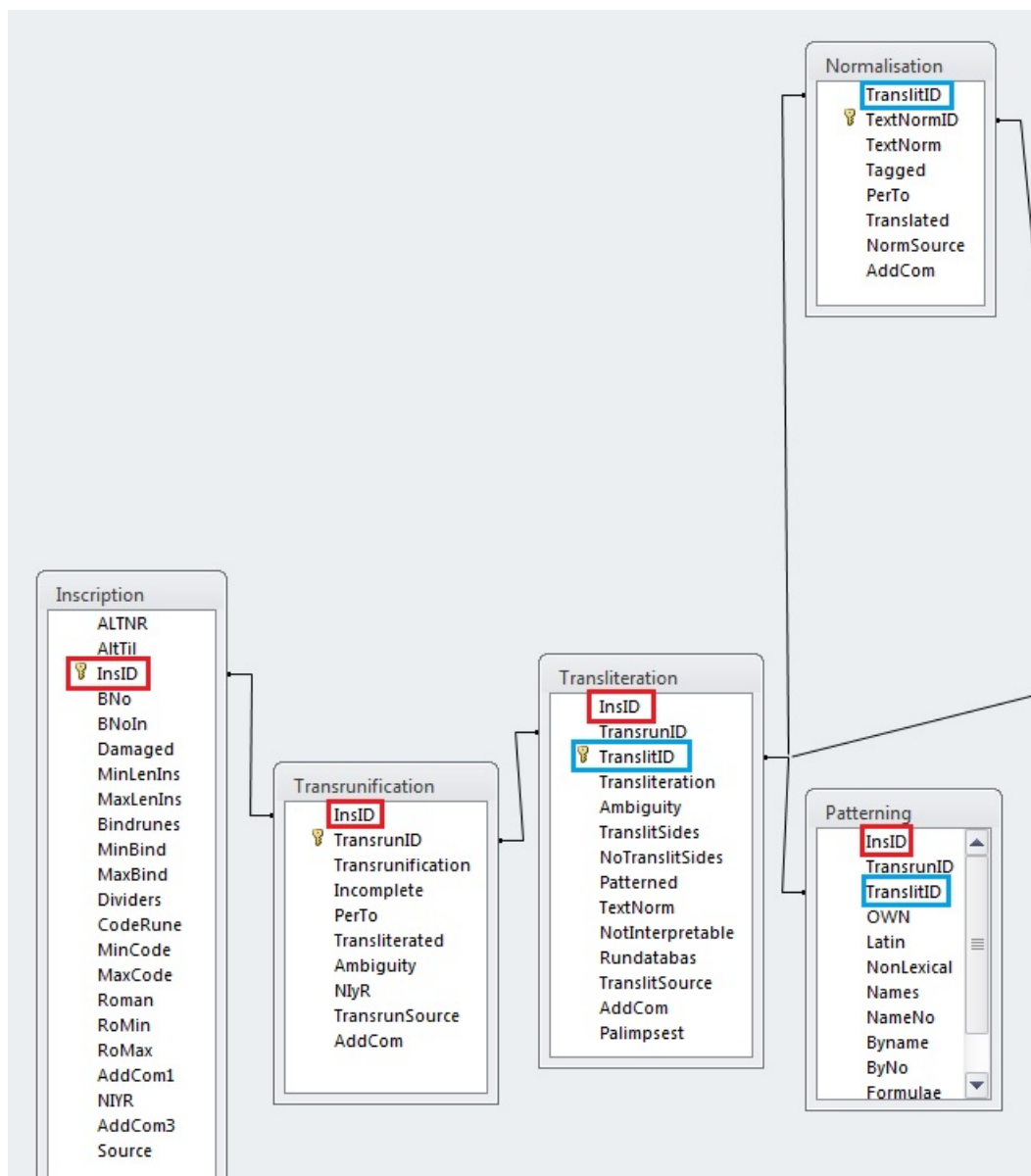


Figure 4.3. Two PKs used in other tables as FKs. Microsoft Access 2010 marks the PK columns in the DB scheme with a little key, and the black lines symbolising the relationships connect the fields matched against each other when running a query.

data integrity, it is often advisable to use customised **PKs** for each separate **entity type**.<sup>11</sup> These should ideally be *meaningful*, i.e. real data, like for example a student number.<sup>12</sup> This prevents users from accidentally connecting **entity types** not meant to be connected. Since this process of matching numbers is most easily explained and understood via example, the next section deals with retrieving information from the different tables of a **DB**.

## 4.7. Retrieving information: writing and running queries

The special power of **RDBMS** as opposed to other **DBMS** lies in the fact that the relational model allows connections between **entities** that are not hierarchically structured, but are instead created by the **entities** sharing the same **attributes**. With the ability to recombine, reassemble and connect different types of data into result sets containing exactly the data one is looking to analyse, they provide much more flexibility than other systems. In addition, they prevent data corruption from the outset by utilising queries to interact with the data. Result sets may then easily be exported into other applications, again without running the risk of corrupting the original data.

**RDBMS** can therefore be described as tools to store and retrieve data *when it is needed*. Since computers can only understand precise, structured requests or commands composed using formal languages, requests need to be formulated in a specific way. In the case of **RDBMS**, the formal language adopted as a global standard is **SQL** (Section 2.1). While this “language” uses a simple syntax and a relatively short list of commands in order to enable users to control a **DB**, it is immensely powerful, and the other reason why relational **DBs** are such useful tools (the first being the relational model itself).

While there are more commands available, on the most basic level only the following three commands are needed to retrieve information from a multitable-**DB**: **SELECT**, **FROM**, **JOIN**.<sup>13</sup>

### 4.7.1. Example query: Finding Ólafr

To fully illustrate the potential of recombination, I built an example query looking for inscriptions containing any variation of the name *Ólafr*. As illustrated in Figure 4.4, the query starts out in **IDIONYM** (which is part of the **research database** described in Chapter 5). The purpose is to retrieve the inscription numbers of every inscription mentioning an Ólafr, e.g. to then track it through different geographic regions. To this end, the first order to the **RDBMS** must specify what type of query is to be run; in this case, it is a **SELECT**.<sup>14</sup> The **RDBMS** needs to know what data to select and whence:

---

<sup>11</sup>Many **RDBMS** offer the option of automatically implementing the next incremental digit whenever a new record is added, though.

<sup>12</sup>Which was not possible in this project; one part of the **PK** carries meaning, the attached numbers do not.

<sup>13</sup>**SQL**-commands are often capitalised so as not to confuse them with the columns and tables that follow. It is a purely cosmetic distinction. **SQL** is not case-sensitive, which makes spelling and syntax errors the only sources of problems. Ramsay (2004) focuses on explaining each command, and so do several other sources, for example w3schools (2020).

<sup>14</sup>The **SELECT** command forms the basis of all retrieval queries a user will want to run. Other possible first words are **UPDATE**, **DELETE** or **CREATE**.

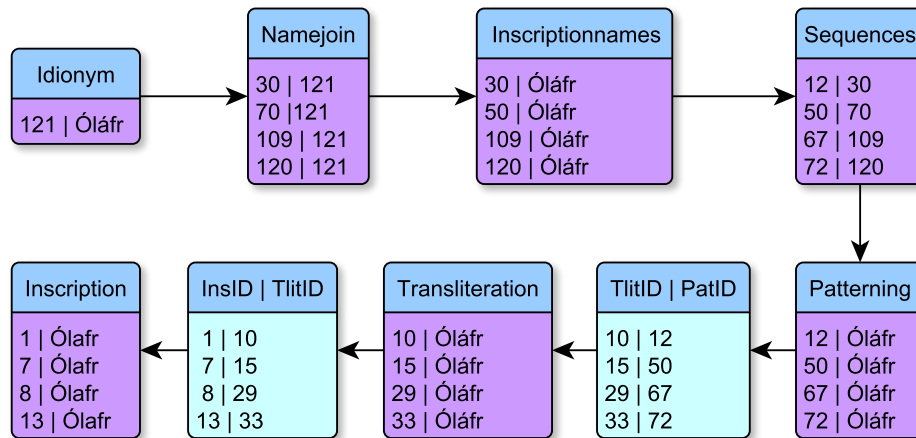


Figure 4.4. The process of filtering all inscriptions containing Ólafr from the DB. Violet marks actually existing tables, light blue marks PKs stored as FKs in the next entity type.

```
SELECT inscription.number
```

```
FROM
```

```
(((((inscription INNER JOIN transliteration ON inscription.primarykey = transliteration.foreignkey)
```

```
INNER JOIN patterning ON transliteration.primarykey = patterning.foreignkey)
```

```
INNER JOIN sequences ON patterning.primarykey = sequences.foreignkey)
```

```
INNER JOIN inscriptionnames ON sequences.foreignkey = inscriptionnames.primarykey)
```

```
INNER JOIN namejoin ON inscriptionnames.primarykey = namejoin.foreignkey)
```

```
INNER JOIN idionym ON namejoin.foreignkey = idionym.primarykey;
```

This piece of code looks rather complicated; a proper explanation of why it is that complicated is provided in Section 5.5.5. For now, it is enough to know that results from more than one table are acquired via the function **JOIN**. An **INNER JOIN** will return all entries from the specified tables which contain data.

There is no limit to how many tables may be joined together in this way, except the increasing complexity of the query and the potential to link up tables in the wrong direction. In the example presented here, seven tables are linked together; this also means that the column designations need to be further specified by adding the designation of the respective table they belong to. Table and



column designation are generally separated by a full stop. It should be noted that the column designations change depending on where in the query they turn up, because the 1:N-relationships between the tables are mirrored. **SEQUENCES** for example is one of the above-mentioned **JOIN** tables, and only contains **FKs** by default (creating a compound **PK**), while **IDIONYM**, **TRANSLITERATION** and **INSCRIPTION** all have proper **PKs**. The **PKs** from **INSCRIPTION** go again as **FKs** in **TRANSLITERATION**, the **PKs** of which are to be found as **FKs** in **PATTERNING**. Figure 4.4, where the **PKs** are symbolised by simple numbers, also illustrates why it might be wise to design bespoke **PKs** for each table to avoid corruption. With only the numbers serving as **PKs**, **IDIONYM** could be directly linked up to **INSCRIPTION**, yielding no useful results at all.

The query as it is now will return every inscription number connected to an **idionym**. Yet the result set is supposed to only contain results with Ólafr. To filter out the unwanted results, a **WHERE**-clause is added, by which one specifies what particular value of an **attribute** one is looking for. Since the **attribute** in question comes from **IDIONYM**, it provides the **WHERE**-clause:

**WHERE** idionym.name="Ólafr";<sup>15</sup>

This query now returns only those inscription numbers connected to the **idionym** Ólafr. Since the names are not directly linked to inscription numbers (for reasons that will be explained in Section 5.5), the query must follow the red thread of primary and **foreign keys** until it reaches **INSCRIPTION**. The query can be written starting from either end, as long as the tables in between are lined up right, but in this case, it is written to start in **INSCRIPTION**.

Frequently, however, one is looking for a very precise piece of data. In such instances, query modifiers can be used to narrow down the search.

#### 4.7.2. Query modifiers

Generally, query modifiers mainly serve the purpose of narrowing down a particular result set even further. Mostly this is done to save time when looking only for a particular piece of information. **WHERE**-clauses by themselves are already query modifiers, but there are two more that play an important role in data retrieval in this thesis, and which therefore need a short introduction.

#### 4.7.3. Wildcards

There are cases where the precise value of an **attribute** is unknown. In such instances, **wildcard** characters play a vital role in permitting searches on the premise that not all information about the looked-for item is known (or, indeed, required, for example when only the Graphtypenklasse matters). These **wildcard** characters differ between different **RDBMS** applications; most **SQL**-based applications utilise “\_” to symbolise a single unknown symbol, “%” to signify *none, one or several*.

<sup>15</sup>Words and expressions need to be put into double or single inverted commas, depending on the **RDBMS** used. In MS Access and MySQL, it tends to be double inverted comma, but this may vary between different versions. With (double) inverted comma, parentheses, square brackets and equation signs (amongst others) being operational characters, they should not appear as characters anywhere in the **DB**, as the **RDBMS** will not recognise them as such and be unable to query for them, unless specific formulations are used. Numbers are handled without inverted comma.

**Wildcards** are often used in one of two cases: 1) uncertainty about the spelling, 2) broadening query output. Consider for example the (likely) possibility that, in looking for everyone named Ólafr in runic inscriptions, the name has not been spelt exactly that way, instead *Olaf*r or even *Olaf*, *Olav*.<sup>16</sup> The doubtful characters can in such instances be substituted by “\_”, resulting in “\_lafr”.

Running the query will now return every record containing any letter + *-lafr*. If the *Olaf/v*-spelling is a possibility as well, the sequence can be modified further into “\_la\_%”, informing the **RDBMS** that one sign precedes *-la-*, one follows it, and none, one or more further signs follow the unknown character.<sup>17</sup>

The end result looks like this:

```
WHERE idionym.name LIKE "_la_%";
```

Translated into human language, the user is telling the computer to go looking for a sequence of four or more characters, the first, the fourth and any following of which are unknown, while the second and third must be *-la-*.

Obviously broadening a search in this way might produce results not looked for, as the underscore can be replaced by literally any other character from the character map. It can, however, only be replaced by *one* character, therefore entries containing two, three or more characters followed by *-la-* will not be part of the result set. Neither will for example the name *Ola* be returned – it only contains three characters on the whole, and the search specifies four characters at least. For runologists, **wildcards** are indispensable and incredibly powerful tools in view of the often unorthodox way rune-carvers put their words together.

#### 4.7.4. DISTINCT

The other important query modifier is **DISTINCT**, used when, despite correctly established **1:N-relationships**, some data might be duplicated in the result set. The frequency of names in inscriptions is one of the cases where this query modifier comes into its own right. As mentioned above, names may turn up in more than one, but also more than once within the same inscription (as is the case for the query illustrated in Figure 4.4).

The use of **DISTINCT** now depends on the required result set. If the query is run as described above, all inscription numbers connected to Ólafr will be returned. Due to how **RDBMS** match records, this also means that if Ólafr turns up two or three times in the same inscription, this inscription number appears two or three times in the result set.

This might actually be what one is looking for (namely when the goal was to find out how often the name itself appears in the material). But when the aim is to create a map showing every place where Ólafr appears, this multiplication becomes an issue, since running a subsequent query for coordinates multiplies the objects. If the map is then set to indicate number of objects, this multiplication falsifies the map. By adding **DISTINCT** to **SELECT**, this can be avoided, although it is important to remember that **DISTINCT** takes into account *all* the data in the result set. If

---

<sup>16</sup>See Chapter 3 for why the glyph used to express a certain sound is likely to return wrong results.

<sup>17</sup>When using **wildcards**, the operator in the **WHERE**-clause needs to be changed from = to **LIKE**.

another column containing different information is added (for example *transliteration*), the result will be distorted again.

Now that both sides, the technical and the runological, were given the necessary attention, and it should be clear how the crucial first steps of deciphering an inscription should be modelled and how **RDBMS** store and retrieve data, the next section focuses on what these relations look like when brought into existence by using the **RDBMS** to create the required **entity types** as relations.

## 4.8. The core tables of a “model” runological database

The **entity model** for the core **entity types**/tables of a runic **DB** is presented in Figure 4.2, with the relationships between the **entity types** modelled according to the process of deciphering a runic inscription. Figure 4.2 also illustrates well that relationships are not restricted to existing only between two **entity types**; in fact, one **entity type** may even be required to relate to more than one other **entity type**. Again, the relationship is marked by a bespoke **FK**-column in the respective table. **INSCRIPTION** and **PATTERNING** relate to more than one other table, for a very simple reason:

In several cases, it was impossible to determine which **transrunification** a **transliteration** was based on, for example for all entries concerning the Bergen inscriptions from **SRDB**. Therefore a direct connection needed to be established to still tie **transliterations** to inscriptions. Why **PATTERNING** relates to different tables was already explained; **NORMALISATION** depends on it, since it is unlikely that a **normalisation** will be based on a **transrunification**, and it is not directly based on the **transliteration** either.

This stage of the process marks the putting of theory into action, designing the concrete physical tables in the **DB** that one is going to fill with data. The table structure of each **entity type** is therefore the focus in the next few sections. While I was still working with MS Access 2010 at the start of this thesis, technical problems with searching for characters outside the ASCII-range necessitated a switch to MySQL. Therefore all technical terms used below refer to the **DB** vocabulary used within MySQL.

Another important question that needs to be decided upon *before* creating the physical tables is which **character encoding** to use in the whole **DB**, as tables using different **character encodings** cannot be connected by **JOINS**.<sup>18</sup> The **character encoding** in this **DB**, named **TAKERUN**, is `utf8mb4_general_ci`.

### 4.8.1. Inscription

Creating tables in a **DB**, creating the **DB** from scratch, is done by either installing or making use of already existing installations of a **DB**-server application, like MySQL, MariaDB or others. Ramsay (2004) provides a good explanation (and so does, in fact, the documentation of these server applications), so I will concentrate on describing the practical considerations behind the choices of field types and **attributes** and only provide the relevant queries in **Query E.1**, **E.2**.

With the objects of the Bryggen excavations stored in the University museum’s MS Access **DB** (until 2017) and then the nationwide MUSIT-**DB**, each of which contain several hundred

---

<sup>18</sup>Error messages will be returned until one of the tables is converted into the other respective **character encoding**, which in turn might result in the wrong characters being displayed in the end result, see Section 3.3.

Column Name	Data Type	Length	PK?	Not Null?
insid	varchar	8	true	true
altnr	varchar	15	false	false
alttil	int	9	false	false
bno	int	6	false	false
bnoin	varchar	7	false	false
niyr	varchar	7	false	false
addcom1	varchar	300	false	false
addcom2	varchar	200	false	false
photographed	tinyint	1	false	false
rti	tinyint	1	false	false

Figure 4.5. Table structure **INSCRIPTION**. Length denotes the maximum number of characters that may be typed into a field within that column. NOT **NULL** indicates whether entering data in this column is mandatory or not. If it is set to “true”, the column is mandatory and the **RDBMS** will not add a record unless a value is entered.

thousand records, it was more feasible to create the runological **DB** on a subset, namely all of the objects already identified as carrying runic inscriptions. The table **INSCRIPTION** therefore does not contain much information about the objects themselves, despite what was said above about using object as the basic point of reference, but rather provides the point of contact between the archaeological and runological sides of the **DB**. This also has the added benefit of adding one more layer to the **DB** and establishing a differentiation between “inscription” and “object”, thus drawing attention to the fact that those two need not necessarily be synonymous (Section 4.4). The table is therefore also not named “object”, tempting as that might be, but “inscription” – an abstract concept, in this case understood in the broader sense of all the text inscribed onto one physical **entity**. The structure is as follows:

*Insid* (inscription id) is the **PK** of this table, which technically would not have been needed if not for certain circumstances. Originally, the museum’s inventory numbers were supposed to be used in this capacity (*altnr*, Figure 7.15), since they are unique and would have directly linked to the archaeological **DB**. Unfortunately, one of the excavations yielding runic inscriptions, BRM 48, was never digitised, and the inscription from this excavation therefore has no inventory number. It can be found in a list of the runic inscriptions at the museum and was therefore included. Some other inventory numbers were also entered incorrectly, causing confusion and duplicate entries. A bespoke **PK** for this table was therefore the logical choice.

*Altnr* (Altnummer) consists of excavation number/object inventory number/piece (the last referring to items which are broken and consist of several pieces; with the runic inscriptions, most of the time it will say 001), whereas *alttil* (Alt tilvekstnummer) is the object’s inventory number without the excavation number attached. Since the objects originate from different excavations, this could not be used as a **PK**, as each excavation started counting again at 1, therefore creating duplicates. It is, however, useful when working in the archive, as the plastic bags in general do not carry the excavation number.

*Bno* (Bergensnummer) references the first runological number given to each inscription by runologist Aslak Liestøl. They were not viable **PKs** either for, due to Liestøl's untimely death, they do not continue beyond 672, while there are 678 inscriptions. *Bnoin* (Bergensnummer inscribed) refers to the sides of the inscriptions according to Liestøl and lists their letters.<sup>19</sup>

*Niyr* notes the corresponding numbers from NIYR VI for inscriptions published there, while both *addcom* columns serve to note down any comments that might be important for scholars working with the inscriptions. It should, however, be noted that these comments relate to something in the table itself, meaning to the **entity** or one of its **attributes**. Comments on other aspects of the inscription should be noted either in the appropriate column in the right table, or in a separate table designed to house notes that would not fit anywhere else.

*Photographed* and *rti* were working columns added to keep track of which objects I had already taken pictures of during research visits to the museum, but they may of course be used to denote whether pictures and RTI-images of a particular inscription are available for other scholars as well.

The field types are either varchar or integer, and it should be noted that the length of each field is restricted (Data Type, Length). This is less to save space and more to ensure better control over what is being entered into each field, as it is easier to retain data integrity if the **RDBMS** helps by not letting one enter wrong values, or values longer than expected, into the respective fields.

As can be seen from the above, **INSCRIPTION** does not yet contain any data relating to the inscription itself, and it is not meant to. Instead it concentrates on the essential information scholars might need to begin their research – inventory numbers, edition numbers and information about available images. It is only with the next few tables that the actual inscription becomes the focus.

#### 4.8.2. Unirunes

As mentioned previously, most runic inscriptions were read and interpreted at least twice, which is in part why **UNIRUNES** is its own **entity type**. While the table could have been called “**transrunification**”, the designation used is a shortened version of “unicoded runes”, because that is really what the content consists of; and if another table containing **transrunifications** in the print style should be added, this will distinguish them.

*Insid* is the first **FK** column in the **DB** as a whole, and contains the **PKs** from **INSCRIPTION** as **FKs**. This column is set to NOT **NULL**=true, as a missing entry in this column would create an “orphan record” (a record not tied to another entry), thus rendering it useless.

*Urunid* combines the table designation with “id”, and holds the **PKs** for each unicoded **transrunification**, while the next column, *utransrunification*, contains the encoded information. With 700 characters, it is a very long field, which it needs to be since the five-character-encoding requires that much space in case of longer inscriptions. Since text is broken up into the individual sides of the object, the content of *utransrunification* is not as extensive as it could be if, for example, an inscription of 200 runes needed to be encoded (200x5=1000, not counting additional punctuation or indicators for **bind-runes**), but it still needs a fair amount of storage space.

---

<sup>19</sup>Runologists often choose Roman letters to denote parts of inscriptions or different sides of an object.

Column Name	Data Type	Length	PK?	Not Null?
insid	varchar	8	false	true
urunid	varchar	10	true	true
utransrunification	varchar	700	false	true
urunincomp	tinyint	1	false	false
urunobside	varchar	1	false	true
transliterated	tinyint	1	false	false
patterned	tinyint	1	false	false
uruncom	varchar	150	false	false
urunsource	varchar	30	false	true
urunsourcepg	varchar	8	false	false

Figure 4.6. Table structure **UNIRUNES**.

The next column refers back to *utransrunification*: *urunincomp* is a **BOOLEAN** column indicating whether or not the **transrunification** in the preceding column shows the complete text of the inscription or only parts of it. This was deemed necessary because some scholars concentrate on particular aspects of an inscription and only publish **transrunifications** of these (e.g. Markali 1983, who only provides the names in **transrunification**, but generally ignores the remaining parts of the inscription). It is important to store this kind of information, because it could otherwise result in confusion and even doubts about whether two entries refer to the same inscription.

*Urunobside* gives the side letter, again because it would otherwise be easy to get confused when an object has more than one inscribed side with different texts. Unfortunately, the lettering of the sides depends on the runologist, so they may not be consistent throughout all publications of the inscription. The practice was nevertheless adapted for consistency, and a comment added in *uruncom* making a note of this complication.

*Transliterated*, *patterned* are again a **BOOLEAN** marked when the **transrunification** was transliterated/patterned, while *urunsource* and *urunsourcepg* hold, respectively, the **PK** of the literature reference and the page number in cases where page numbers can be given (obviously they cannot be provided when the information stems from another **DB**). Since the literature references are so important, this column is again set to NOT **NULL**=true.

### 4.8.3. Transliteration

Linking back to either **UNIRUNES** or, in cases where the underlying **transrunification** is not known, **INSCRIPTION**, is **TRANSLITERATION**. The **PKs** from either table are stored respectively in *insid* and *urunid* as **FKs** and the **PK** is labelled *tlitid*. It should be noted that to keep the **PKs** truly unique, the first few letters of each table which precede “id” are also used in the **PK** itself, so entries are designated “ins1”, “urun15” or “tlit233”.

*Transliteration* contains the actual text, while *tlitincom* serves the same purpose as in **UNIRUNES**, namely to indicate whether the **transliteration** is complete or parts are missing; equally *tlitobside* indicates the side. Because of the potential of numbering sides differently, this was deemed ne-



Column Name	Data Type	Length	PK?	Not Null?
insid	varchar	8	false	true
urunid	varchar	10	false	false
tlitid	varchar	9	true	true
<b>transliteration</b>	varchar	200	false	true
tlitincom	tinyint	1	false	true
tlitobside	varchar	1	false	true
tlitcom	varchar	150	false	false
tlitsource	varchar	30	false	false
tlitsourcepg	varchar	8	false	false

Figure 4.7. Table structure **TRANSLITERATION**.

cessary, for nothing prevents a scholar working with someone else's **transrunification** to number the object sides anew according to their own interpretation.

*Tlitcom*, *tlitsource**tlitsourcepg* again contain additional comments relating to the **transliteration** (*not* the inscription itself) and literature references.

#### 4.8.4. Patterning

As explained in Section 4.5, the process of deciphering an inscription starts with the scholar (trying to) observing patterns and then deciding on what they might mean. These observations concern characters, whether runic, Roman or unidentifiable, coded runes and a variation of others, amongst them the potential language of the inscription. Since there are many observations to be made on an inscription, this table is the most extensive within the runological part of the **DB**.

While **PATTERNING** is by far one of the most extensive tables in terms of columns, most of the **attributes** are, in accordance with the requirements set out above, either number or **BOOLEAN** field types, permitting scholars to note down observations quickly. Since a **patterning** can be based on either a **transrunification** or a **transliteration**, both options are provided with *urunid* and *tlitid* as potential **FKs**. Unfortunately the general rule of making them mandatory cannot be applied in this case, for, as explained earlier, not every **transliteration** can be linked to a **transrunification**. Great care has to be taken with this table therefore to make sure the entries are properly linked up.

Further observations concerning the inscription are noted down in the other fields. *Damaged* refers to whether the inscription (not the object!) has been damaged in some way, followed by information about the inscription:

*OWN*, *latin*, *nonlexical* refer to the identified language and are **BOOLEAN** fields. Non-lexical, in this case, means that the characters do not make semantic sense, *not* that they cannot be interpreted; this is different and marked in a different way (Section 6.2.2). While it would have been possible to use only one text field and use code to distinguish combinations of the three language options (even if non-lexical is not really a language), using three separate **BOOLEAN** fields enhances the search flexibility and does not require users to remember the code, making



Column Name	Data Type	Length	PK?	Not Null?
urunid	varchar	10	false	false
tlitid	varchar	9	false	false
patid	varchar	9	true	true
damaged	tinyint	1	false	true
own	tinyint	1	false	true
latin	tinyint	1	false	true
nonlexical	tinyint	1	false	true
names	tinyint	1	false	true
namesno	int	2	false	false
bynames	tinyint	1	false	true
bynamesno	int	2	false	false
patcom	varchar	150	false	false
patsource	varchar	30	false	false
patsourcepg	varchar	8	false	false

Figure 4.8. Table structure **PATTERNING**.

**PATTERNING** more comfortable to use. Also, since the Bryggen inscriptions are by default normalised to **OWN** or Latin, no provisions were made for storing other potential languages, despite **SRDB** providing this kind of information. Should the need arise, though, it is easy enough to add another **BOOLEAN attribute** storing this information.

Owing to the research areas I decided to investigate with the help of **TAKERUN**, the columns *names*, *namesno*, *bynames*, *bynamesno* were created. Two are, once more, **BOOLEAN** and indicate whether one or more **idionyms** were identified in the **transrunification/transliteration**; the “no”-columns give the exact number so that it is possible to calculate how many **idionyms** in total appear in these inscriptions (see Chapter 5 on how to use MIN/MAX in queries to calculate totals).

**PATTERNING** was originally designed with a host of additional **BOOLEAN**-columns indicating, for example, whether particular inscriptions contained mirror, code- or **bind-runes**; since they were not used in this project, I am not listing them here, but they are designed exactly like the columns for names. As with the previous tables, it is also possible to add as many **patternings** for a single **transrunification/transliteration** as required. The column settings are, however, meant to prevent entries like “runesno: 3-6” or “3/4”, on the simple principle that these are two distinct possibilities for **patterning** one and the same inscription, and therefore need to be entered as such.

Once more, it is important to remember that we are dealing with a system here that benefits greatly from clarity, and it does make a difference whether there are three, five or six names in an inscription, especially when statistical analyses come into play (Chapter 5). Having entered all of the **patternings** by hand myself, I can confidently attest that it is taxing having to enter six different possibilities for the same string of eight runes (and it also influences query formulation, Section 5.5.5). But once more, if this is what reality looks like, then this is what reality looks

Column Name	Data Type	Length	PK?	Not Null?
patid	varchar	9	false	true
normid	varchar	9	true	true
normalisation	varchar	300	false	true
normobside	varchar	1	false	true
normincomp	tinyint	1	false	true
normcom	varchar	150	false	false
normsource	varchar	30	false	false
normsourcepg	varchar	8	false	false

Figure 4.9. Table structure **NORMALISATION**.

like, and to represent it as closely as possible is the whole purpose of building a research database. In this case, for the benefit of precise data, conceding to the limitations of **RDBMS** and adding all six of these possibilities as distinct records is not a high price to pay.<sup>20</sup>

#### 4.8.5. Normalisation

**NORMALISATION** was included in the core **DB** as its own **entity type**. There is little to be said about its **attributes** that was not said already about the other tables. What is different to before though is that the **normalisations** are not linked back to **TRANSLITERATION** as may be expected, but to **PATTERNING**. When analysing the process of deciphering an inscription, I concluded that the text **normalisation** can logically only take place *after* runologists have patterned a **transrunification** or, more often, a **transliteration**. Without having identified certain patterns that can be orthographically normalised, it is not possible to normalise; therefore, the **entity type** has *patid* as a **FK**-reference.

*Normalisation* is only set to 300 characters, for, other than in *utransrunification*, no space is needed to store additional information like rune-type and uncertainty. Again, the field always contains only one side of the object, therefore 300 characters are plenty of space. *Normobside*, as before, marks the side of the object this normalised text is found on; *normincomp* marks whether the whole **transliteration** was normalised. This difference is important to note; in **UNIRUNES**, the equivalent **BOOLEAN** marks whether all of the characters on the object were transcribed into the coded system. In **TRANSLITERATION**, it equally marks whether there are some parts of the inscription that were not transliterated for whichever reason (since it is unfortunately impossible in several cases to establish whether the lacunae were already present in the **transrunification**, this field is not as informative as it could be). In **NORMALISATION**, though, *normincomp*'s purpose is to signify whether there were some parts of the **transliteration** that could not be normalised; these may well have been transcribed and transliterated, but they cannot be normalised.

Once more, *normsource*, *normsourcepg* contain literature references; and where these come from is the focus of the next section.

<sup>20</sup>Also, most runologists will not add hundreds of entries at the same time.

#### 4.8.6. Literature references

As mentioned several times already, scholars cannot work without properly referencing the origin of their theoretical background, data and source materials, primary and secondary. With the process of deciphering an inscription, it is also quite obvious that the single steps of the process can be undertaken by different scholars, for example by one scholar publishing a **transrunification** and two others basing their **transliterations** upon this, and a further three normalising them in different ways.

To be able to also represent this part of the process was one of the core aims of my project, and by including literature references in each table representing the various steps, it is now possible to link the **transrunification** from one scholar to the **transliterations** from two others. Besides properly documenting who is basing their work upon whose prior work, this also enables other scholars to trace the process to its different sources, which, in my opinion, is a huge benefit.

Including literature references in **TAKERUN** was therefore of the utmost importance, and this raises the question of why there is no **entity type** LITERATURE. There are two reasons for this:

A properly designed literature **DB** following the relational model would once more introduce a host of new **entity types** into **TAKERUN**, and the analysis chapters will show that there are already enough **entity types** that need to be added for the purposes of different research approaches. It therefore seemed unwise to combine **TAKERUN**, at the present stage, with a literature **DB**. More importantly, though, there are a number of perfectly well-designed and accessible literature referencing applications around. Designing a bespoke literature **DB** to include in **TAKERUN** was therefore a pointless endeavour, especially since a good proportion of them work on the same principle of assigning every entry its own unique key (or letting users define their own), and some of them, like for example JabRef, even permit direct connections to and import into relational **DB**.

It was therefore chosen as the literature referencing application since it conveniently offers a function to work directly with a **SQL-DB** from the JabRef interface, meaning entries made via its interface can automatically be linked up to an **SQL-DB** without having to enter them into **TAKERUN**. As long as the bibtexkeys (**PKs** in bibtex-files) defined in JabRef correspond to the **FKs** used in the respective *-source-columns*, they can be linked up.

### 4.9. Conclusion

With the inclusion of the required literature references, the basic all-purpose-model for a relational runic **DB** is complete. These tables only mirror the very first steps in the process of interpreting a runic inscription, however. Düwel's list (Section 4.4) reveals that there is much more information relating to the domain "runic inscriptions"; after deciphering the runes, the process of setting the runic inscription into context begins. This may include, but is not limited to, looking for other inscriptions containing similar words/phrases/names, similar objects carrying runic inscriptions or working with the content of the text and interpreting it against the backdrop of what is known of people's lives during that time period.

As explained in Section 2.2, not all of these aspects can or should be stored within the same **DB**. But it is certainly possible to design further **entity types** concentrating on particular aspects of an inscription, like **KDB** did for syntactic structures. Within the scope of this thesis, I have

largely concentrated on onomastic and qualitative text along with archaeological analyses; I am fully aware that other scholars might not be as interested in these aspects as I am. Therefore a distinction is made here between the **entity types** making up the *core* tables as opposed to the *research* tables. The core tables comprise the **entity types** deemed indispensable when working with runic inscriptions, whereas the research tables contain the aspects pertaining to my chosen areas of research. The next three chapters outline how onomastics can be used to analyse the social background of rune-carvers, how qualitative text analyses can help determine what purposes runes were used for by which groups of people, and finally, how the use of runes changed over the course of time in **Björgvin**.

## 5. Onomastic analysis

Since human interaction relies heavily upon our ability to assign names to things, animals, places and people, with the name's ability to "stand in place" of the thing/person facilitating communication, **onomastics**, the study of names, are an important research area. Research focuses on different aspects such as etymology, transmission and usage of, for example, **toponyms** (place-names), but also **anthroponyms/personal names (PNs)** (e.g. the wide range of studies presented in Hough and Izdebska 2016; Beech, Bourin and Chareille 2002; Burkhardt 1995; as well as the Scandinavia-focused onomastic research reviewed in Beck 2002).

Onomasticians generally also agree that the onomastic material of a society or period is firmly rooted in the social environment in which it is used (for example Andersson 2003, 609; Stefani 2016, 54; Bramwell 2016, 265). Therefore, names are studied to gain insights into the culture and society behind the name (Bramwell 2016, 265). For historical societies and communities, establishing whether the individuals behind the names shared a common cultural framework is difficult, in some cases probably impossible. While names derived from the same language are often used within communities sharing that language (or at least, a descendant of said language),<sup>1</sup> using names to ascertain ethnicity (and therefore establishing a group likely to share the same cultural framework) is inadvisable, for name loan can have taken place at any point in time (Andersson 2003, 608; also the spread of Biblical **idionyms**).

Establishing the cultural framework of a single name-bearer is almost impossible if the name is the only known piece of information about a person, originates from a group in close geographical/linguistic contact with others, or was borrowed into several languages. Instead, single names need to be interpreted (if possible) against the backdrop of the general name-stock of the whole community, since "much research in the field begins at the level of the individual name, but only reaches full significance when the results are grouped together, allowing patterns to emerge" (Hough 2016, 1). To this end, large corpora of names may be analysed in order to find out more about the society they were used in.

This chapter focuses on the large-scale analysis of names appearing in the Bergen runic inscriptions to expose patterns on a macro-level rather than the analysis of single names on a micro-level. This decision is partly based on the fact that the Bergen names, just like the inscriptions themselves, present a coherent, datable corpus of names that can with great certainty be said to originate in an identifiable community. Yet the study also serves to analyse the applicability and usability of **RDBMS** for large-scale studies of names appearing in runic inscriptions.<sup>2</sup>

Lastly, the decision is rooted in previous studies of parts of the name material, which mostly

---

<sup>1</sup>Some scholars would argue even this on very valid grounds, for example Parsons (2002, 35), who writes "[p]ersonal name fashions and general language are not the same thing, and people with Scandinavian names clearly do not have to speak Old Norse" about the use of **OWN** names in Anglo-Saxon **toponyms**.

<sup>2</sup>Without delving into the intricacies of proper onomastic research, see Janzén (1947b, 2) on the complexities of medieval onomastic studies, or the more general comments by Bramwell (2016, 273).

focused on the supposed internationality of the denizens of Bergen; yet they originate in cultures/languages geographically close to Norway, and should not, per se, be regarded as belonging to foreigners for that reason alone (Section 5.1.2).<sup>3</sup> A large-scale comparative study of the general patterns might help shed some light on this and other questions regarding the background of the Bergen rune-carvers.

Due to the nature of the material, the analysis focuses on **anthroponyms** (the number of recognisable **toponyms** is too small to be of interest) with a view to what Stefani (2016, 54) calls their “social significance, that is, social identification and the embedding of an individual within a community”. Yet identity, and how names express identity (Stefani 2016, 54; Bramwell 2016, 265, 270), are not the main focus; Geary (2002, vii) rightly cautions that names are not to be regarded as being synonymous with identity.<sup>4</sup>

Instead, the chapter first provides an overview of current knowledge about **OWN** medieval naming customs and how names could be used as markers of kinship and social status, alongside the requisite definition of what constitutes a “**personal name (PN)**” within the scope of this study. The following section takes a critical look at sources of **PNs** from Scandinavia to contextualise the Bergen names within the wider society and name-stock in Scandinavia.

Section 5.3 and Section 5.3.3 focus on the methodological approach, while Section 5.5 presents the part of the **entity model** concerning this part of my study. Based on the results from the statistical tests in Section 5.3.3, the last sections discuss how said results can help to contextualise the name material from Bergen and possibly indicate socio-cultural implications of certain names.

## 5.1. “Mirrors of society”: name-giving as a social practice

While the practice of using names appears to be universal to humans, the processes of choosing a suitable name, and what constitutes a suitable name, differ from culture to culture, which led Andersson (2003, 609) to describe names as the mirrors of the society in which they are created. The general practice in Scandinavia, likely already before Christianisation, certainly afterwards, was to name a child shortly after birth (ibid., 589). The identity expressed by the Bergen names may therefore provide more clues to how the name-giver perceived the name-bearer’s identity than to how the name-bearer themselves did; for them, their name was possibly “only one representation of identity” (Geary 2002, vii) Although renaming could take place (e.g. in the form of nicknaming), there is nothing to suggest this was a common occurrence, as it is in some other cultures, where names change according to the stage of life of a name-bearer (Bramwell 2016, 264). Most people likely carried their name throughout their lives, which made the process of choosing a suitable name all the more important.

By doing so, the name-givers “placed” a child within the wider world, which in turn necessitates an understanding of how that world works. The strategies involved in naming may therefore be seen as “provid[ing] insights into otherwise impenetrable areas of medieval social values” (Geary 2002, vii). At a later stage, the original “placing” supplied by the given name might be expanded

---

<sup>3</sup>The first such paper was presented by Johnsen (1981).

<sup>4</sup>Such studies are either conducted within the field of socio-onomastics and frequently include interviews (Aldrin 2016), or in conjunction with analyses of family trees (for example Le Jan 2002), neither of which are available for the Bergen material.

Area	Factors
Linguistic	meaning of the name origin of parents gender of the child
Religious	names of sacred persons/gods taboo names
Socio-cultural	social background of parents family traditions (emotional) associations considerations for the child's future location of the child at birth

Figure 5.1. Influences on naming; table based on, among others, Nyström (2016) and Leibring (2016).

upon by the child/adult being given a nickname or byname that further anchors them in the community.

Various factors contributed to the parents' (or another name-giver's) choice of name for the child, the most important being linguistic, religious and socio-cultural (Figure 5.1). Each area comprises different factors that are taken into account when name-givers make a choice, although they may be unaware at the time, and the factors may manifest in different ways depending on cultures and languages, also in OWN naming customs. First, however, a short definition of what constitutes a **personal name** (PN).

Medieval Scandinavia did not know family names, a **PN** may therefore be defined as the single name designating an individual. Andersson (2003, 589) suggests "Individualname" (individual's name) and "Idionym", either of which would be suitable, whereas Leibring (2016) prefers "given name". Since the Bergen finds date to after Christianisation in Scandinavia, a terminus like "Christian name" would also be appropriate, which should be avoided in pre-Christian times. I chose to make use of the term "**idionym**" when referring to the abstract concept, while using "name(s)" when referring to their use or specific instances, since most of the Bergen **idionyms** were created in pre-Christian times. Using "Christian name" might falsely imply that the names are Christian in the sense of having been formally given in Christian baptism and based on Biblical names.

**PNs** are also distinct from **hypocorisms** (short or pet form of an **idionym**) bestowed upon individuals, potentially in order to better distinguish between individuals carrying the same **idionym**. They can replace the original name in daily use and gradually turn into their own independent form of an **idionym**. They are then in use as **hypocorisms** and **idionyms** proper at the same time, with little possibility to distinguish in the case of the single occurrence, unless the **hypocorism** is so unusual (or previously unknown) that it draws attention (Andersson 2003, 590). As far as the Bergen material is concerned, I know of no case where the name was identified as a **hypocorism**, at least not in the sense that the actual name would have been the original version, and the carved name a **hypocorism**. The possibility of some Bergen names being **hypocorisms** instead of



**idionyms** has to be accepted, since there is no way to pinpoint potential cases.

Alternately, additional names can be attached to an **idionym** as a “byname”, based on **OWN** “kenningarnafn”, which Whaley (1993, 124) also translates as “nickname”. Andersson (2003) and Brylla (2016) appear to use a similar definition, but it is not quite clear whether Brylla considers the byname as an addition to the original name. Whaley (1993) uses the term exclusively for additions to an already existing name, for example “Þórir hjörtr” or “Skjaldar-Björn”, and also for patro- and metronyms (names created by combining the father’s/mother’s name with the language’s equivalent of “daughter/son”). Since either of these fulfil the function of individualising a person (Leibring 2016, 200), they might with some justification be included in the term “**idionym**”, even if they are coined later in life as a reference to particular events, skills or characteristics of a person (Stemshaug 1982b, 25). Also, bynames can turn into proper **idionyms** in their own right (for example *Sturla, Snorri*). There are only a handful of these instances in the Bergen material, though, and again it is impossible to determine whether they were used as **idionyms** proper or bynames.

The names referred to as “**idionyms**” within the scope of this thesis therefore only comprise what Leibring (2016, 200) calls “given names”: “the name (or those names) bestowed on an individual person, in most instances a very young child, with the purpose of individualising this child; to separate him or her as a person from other people in the vicinity. This purpose is combined with the aim of including the child in the family and in the (local) society.”

Individualisation and inclusion strategies, however, have to take certain considerations into account, which can limit the choice and even directly contradict individualisation. One limitation is linguistic in nature: **idionyms** are generally formed of components of a community’s language, unless borrowed from elsewhere (like the Bible). This can be utilised to signal or conceal the child’s connection to a specific community (Section 5.1.2).

Meaning is another linguistic consideration, as an **idionym** may be composed of “common nouns which have preconceived associations, or **anthroponyms** with particular connotations of gender, social class, or religion” (Bramwell 2016, 273). In the case of ethymologically Scandinavian **idionyms**, the child’s gender also directly influences its name – or rather, the linguistic structure of **OWN** predetermines which **idionyms** can be used for which gender. Germanic languages in general assign grammatical gender to nouns, and when making use of a noun in an **idionym**, the gender of child and noun had to correspond. Therefore female children could not be given a masculine **idionym**, and there is only a handful of exceptions where a noun classified as feminine can be used as a male **idionym**.

For the Bergen material and the Scandinavian name-stock in general, there is therefore rarely doubt when classifying **idionyms** as *feminine* and *masculine*, and identifying their bearers as female or male (Leibring 2016, 202; Andersson 2003, 596). The gender dimension also appears to have been more important than the semantic meaning of the components. Examples like *Hallsteinn*, composed of *hallr* (m), “(flat) stone” or maybe “stone slab”, and *steinn* (m), “stone” (Janzen 1947b, 77), or *Hildiríðr*, with *hildr* (f) meaning “fight, battle” and *(f)ríðr* “beautiful (woman)” (ibid., 78), certainly suggest that meaningful semantics may not have played a major role in these instances (Andersson 2003, 593). This also applies to the name material from Bergen, where speakers of **OWN** would have known and recognised the single elements.

Religious connotations did, however, play a role. A rise in **idionyms** including Norse deities’ names (Shaw 2011) preceded the influx of Christianity-inspired **idionyms**, which also appears to

have triggered a change: prior to Christianisation, deistic **idionyms** were never given to children by themselves, only as part of a **dithematic idionym** (Andersson 2003, 608; see also Section 5.1.1 for **variations** on *Þór*- and *-þórr*). **Dithematic idionyms** are names like the two examples above, made up of one noun and either another noun or an adjective. Conversely, **monothematic idionyms** only contain one noun, e.g. *Björn*.<sup>5</sup>

The names of pre-Christian Scandinavian deities are never used as **monothematic idionyms**, and only as the first element in **dithematic idionyms**, which has led to them being regarded as taboo names by scholars. They appear to have lost this status after Christianisation, although they still were not bestowed often, now likely owing to the heathen connection (Janzén 1947a, 130; Stemshaug 1982b, 36). Conversely, Saints' names of different etymological origin and their derivatives were soon used following Christianisation, up to the point where they appear with equal or greater frequency than etymologically Scandinavian **idionyms**, with the notable exception of *María*. This lists a surprisingly small number of occurrences; with the exception of a few princesses, the name itself is not found as a **PN** in either Norway or Iceland before 1500 (NID, 764). It appears that while the pre-Christian deistic **idionyms** lost their taboo status, certain Biblical **idionyms** took their place (Johannessen 2002, 36, with references to other scholars). This is important to keep in mind, as *María* occurs no less than 19 times in the Bergen material (Section 5.5.1).

Restrictions on name choice, whether linguistic, gender- or religion-related, narrow down the pool of possible **idionyms** considerably. Other potential influences are of a more emotional character and impossible to trace or guess at (Figure 5.1); emotional association (i.e. positive/negative connotations) and wishes or expectations may be reflected in the name, e.g. choosing a deity's name as a first theme in hopes of securing the child special protection (Nyström 2016, 50; Leibring 2016, 211-212). More visible are different strategies signalling a child's connection to a certain family, in-group and society (see Leibring 2016, 211-212 for a more extensive list).

### 5.1.1. Expressions of kinship

Lacking last/family names as a means of identifying a person as part of a specific family, people in Germanic-speaking areas made use of **alliteration**, **name transfer** and **variation** to different extents to associate children with particular families and lineages. Perhaps **variation** was the predominant way of naming children before the Viking Age, and was later replaced by **name transfer**, partly due to changes in the language that rendered people unable to apply the principle any longer (Stemshaug 1982b, 27; Andersson 2003, 606), although the corpus of pre-Viking Age **idionyms** is not great or varied enough to be making any definite statements. **Variation** is made possible in Germanic languages in general because **idionyms** are often **dithematic** (page 74), meaning they consist of two nouns, or one noun and an adjective joined together. Parents could thus easily take one part of their own names and create a new name for their child out of them, directly associating the child with its lineage. Examples can be found in the Icelandic family sagas, e.g. in *Egils saga*, where *Úlf* has two sons, one of them named *Þórólfr*, incorporating the father's name *Úlf* as a **deuterotheme** *-ólfr* in the son's (the first being *Þór*-). His name is later transferred to a

<sup>5</sup>Generally the second element's grammatical gender decides the **idionym**'s gender; for **monothematic idionyms**, there is no question.

new child; one of his brother Skalla-Grímr's sons is named *Þórólfr*. The second *Þórólfr*'s brother re-uses *Þór-* when naming his son *Þórsteinn* (more examples in e.g. Stemshaug 1982b; Janzén 1947a; Andersson 2003). *Úlfr*'s first son is therefore directly associated with his father, whereas the other sons and grandsons are associated with other family members, uncles or cousins, which may have served as a mechanism to strengthen familial bonds.

A toned-down version of **variation** is **alliteration**. The first sound or letter of the child's name corresponds with the first sound/letter of the father's/mother's name. In the example above, both principles are in use when *Þór-* is used in *Þórólfr* and *Þórsteinn*. According to Andersson (2003, 606), it is not surprising that they are often used in conjunction, it is more a question of who made use of them. He as well as Janzén (1947a, 34) and Stemshaug (1982b, 30) consider these strategies typical for families of high social standing.

The *Egils saga* example also shows instances of **name transfer**. The custom itself dates back as far as the Migration Period according to currently known sources (Andersson 2003, 606). It describes the practice of naming a child after dead ancestors, most often grandparents or partners (Halvorsen 1984, 117).<sup>6</sup> It is distinguished from **variation** by the name being transferred whole to the child (Stemshaug 1982b, 29): *Þórólfr* > *Þórólfr* instead of *Þórólfr* > *Þórsteinn*.

At the time of the Bergen rune-carvers, **variation** appears to have disappeared, although it is impossible to pinpoint when exactly the change was completed (Halvorsen 1975, 161). With **name transfer** taking over, **idionyms** start to “go again” in families (Halvorsen 1984, 117), perhaps indicating an even stronger marking of family ties than **alliteration** or **variation** (for example Andersson 2003, 606; Halvorsen 1984, 118). The switch from **variation** to **name transfer** results in already common **idionyms** becoming even more common. Rare **idionyms**, on the other hand, have a higher chance of declining in use or even disappearing completely, a phenomenon commonly referred to as “name-stock reduction”. This is the opposite of what **variation** entails – the recombination of nouns permits new **idionyms** to be created at any time. Although the full extent of the reduction cannot be gauged, several scholars noted that **name transfer** leads to a reduced name-stock in general in the areas where it is practised (for example Chareille 2002, 18; Bourin 2002, 4). However, this observation was made on a comparatively small basis, and begs the question of how much evidence we may be missing. Chareille (2002, 21) observes that in large corpora (i.e. beyond single family trees), “names borne by a single individual make up a large part of the corpus of names (often more than half), even though the concentration of choice on certain names was greater during this period.”

Since these larger corpora frequently consist of lists from (tax) registers, whereas the phenomena of **variation**, **alliteration** and **name transfer** can only be observed in family trees, this begs the question of precisely whose name-stock was being condensed once **name transfer** became predominant. Preserved family trees tend to favour families of high social standing, while tax registers should, in theory, mirror at least most of the male population. It is possible that neither of the three principles was actually used among the non-attested population for a long time. Stemshaug (1982b, 29) already provides another example of an Icelandic family where neither principle appears in the family tree, perhaps due to the difference in social status between the two families in question. Halvorsen (1984, 117) suggests that at least within the upper echelons of society, **name transfer** may have been utilised as a way to show the child's or even the parents' legitimacy

<sup>6</sup>Also referred to as (*fullnamns*)*oppkalling*, *uppkallelse* or *Nachbenennung*.

in claiming to be part of the kin-group. Having established their social position by means of their name, children could then rightfully avail themselves of the power exercised by said kin-group. He refers to the custom as “legitimeringsoppkalling”, and it was an apparently widely adopted approach amongst families of high social status (Le Jan 2002).

While the evidence from Scandinavian non-literary sources is scarce for the time period under consideration (1100-1400), based on evidence from other countries, there is a possibility that different naming strategies may have been in operation within the different groups of society. Potential social implications of an **idionym** play a big role in **PN**-studies, and naming strategies employed by certain Germanic/medieval Scandinavian families seem to indicate that the social status of a child or its parents may have strongly influenced the choice of name. It remains to be seen whether this hypothesis can be supported by evidence, and if so, in which ways naming strategies differ between social scales. Gathering evidence is difficult however, since the large name corpora (tax registers etc.) do not necessarily contain information on people’s descent.

Nevertheless, the possibility cannot be discounted, and should be kept in mind especially where the Bergen material is concerned, as there is no reason to assume that rune-carving was necessarily restricted to the privileged, like the Roman alphabet.

### 5.1.2. Markers of foreign descent

With **Björgvin** being the most important Norwegian trading hub and the king’s seat (Helle 1982, especially 153-172), one can safely assume that several different social as well as ethnic groups met and interacted with each other there. Potentially, they also made use of runes as a means of communication. The Bergen names were early on used to illustrate **Björgvin**’s international connections, evoked mainly by a passage in *Sverris saga* referencing the multi-nationality of the traders even at a very early stage of the town’s development (*Sverris saga*, 159). The first such study was presented and subsequently published by Johnsen (1981), illustrating connections to other geographic regions on the basis of foreign **idionyms**. Hagland (1988a,b, 1989) presented an hypothesis about the name-tags from **Björgvin** actually being part of the Icelandic rune corpus rather than the Norwegian. Seim (1988b, 1989) rejected this hypothesis on grounds of Hagland’s methodology, which she deemed insufficient for the task. Instead, the **idionyms** invoked mainly signify inter-Scandinavian trading relationships, with little evidence to support more precise geographic placement than “Scandinavia and related areas”. That does of course not rule out that some of the name-tags may have been carved by Icelanders or Greenlanders, however if that is the case, there is no telling which. On the whole, Hagland’s endeavours inadvertently support Andersson (2003, 608) in that **PNs** should not be used to ascertain ethnicity, especially when there is intense contact between different peoples. A number of studies on name material from medieval Norway such as Gunnes (1983) and Meldgaard (1994) also uncover differences in naming customs from different regions and times, and the fact that **OWN** was spoken in Iceland and Norway with only minor variations only complicates matters further.

Potentially foreign **idionyms** in the material should nevertheless be paid attention, although there is the difficulty of what precisely constitutes a “foreign” **idionym**. In the process of name loan, **idionyms** are often adapted to the new language’s pronunciation, spelling and grammatical system; it is then difficult to argue that they are still “foreign”. From an etymological point of view, their origin is “foreign” in the sense that their components are not part of the language

they are used in; however, they can still be carried by someone who is definitely part of the local community, and this also applies even when the **idionym** is not adapted into the new language.

Yet the presence of foreigners within a given population is an important aspect; they not only represent a distinct group within a given population in terms of their origin, but often also in terms of their social (and legal) status. They may even strive to remain distinguishable from the local population for several generations, with **idionyms** playing an important part in establishing their identity. Laliena (2002) analyses two different communities using foreign **idionyms** in medieval Spain, the European *francos* and the Muslim population originating from the Arabic conquests. The *francos* continued to use **idionyms** from their areas of origin for several generations, thus setting themselves apart from the local population carrying, for the most part, Basque **idionyms** (ibid., 125). In this case, geographic location at the time of birth influenced the choice insofar as an etymologically foreign **idionym** was consciously chosen by the name-givers to emphasise their (ancestors') origin (Figure 5.1).

Written sources as well as archaeological evidence suggest that the presence of children of mixed (linguistic and ethnic) background can be assumed on a frequent basis in a well-connected town like **Björgvin**, especially at later stages. Whether they are visible as such is a different question altogether; the origin of the parent(s) only has visible consequences when the name chosen is etymologically distinct, and even then it can be a form adapted to the local language. Therefore the presence of an etymologically foreign **idionym** by itself gives no indication whether the bearer was of mixed background, a foreigner visiting/living in **Björgvin** or the result of an import from another language. A notable example for all three possible explanations being the case is the wife of Haraldr harðráði, daughter of Yaroslav, Princess of Novgorod by birth, given the Hebrew name *Elisabeth*, but spelled *Ellisif* in manuscript sources, the pronunciation having been adapted to **OWN**. She is of mixed background, too, being the granddaughter of the Swedish king by her mother, given an imported Christian name and then following her husband to Norway. Yet unless a person's background is known to the same extent from other written sources, there is little possibility of deciding whether an instance of a Christianity-inspired **idionym** is a foreigner or a Norwegian with a Christianity-inspired name. Additionally, the common hypothesis is that Christianity-inspired **idionyms** were first utilised by the upper social scales in order to broadcast their affiliation with the new faith (Schmidt 2002), suggesting that Norwegians with these **idionyms** are more likely to be of higher social status.<sup>7</sup>

Moreover, preferences for specific **idionyms** also vary between countryside and towns. Halvorsen (1984) concluded that the names of townspeople, in contrast to those of people from surrounding areas and the hinterlands, appear to be strongly subjected to foreign influences. This is almost certainly due to the towns' heightened exposure to foreigners; as a result, their **idionyms** became part of the general name-stock in different ways: traders brought them, priests were imported following Christianisation, men entered the king's service, men and women married to strengthen alliances between countries, towns or political allies (cf. page 78), and immigration in general (ibid., 7). The **idionyms** probably filtered from the towns to the hinterlands, if they did get there at all, and the origin and number of foreigners in Norway changed over time. Halvorsen (ibid., 121) mentions especially the German influence, becoming more visible during the 13<sup>th</sup> century

---

<sup>7</sup>It does not logically follow that foreigners carrying these **idionyms** would automatically have held a high social position in Norway, however.



due to the rise of the Hanseatic League, while the English influence must have been stronger during the 11<sup>th</sup> century.

Foreign **idionyms** are, however, not the only influence on a town's name-stock; towns also attract many people from the countryside, who bring their naming customs. That in turn means that one can expect different naming customs to co-exist, mix, overlap, interact and form something new. **Björgvin** as an important trading centre (and one of few towns in Norway at the time) is sure to have had its share of foreign immigrants as well as local workers flooding in from a certain point in time, although the exact point in time is still a matter of contention between historians and archaeologists. The expectation is that the runic material reflects this mix of men, women, foreign and local, of high and low social status, as expressed by Johnsen (1981); the question is how and in which ways it does.

Following this, the presence of etymologically not-Scandinavian **idionyms** does therefore not necessarily indicate the physical presence of foreigners in Bergen. The etymological origin of an **idionym** does not have to correspond to the background of the name-bearer, although that *can* be the case; but certainly where **idionyms** borrowed into several different languages are concerned (e.g. *Johannes*, appearing in Bergen as *Jóhan*, *Jóan* and *Jón*, with the original name not being present other than as the saint, see Section 5.5.1), there is no telling. At times, it is even impossible to tell the etymological origin: *Samuel* and/or *Samson*, shortened to *Sam* and provided with the *-r* mandatory for masculine names in the nominative case is impossible to distinguish from the etymologically **OWN** *Sámr*.

Another problem is presented by the inscriptions being for the most part of a less formal nature, and name use in official documents and in informal sources can differ quite significantly.

### 5.1.3. Name use in daily life

For the current survey, this represents an issue because the two comparative corpora consist of mostly official diplomas (Section 5.2.1). Due to their nature as less official documents, the names people used in the Bergen inscriptions may not have corresponded to those people would have used in more formal documents: “official names are those which are recorded and endorsed by the state or other authorities, while unofficial names are usually maintained within oral tradition” (Bramwell 2016, 273).

The reason for using a different name can be harmless, for example a **hypocorism** in an intimate message (page 73), or it could be motivated by politics; considering the content of INS424, some rune-carvers may have wished to remain anonymous. Yet the difference between official and unofficial name does not only refer to the existence of two different systems of writing existing side-by-side in **Björgvin** (manuscript and runic writing). Especially with foreigners present, this dichotomy may have taken several different forms. “Official” and “unofficial” suggest that name-users/name-bearers differentiate between the names they are referred to in everyday situations. For a person speaking one language at all times, the difference consists most likely of using a nickname in daily life, and the “proper” given name in official documentation (Janzen 1947b, 57). Where foreigners are involved, it may also refer to literally two different names existing side-by-side, one used by the host, the other by the native community. The *franco* population consciously chose to emphasise their origin by using **idionyms** with a different etymological origin than the local language (Laliena 2002); the Muslim communities co-existing with the *francos* and the local

population, chose differently: they continued to name their children in their inherited tradition, using different names for interaction with the Christians they were surrounded by. They were not entirely dissimilar to their proper given names, but had been modified by Christian officials, and Laliena (2002, 130) concludes that “[b]y accepting these designations, the Muslims protected their true names; [...]. These names veiled the names of the Muslims and helped them to maintain their social identity.” These two naming systems only emerge by comparison with contemporary Muslim written sources. The approach differs fundamentally from the *franco* approach, who apparently did not feel a need to disguise their identity like this.

Translated to the situation in Bjørgvin, a local pronunciation and spelling of an etymologically foreign *idionym* does not necessarily mean either that the name-bearer is a local, nor that they are not a local; the use of an etymologically Scandinavian *idionym* could still conceal a foreigner. But unlike in Spain, no religious conflicts complicated matters between the different groups in Bjørgvin. Tensions are reported for later periods, mainly during the times of the Hanseatic League’s residence, and King Sverrir reprimands specifically the German merchants for bringing wine and trouble to Bergen (Sverris saga, 159). Yet these seem never to have reached the point where the adoption of a different naming system or the concealment of the original *idionym* was deemed necessary. Additionally, German, Dutch and English *idionyms*, all derived from Germanic languages, were much more similar to Scandinavian *idionyms*, which cannot be said about the Muslim naming system (Laliena 2002, 126), and therefore not as glaringly obvious to begin with.

Still, that does not rule out children of mixed background using one name within their family and another in public, or foreigners adapting their *idionyms* for whatever reason. An etymologically Scandinavian *idionym* appearing in runes may well belong to a foreigner or a child of mixed background, who chose to use this *idionym* in the context of a runic inscription; or the foreign *idionym* may have been spelled as the equivalent Scandinavian *idionym* by a rune-carver aware of the parallel.<sup>8</sup>

It is impossible to pinpoint where this may have happened, and since the runic inscriptions in a lot of cases seem to have been carved with some everyday purpose in mind, it is possible that there are more foreigners in the runic inscriptions than we are able to recognise by *idionym* alone. With only the *idionyms* at our disposal, and as problematic as it is to assume that etymology of *idionym* and background of name-bearer correspond, this study must by necessity take the approach that etymologically non-Scandinavian *idionyms*, especially when not spelled in an *OWN* fashion, are treated as indicators that the name-bearer could have been a foreigner, although that may only refer to one parent.<sup>9</sup> Etymologically Scandinavian *idionyms*, conversely, are considered as indicating Scandinavian name-bearers; this also includes, by the same issue of etymology, potentially Irish, Orcadian or English name-bearers. Section 5.7 is dedicated to establishing whether there are certain *idionyms* within this group that appear to be used preferentially by families of high social status.

<sup>8</sup>Some inscriptions containing foreign *idionyms* are ascribed to Norwegian carvers (Johnsen 1987, 730).

<sup>9</sup>Whether in particular the Christianity-inspired *idionyms* indicate people of a higher social status is discussed in Section 5.7.2.



## 5.2. Names as indicators of social status: prerequisites

Since our knowledge of the medieval society in Bjørgvin is by no means comprehensive, analysing **idionyms** to gain information about specific individuals is only feasible to a certain extent, if at all, and in particular questions concerning whether a name is the **idionym** or a **hypocorism**, or an individual with an etymologically non-Scandinavian **idionym** is actually not Scandinavian, will often have to remain unanswered. Conversely, analysing broader patterns to gain knowledge about how **idionyms** were distributed amongst the population in general, and how the Bergen material compares to that, is possible, provided a comparative corpus can be found.

Just as the Bergen material was used to (futilely) establish nationality to trace trade connections, the idea that **idionyms** can be used as indicators of social status has long been accepted in **onomastics**. First brought up by Lévi-Strauss, other scholars have picked up on it; Stemshaug (1982a, 36) for example puts forth the hypothesis that names only consisting of one theme might have been used more often amongst people of lower social status within Germanic-speaking areas. Schmidt (2002, 96) disagrees; too little is known about social distinctions with regard to naming customs in medieval Scandinavia. Geary (2002, vii) puts it as follows:

A truism of medieval scholarship is that observing ordinary medieval people making choices and giving meaning to important aspects of their lives is almost impossible for the modern historian. Written sources, produced largely by a clerical elite and concerned primarily with the affairs of the great, leave the vast majority of the population of Europe known to us at best only by their names, recorded in lists of witnesses to legal proceedings, in tax rolls, or in liturgical texts.

The Scandinavian countries are no different; the question is which society exactly is mirrored in the naming sources and customs known to us (Section 5.1.1). It is difficult to say with certainty how widespread the custom of **name transfer** was, yet the surviving family trees of Scandinavian families of social standing suggest that certain **idionyms** were used repeatedly in specific families. Since families as well as persons hold a social status within any given community, the name of a person could thus also indicate their social standing – to a certain degree. There is little known about how protective families would have been of “their” **idionyms**, or even if this was a common phenomenon across the social scale, since the sources for which it is attested tend to be prejudiced towards the upper social scale.

Even so, “social status” is rather a vague construct, not to mention that determining the social status of a long-dead person is notoriously difficult, especially if the person in question was not part of a family well-known through written sources. Stemshaug (1982b, 25) insists that the choice of **idionym** was restricted by the requirement that it had to indicate which kin-group the child belonged to. Would that have applied to people whose kin-group was not particularly powerful or important? As far as Germanic and **OWN idionyms** are concerned, there is a regrettable lack of sources enabling scholars to test these hypotheses.

When analysing the Bergen material against the backdrop of naming customs in Norway at that point in time, the sources at our disposal are restricted, particularly because the corpora need to contain at least a few hundred names; the larger the sample size, the less the picture will be skewed by single deviations from the general pattern.

### 5.2.1. Name sources in Scandinavia c. 1100-1400

The choice fell on using the name material from the diplomataria published in *Diplomatarium Islandicum* (DI) and *Diplomatarium Norvegicum* (DN); more precisely, the basis for analyses is the lexicon compiled by Erik Henrik Lind, *Norsk-isländska dopnamn ock fingerade namn från medeltiden* (NID). Despite all its inherent problems and inconsistencies, it still forms the basis of most studies on **OWN PNs**, since studies of Scandinavian onomastic material tend to focus on **toponyms** rather than **PNs**. Research into medieval Scandinavian **PNs** is scattered and most often concentrates on one or a group of names, analysed in regard to their elements and etymology. The comprehensive and still relevant study of **OWN PNs**, Janzén (1947a), focuses on etymology and semantics.

NID collects more than the name occurrences from DI and DN, it also includes saga material and *Landnámabók*. Yet *Islendingasögur* and *Konungasögur* were excluded from this study on account of discussions concerning their historical reliability with regard to protagonists, especially minor actors (see for example Halvorsen 1984, 114). *Landnámabók*, though generally a reliable source for names due to being more of a historical account than a work of fiction, is fringed with other problems: the naming customs reflected are for the most part Norwegian, entangled with the naming customs from the whole area of Viking influence around the Atlantic and Irish Sea region, and it is important for this study to be reasonably certain where the name-bearers hailed from. Besides, the **idionyms** found in *Landnámabók* are those of the settlers; most of them date earlier than the Bergen inscriptions (ca. 870 to the 11<sup>th</sup> century), and also represent a mix of different naming customs in themselves owing to the origin of the Icelandic settlers (Simek and Pálsson 2007, 241).

DI and DN contain, for the most part, contracts, private correspondence and ware orders. They therefore represent a corpus fairly similar to the Bergen inscriptions (Chapter 6), and just like these, they come in handy, quantifiable manuscripts. They also fit the requirements in terms of time scale, as the documents date to between 1050 and 1590 (DN) and 834 to 1589 (DI). The latter was included because potential Icelandic traits in the Bergen material have been debated quite fiercely, and foreign influence, whether Icelandic or elsewhere, is an important factor.<sup>10</sup> The aim was to establish whether there are notable discrepancies in the name patterns discernible in either corpus. That it is possible to use statistical methods to show that there are different distribution patterns for certain **idionyms**, is certainly an interesting outcome, especially considering that the languages spoken in either country are mutually intelligible dialects of **OWN**.

Sources also used by other scholars to determine name patterns include urbaria (registers of property ownership) alongside parish registers and account books, as well as the *Regesta Norvegica*, a collection of all known documents mentioning Norway and/or Norwegians (e.g. Johannessen 2002; Gunnes 1983). These, however, overlap with the material compiled in DI and DN, while the urbaria date to later centuries, and are therefore not suited for direct comparison. In terms of similarity, the onomastic material from Bergen could also be compared to the name corpora found in runic inscriptions in Sweden and other Scandinavian countries. Yet these often date to the Viking Age, earlier than the Bergen inscriptions, the oldest of which can be dated to the 12<sup>th</sup> century. Furthermore, since my study makes use of statistical hypothesis testing, there are certain requirements regarding the nature of the corpora:

---

<sup>10</sup>Hagland (1988a,b, 1989) and Seim (1989).

- The comparative data had to come from sources which can be fairly securely attributed to a specific social background.
- It had to originate from approximately the same time and place as the Bergen corpus, and preferably include a large number of names (this is relevant to the  $\chi^2$ -test, Section 5.3.4).
- If possible, it also needed to be quantifiable in order to compute percentages, and – maybe most importantly – the sources had to be genuine and reliable.

“Genuine” in this instance means that the sources had to be Scandinavian, and best written in **OWN** and/or Latin, the two languages predominant in the runic material. “Reliable” concerns the actual existence of the persons mentioned, and this cannot always be guaranteed where literary sources are concerned. DN and DI answer all of the requirements – technically.

### 5.2.2. NID: a critical evaluation

Despite being best suited to the purpose at hand, by nature of the content type as well as other factors, the diplomataria, and consequently the lexicon based on them, are not wholly without problems when used as a comparative corpus. Like every historical source, the diplomas were subject to various destructive influences over time, and many are without a doubt lost. Considering the expense of manuscript writing, it is also almost certain that in poorer parts of either country, manuscript writing never took place on a large scale. Like other new techniques, it took time to become properly established, and later centuries therefore tend to produce more material on the whole, which helped more diplomas from those periods survive. Later centuries are therefore by default better represented.

The most important argument against using the diplomataria for surveys of Scandinavian **idionyms** and naming customs the people responsible, however. The diplomas were written almost certainly by or for the ruling class, or at least persons of a high social status:

The material is little representative both geographically and socially; the upper social circles, small in numbers, are strongly overrepresented, and it is ‘noble’ men from the West Coast, Trøndelag and northern Norway who dominate, especially before 1177 (Halvorsen 1984, 116, my translation).

In regard to a comparison with the Bergen material, however, this bias towards the upper social echelons is an advantage. Since the social status of diploma authors can be determined with reasonable certainty, while that of the Bergen rune-carvers cannot, notable differences between those two corpora can hint at the potential social status of rune-carvers in **Björgvin**.

The dominance of masculine **idionyms** in the diplomataria, however, does not present an advantage. Gender bias is common for all written sources of the medieval period for various reasons, amongst them acquiring the necessary skills and women’s legal rights. This is not to say that women are absent in the diplomas; it means that feminine **idionyms** will by default appear with lower frequency than masculine **idionyms**. This, however, also appears to be the case for the Bergen inscriptions as illustrated in Section 5.2.2: out of 242 attested **idionyms**, 40 are feminine as opposed to 192 masculine **idionyms**, disregarding 9 where the gender association could not be

Gender	Total of m/f/-/mf <i>idionyms</i> in sample	DN total of m/f/-/mf <i>idionyms</i>	DI total of m/f/-/mf <i>idionyms</i>	Bergen total of m/f/-/mf <i>idionyms</i>
m	192	31,338	5,268	415
f	40	3,734	710	77
-	9	2	0	9
mf	1	0	0	2
total	242	35,074	5,978	503

Figure 5.2. The total tokens of masculine, feminine, unidentifiable and gender-neutral *idionyms* in the samples from DN, DI and Bergen, based on the sample of 242 *idionyms* appearing in the Bergen corpus.

determined and one which can be used for either gender. There is a clear bias towards masculine *idionyms*, but really telling is how often those 40 feminine *idionyms* appear in the diplomataria. The 242 sample *idionyms* add up to 35,074 tokens in DN, in DI to 5,978 (Figure 5.2). Out of these, feminine *idionyms* appear only 3,734 in DN and 710 times in DI.

Since the sample is restricted to the 242 *idionyms* appearing in Bergen, there is no point in calculating how often feminine *idionyms* appear in diplomas; this should be calculated once the tokens of *all* feminine *idionyms* in the diplomataria have been counted. Within the current sample group of *idionyms* (see also Sections 5.3.2 and 5.6), the feminine *idionyms* make up DN=10.65%, DI=11.88% and Bergen=15.31%. While the runic inscriptions show the highest proportion of feminine *idionyms*, feminine and masculine *idionyms* are still not equally distributed. In that, the three corpora are alike, and may therefore be compared to each other.<sup>11</sup>

One particularly complicating factor, which potentially also skews the numbers presented, is the actual number of documents printed in the diplomataria, or rather the ones available at the time Lind compiled *Norsk-isländska dopnamn ock fingerade namn från medeltiden* (NID) and *Norsk-isländska namn ock fingerade namn från medeltiden. Supplementband*. (NID-S).<sup>12</sup> *Idionyms* published especially in the later years were not added to the lexicon. DI was only published up to vol. XII in 1932, and NID-S appeared one year earlier. Since DI was, to my knowledge, published quarterly, it is uncertain how many volumes Lind was actually able to use for his supplement.<sup>13</sup> Everything published *after* 1931 is definitely not included in either NID or NID-S, which distorts the numbers in addition to transmission and historical selection processes.

Another issue relates to the same kind of problem Lind already faced. He warns readers that “[t]o identify as one or tell apart persons belonging to a time when family names and last names weren’t used at all, will always be a very difficult task, which never happens without mistakes and errors” (NID-S, III). He also mentions that especially patronymics (which I included in my

<sup>11</sup>These numbers are, of course, subject to knowledge about both inscriptions and diplomas. As research continues, they will most assuredly change.

<sup>12</sup>As he himself mentions, “Fullständigheten har lidit intrång även därav, att en del viktiga tåkstpublikationer, bland annat de båda diplomatierna, varit oavslutade ock under utgivning” (NID, IV).

<sup>13</sup>Vol. XII was published from 1923 to 1932, so it is theoretically possible, but by no means certain that he used all single volumes except for the last for the supplement.

counting exercises) might have been overlooked, not least due to missing indexes (NID, IV). Since this point is very important for my methodology, I shall return to it in Section 5.3.1.

A problem specific to Lind's methodology was criticised by Halvorsen (1984, 116):

[...] he does not register all names according to the same principles; he does not include foreigners, or mentions that most bearers of one name are likely foreigners without mentioning for how many this may be the case, or considering how the foreigners might be distinguished. Danish or Swedish immigrants to the Norwegian towns with common Scandinavian names will stay under his radar while English and German immigrants will be registered as foreigners because of their names. [...] there is the possibility that immigrants with non-Scandinavian names have children in Norway and thus further the use of foreign names (my translation).

What Halvorsen complains about is described in Section 5.1.2 and Section 5.1.3. There is no helping the situation, however, even if it becomes obvious that when using the names from NID; NID-S, they should be properly evaluated, which in turn would have required looking at each single diploma. There was neither time for this nor was it the aim of my study. Thus the diplomas are considered as documents written in one country by a specific social class.<sup>14</sup> No attention is paid to whether the person mentioned is a foreigner (although Lind every now and then mentions their origin), because without consulting the diploma itself, ignoring the tokens marked as foreigners is arbitrary.

### 5.3. Quantifying names: methodological framework

If conclusions regarding the social status of an *idionym* are the goal, it is crucial to first establish whether social status can be expressed via *idionyms* in the society under investigation, and secondly, which *idionyms* can then be said to carry which implications. Regarding the first point, some doubt must remain attached to any answer. The practice of *name transfer* appears to have been widespread in Scandinavia according to the sources available, yet it cannot be said for certain which families would follow the custom and whether observing it was of more importance amongst families with a high social standing, as Stemshaug (1982b, 29) suggests. Also, with generally a wealth of relatives, different *idionyms* could be chosen, so a certain selection would still take place (Meldgaard 1994, 212). Since evidence so far indicates that *name transfer* was common amongst those likely to end up in historical accounts as well as sagas, this study works on the assumption that this observation is correct.<sup>15</sup>

Choosing the diplomataria as a comparative corpus is therefore justified by the fact that individuals likely to be mentioned in historical accounts and sagas tend to be members of the community holding a certain social status, which is in many cases connected to wealth.<sup>16</sup> Consequently, they belong to the group involved in the kinds of transactions (e.g. land sales, donations to churches Johnsen 1987, 717) necessitating diplomas. That does not preclude people from

<sup>14</sup>This includes part of what is nowadays Sweden since the east of Norway also comprised Jämtland and Bohuslän.

<sup>15</sup>Naming customs amongst those not or rarely mentioned in those same accounts can, for lack of evidence, not be determined.

<sup>16</sup>Both *Islendingasögur* and *Konungasögur* make a point of mentioning the protagonists' monetary means, often in connection with them being able to equip or reward their followers with precious items.

lower social scales being mentioned, nor does it mean that those mentioned in the diploma also wrote it, nor that they frequently did so; they may also be mentioned in the diplomas for a variety of reasons. Them being mentioned in a diploma still connects them to a certain group of actors. DN and DI therefore likely reflect, at least to a certain extent, the naming customs of wealthy Norwegian and Icelandic families.

In practice, it is impossible to ascertain how wealthy a person or family would have had to be to necessitate manuscript writing, and what social status that person would have held within the wider community. As outlined in Section 5.2.2, the diplomataria are strongly biased with regard to timescale and geographic region. Still, they mirror a particular selection of society which, due to the nature of documents and geographic origin, is particularly well-suited for comparison with the Bergen corpus.

It is important to understand though that when referring to the upper social scales in this study, this not necessarily refers to people of royal birth or the aristocracy (although they are part of that group), but rather those parts of the population who could, and did, frequently employ diplomas as a means of communication, either for personal or official purposes. Whether they would have been considered as part of the upper social scales by their contemporaries is immaterial.

The answer to the second question, which **idionyms** can then be said to carry which implications, needs to be determined by making use of a corpus of **idionyms** which can with some certainty be ascribed to the upper social scales of the society in question; in this case, the diplomataria. Ascribing a high social status to every **idionym** appearing in the diplomataria simply because of its presence is premature, however, as not every **idionym** appears with the same relative frequency.

To figure out which **idionyms** were particularly popular amongst those appearing in these corpora, the tokens of each **idionym** must be counted, and the numbers then compared to each other to create a ranking reflecting frequency of usage (Chareille 2002, 24).

### 5.3.1. Name occurrence and name-bearer

Name occurrence as opposed to individuals carrying said **idionym** is often easily answered with regard to saga protagonists. It is much more difficult to determine whether two diplomas containing the same **idionym** refer to one or two individuals. Since the diplomataria also contain private correspondence, it is, in fact, quite likely that the same person would be referred to in several different diplomas. This presents a difficulty in terms of name ranking. One very prolific diploma-writer might raise the counts for a single **idionym** significantly, thus skewing the ranking. In order to distinguish **idionyms** popular among the upper social scales, it is the number of children it was given to, not how often said children would have used it in writing, that counts.

Parsons (2002) and Gunnes (1983) were faced with a similar problem when counting, respectively, the names in Domesday Book and Regesta Norvegica V. Parsons applied statistical methods to the Domesday **PNs** to produce “an informative sample of the anthroponymic habits of the landed classes in the mid-eleventh century” (Parsons 2002, 35), while Gunnes (1983, 152) was analysing the influence of foreign/borrowed **idionyms** on the overall Norwegian name-stock. Both made it quite clear though that the **idionyms** they were looking at mirrored wealthy, land-owning individuals/families. Their corpora are thus very similar to the diplomataria, and my initial methodology builds upon their work (Section 5.3.3). They also faced the same problem of determining



whether they were counting name occurrences or individuals:

It is, for instance, impossible to deduce that Old Norse *Grímr* was bestowed upon children in the fifteen counties where it is found in the Domesday record, because two or three ‘Grims’ could hold land in numerous counties and distort the figures. This is a clear limitation of the Domesday evidence: too many Domesday people are unidentified for the number of distinct individuals bearing a common name to be established (Parsons 2002, 37).

Gunnes (1983, 167) also addresses the problem: “[...] I followed the rule that where only a person’s given name is noted, every occurrence of said name was counted as different individuals. On the other hand, people with identical given names and patronymics I have regarded as one and the same, where the index did not explicitly distinguish them” (my translation).

The distinction is important. At the same time, establishing name-bearer identity with such certainty that individuals are not counted twice or thrice by accident is difficult, likely impossible, and in many cases probably not even wise, unless said name-bearers are easily recognisable (the king, certain nobles) (Parsons 2002, 37-38; Gunnes 1983, 167-168). Given the sheer size of the diplomataria corpora, establishing identity of name-bearers for this study and then counting occurrences of said name-bearers in the material would have required examining some 26,000 diplomas. This was far beyond the scope of my thesis.

There are other factors to take into account. To begin with, and as discussed above, the individuals mentioned in the diplomas cannot be considered a representative sample of the whole population of either country anyway. Since diploma writing was not something everyone engaged in, and certainly not to the same degree, it can also be assumed that while some individuals entertained extensive correspondence, others would not. Individuals appearing dozens of times in the diplomataria also do not necessarily present an issue. The purpose of this experiment is explicitly to determine the potential social status of name-bearers. An individual with the resources to maintain extensive correspondence is supposedly also wealthy in some way, and a wealthy individual is more likely to also have a high social status.

Counting name occurrences instead of individuals is therefore a reasonable approach, since the more often individuals appear, the higher their social status likely was, which in turn could have reflected back on the **idionyms** they carried. In other words, conclusions about the social prestige of an **idionym** are not only dependent on how many people carried it, but how often those that did had the means (or necessity) to engage in manuscript writing.

Following Parsons (2002) and Gunnes (1983), I therefore counted name occurrences rather than individuals, on the understanding that some individuals will thus find their way into the sample several times, but working on the assumption that these cases will be the exception rather than the rule.

To be clear on the difference between “individual” and “name occurrence”, as well as on the difference between **idionym** and “instance of **idionym**”, the two former are considered as the “type”, whereas the latter are “tokens”. Whenever referring to raw numbers quoted as “tokens”, one individual may be counted several times, with the number of “types”/individuals unknown. Similarly, when referring to tokens of **idionyms**, the tokens are single instances of the **idionym** in question.



Unfortunately the diplomataria are not yet digitised in such a form as to allow specific searches for names.<sup>17</sup> Therefore I relied upon counting the tokens for each **idionym** in NID; NID-S by hand. This I did for the diplomas as well as the inscriptions, although I retained the possibility of counting inscriptions (another kind of “type”) rather than token (Section 5.5). Table F.1 provides both counts, and illustrates that on several occasions, the same **idionym** appears twice or even thrice in the same inscription (*Arni, Sigurðr*).

In the runic inscriptions as well, two tokens may refer to the same individual. INS91, for example, appears to carry *Finnr* on two sides, yet it seems likely that this is only one individual. This possibility also exists for every other inscription carrying the same **idionym**. Different dating of the object is an argument for them referring to different individuals, but different handwriting (or -carving, as the case may be) is already not, as the inscription could have been carved by someone else. Ironically, the two instances of *Finnr* on INS91 are likely carved by different hands (NIYR VI, 165), and even different datings may not be an argument considering that an object may have been redeposited, which applies to many of the rune-inscribed objects from Bergen.

As a last means to determine individuals, in diplomas and runic inscriptions, spelling might be employed. NID though illustrates the vast possibilities of spelling one and the same **idionym** in a time without standardised orthography.<sup>18</sup> Again, the opposite also holds true: the same spelling might still refer to two different individuals, who by coincidence use the same combination of characters. Spelling, therefore, is also no basis on which to establish an individual. In some cases, different spellings also raise the question of whether the name was correctly identified/standardised by Lind.<sup>19</sup> Again, returning to the diplomas and weighing the options was beyond my possibilities. Evaluation will therefore have to wait for further studies, and working with tokens rather than types is the most practical way forward at present.

### 5.3.2. Counting diplomataria names

Following this outline, I counted every token in the Norwegian and Icelandic diplomas to identify **idionyms** with high usage amongst the parts of society named in manuscripts. I did not distinguish between foreigners or **idionyms** appearing in patronymics; it was a simple question of how often one **idionym** is registered in the diplomataria. The results were then entered into **IDIONYM** (Section 5.5.3). Unfortunately, time did not allow for the counting of *all* **idionyms** in NID; NID-S. I was only able to do so for the 242 **idionyms** attested in Bergen; the analysis is therefore prejudiced insofar as it only indicates which of the **idionyms** appearing in Bergen show high and low relative frequencies within the diplomataria. This approach does not allow for an overall picture of which **idionyms** are generally more often used by the upper social scales, which should be kept in mind at all times.

Time restrictions also prevented establishing an internal chronology of naming customs based on the dating of the diplomas; nor was it possible to trace regional differences within either country based on the place of issue, which would have contributed to a more fine-grained analysis. Thus a serious problem remains in the form of the diplomas dating between 834 and 1550 in the case of DI, and 1050-1590 in DN, outdating the time-frame of the Bergen inscriptions (ca. 1120-1413)

<sup>17</sup>DN is available and searchable online, however test runs did not return correct results.

<sup>18</sup>Cf. also Footnote 6 in Parsons (2002, 30).

<sup>19</sup>See also Section 5.5.3 about the difference in standardisation between scholars working with the Bergen material.

on either side by about 150 years. Since manuscript writing activity and preservation conditions varied from the beginning to the end of these periods, and also varied between the two countries, the numbers are going to reflect these circumstances, thereby skewing the analysis. The bias of varying preservation cannot be alleviated, but it is to a certain extent possible to alleviate the dominance of Norwegian diplomas by choosing the right statistical tool.

The core problem is illustrated by a comparison of the number of manuscripts in each corpus: DN contains between 18,500 and 20,000 manuscripts in 22 volumes, whereas DI only contains 8,858 in 16 volumes.<sup>20</sup> It would thus be astonishing, to say the least, if the number of **idionyms** and the tokens for each totalled at the same for both corpora. Summation of tokens of the 242 distinct **idionyms** appearing in Bergen as **PNs** reveals that they total at DI=5,978 and DN=35,074 – the second sample is almost six times the size of the first, a clear sign that direct comparison of raw numbers is inadvisable.

Statistical methods have in the past been applied successfully to medieval name corpora (Parsons 2002, 29–30), so it is mainly a choice of tool and clarifying the limitations of each approach chosen. Percentages are generally used to help *describe* observations rather than establish whether the observed differences are statistically significant, which means that the observed differences are not the result of a badly chosen sample, or coincidental deviations within even a well-chosen sample.

When attempting to establish statistically significant differences in distribution of a particular item like an **idionym** within different samples, it is in most cases inadvisable to rely on raw numbers as a basis for comparison, albeit this has been done in the past (Hagland 1988a, 1989; for criticism of his approach Seim 1989). Parsons (2002) and Gunnes (1983) compare rankings or percentages rather than counts of tokens, but Parsons only uses them to describe distribution within one and the same corpus. Gunnes (1983, 152–153, 162, 164) uses percentages, but provides the sample sizes of his two corpora and clarifies that this approach carries risks (*ibid.*, 168).

Several factors can lead to percentages indicating differences where in fact, there are none, starting with the fact that the approach assumes that the statistical population<sup>21</sup> is a given, independently verifiable total rather than “what managed to survive” or, as is the case here, a total based on educated guesses of the actual number of diplomas at a scholar’s disposal. Since DI was not fully published at the time NID; NID-S were compiled (Section 5.2.2), I had to rely on date of publication to estimate how many volumes of it Lind might have consulted. This study therefore works with DN=20,000 and DI=6,640 as the total of documents. The latter number is based on the sum of diploma numbering from vol. I to XI of DI, published in 1925, which – lacking information on how many issues Lind used – is the last one I deemed possible for him to have utilised given that NID-S was published in 1932.

Additionally, the population size regarding total number of tokens contained within the manuscript corpus, is also skewed by me only being able to count the total tokens of the 242 **idionyms** within the Bergen corpus. To gain reliable results, I therefore opted for using a tool from **inferential statistics**, Pearson’s  $\chi^2$ -test in addition to “corpus-wise percentages” to analyse the corpora. This test can be applied regardless of the varying sample sizes, and is thus to be preferred when at-

---

<sup>20</sup>For unknown reasons different numbers are given on the English and Norwegian versions of the website that permits searching DN.

<sup>21</sup>“Statistical population”, despite making use of the term “population”, refers to the total of any given item or event relating to a research question or experiment.

tempting to establish whether there are statistically significant difference in **idionym** distribution between the corpora.

### 5.3.3. Name patterns in Iceland and Norway

Thus far, I have assumed that the division into Icelandic and Norwegian diplomas as well as considering each name corpus by itself are a given, although NID; NID-S combine both. Seeing as the editions of the diplomas are two separate works, and that the two geographic regions in question are also separated by an ocean, looking at each corpus by itself appears logical. However, Iceland was settled to a great degree by Norwegian immigrants, and failing to take this into account could potentially lead to drawing wrong conclusions with regard to the Bergen corpus. The possible differences in naming customs in Norway and Iceland which several scholars, not least Lind, have commented upon, are so far unproven hypotheses by and large based on qualitative observations.

This study takes a quantitative approach to the matter. The number of **idionyms** and the possibility to count their tokens in DI and DN render it possible to test for significance, i.e. test whether naming patterns within the samples really differ. The tool chosen for hypothesis testing is Pearson's  $\chi^2$ -test (pronounced *kye-square*). It is applicable in situations where sample sizes differ greatly, a problem most definitely afflicting the DN, DI and Bergen corpora. A  $\chi^2$ -test assesses the goodness-of-fit, in this case, of two or more empirical samples' distributions of frequencies over the same set of **idionyms**. The test indicates the extent to which the distributions in the samples diverge based on comparing *observed* frequencies in the samples to those *expected* if they showed the same distribution. The more these two values diverge, the greater the likelihood that the samples do not originate from the same population (statistical dependence). If the distributions in the samples are very similar or even identical, the likelihood that they stem from the same distribution is high (statistical independence). The **probability value (p-value)** additionally provides a tool to evaluate the likelihood of observing said frequencies assuming that they are statistically independent (i.e. from the same population).

In using Pearson's  $\chi^2$ -test, I have chosen a tool from **inferential statistics** instead of using **descriptive statistics** in the form of percentages, as is often the case in studies such as this. But percentages are a tool used to describe the distribution of different attributes of a statistical population; it gives no indication whether said distribution is in any way statistically significant (Sirkin 2006, 192). For a study of **idionyms** as potential markers of social status, it is crucial that the categorisation of an **idionym** rests on more than educated guesses what a certain difference in percentage might mean. Pearson's  $\chi^2$ -test was therefore used to decide where a closer look at the observed difference in percentage is in order, and where it is meaningless in terms of statistical significance.

### 5.3.4. Prerequisites for using Pearson's $\chi^2$ -test

There are certain conditions for using the  $\chi^2$ -test. The first prerequisite is that the samples be chosen randomly, meaning that every **idionym** has an equal chance to become part of the sample. This is very likely not the case (Section 5.2.2), at least not if the sample is supposed to represent the Norwegian/Icelandic population as a whole. Instead, the diplomataria likely present a random

sample of the **idionyms** used amongst the manuscript-using parts of the population, but which individuals that group encompasses, is also not entirely clear. Circumstances being what they are, there is no remedy for that. It is, however, important to consider this when drawing conclusions.

The second condition is difficult to meet, as it concerns the minimum number of *expected* frequencies (not observed). This number is generally given as 5; the Bergen corpus, with its great number of **idionyms** with only one token, does not meet the requirements (expected frequencies are calculated on the basis of those observed). This problem can be circumvented via **bootstrapping**, a resampling method during which samples are taken from samples, which are then used for the actual testing. By using **bootstrapping** for the  $\chi^2$ -tests with 10.000 reruns, expected and observed frequencies cease to matter.<sup>22</sup>

However, first the  $\chi^2$ -test was used on the samples from DI and DN to determine where statistically significant deviations in frequencies can be observed. **Idionyms** either not appearing or listing 0 tokens in both diplomataria were removed for this test, as they would have caused errors in the calculations.<sup>23</sup> This leaves 182 **idionyms** viable for testing (Query F.6), defining the first category of **idionyms** in this study: those only observed in Bergen.<sup>24</sup> This applies to 60 of 242 **idionyms**, although one of those is *Jón*, which needs to be subtracted (page 110), therefore bringing the number down to 59. Ten of these are not clearly identified as **idionyms** or bynames, two are supposedly only used as bynames and five can be used as either **idionym** or byname (Table F.1).<sup>25</sup>

The last condition for using the  $\chi^2$ -test is the formulation of the hypothesis to be tested. This is referred to as **null hypothesis** ( $H_0$ ), and always assumes no statistical dependence between the samples tested against each other. The **alternative hypothesis** ( $H_1$ ) conversely assumes statistical dependence between the samples. Statistical hypothesis testing works on the premise, not of *proving* an assumption, but on *disproving* it, by which so-called *Type I errors* should be prevented (wrongly assuming statistical dependence when there is none).  $H_0$  is only rejected when the **p-value**, which is always calculated with the test, is below a certain threshold. **P-value** is known as the “probability value”, since it represents the likelihood of the observed statistical dependence (in terms of dissimilar distributions in the different samples) being brought about by chance and not actually being representative of the statistical population.

Scholars need to decide prior to the test with which **p-value** they want to be working; common thresholds are  $p < 5\%$  and  $p < 1\%$ . This translates roughly to “There is a 5% chance that this result would be observed even if the samples come from the same population.” The lower the chosen **p-value** is, the lower the likelihood of making Type-I-errors. Although **bootstrapping** balances out too-small expected frequencies, I decided to use  $p < .01$  **p-value** to make reasonably

<sup>22</sup>See the R-code-snippets F.9, F.10. B=10000 indicates the number of times the samples are resampled.

<sup>23</sup>For clarification, by this I mean that Lind does not list the **idionym**, not that the **idionym** does not appear in either DN or DI. In **IDIONYM**, this is signified by the value in the respective columns being **NULL**, whereas if the **idionym** is listed, but not attested in either diplomatarium, the value will read 0. This may not seem like much of a distinction, but as far as **SQL** is concerned, there is a difference whether users query for IS **NULL** or 0, as in the first case, users literally query for entries with no value in that particular field. In the second case, users query for entries with the value 0 in that field. If those queries return the same result, one should go back and check the actual entries for errors.

<sup>24</sup>They may have been observed elsewhere, in other inscriptions or sagas, but not the diplomataria.

<sup>25</sup>These are distinguished by respectively the values 0/0, 0/1 or 1/1 in the **idionym** and **byname** columns in **IDIONYM**, see Section 5.5.3.

certain  $H_0$  is not rejected wrongly. This raises the probability of making Type-II-errors, which in this case means that **idionyms** actually showing different distributions in the samples will still be considered as showing none, and interpreted as coming from the same population.

While this approach may certainly be criticised, considering just how close the two populations in question are in so many respects (up to and including speaking what can only be considered dialect versions of the same language), I preferred to err on the side of caution.

$H_0$  must always be formulated with a view to disproving it; it is therefore:

$H_0$  = **idionyms** and manuscript corpora are statistically independent, i.e. it makes no difference for the count of **idionym** tokens from which country the sample is taken. The patterns in both samples correspond.

This hypothesis was now tested by using the data extracted from the onomastic tables by means of **Query F.6** and the code snippet **F.9**, written in the programming language **R for statistical computing (R)**.

### 5.3.5. $\chi^2$ -test results

The first  $\chi^2$ -test comparing the diplomataria tokens returns a  $\chi^2$ -value of 9669.1, indicating that there is a statistically significant difference between the two corpora. **P-value**, on the other hand, is given at 0.00009999, well below  $p < .01$ . (In other words, there is considerably less than a 1% chance that these distributions would appear by chance if the name patterns in the corpora were the same.)

$H_0$  = the distribution of **idionyms** is the same in both corpora, can therefore be rejected, and  $H_1$  = the distribution is different for each corpus, has to be accepted as the new working hypothesis, supporting earlier scholarship that Norwegians and Icelanders followed different naming customs.

The sample represents only a fraction of all possible medieval **idionyms** used in Scandinavia, however. A careful conclusion is therefore that name patterns in Norwegian and Icelandic diplomas differ where the sampled **idionyms** are concerned. Since name-giving is influenced by naming customs, these likely differ as well. Yet because the diplomas likely represent a very specific group of individuals – people of a certain social status, who had need of manuscript writing – these results are only representative for the selection of people whose **idionyms** appear in the diplomataria, not for the whole of the population. Still, the result is satisfactory for the purpose of this study, as it supports the hypothesis that naming customs in the upper echelons of society in Norway and Iceland differed. There is no good reason to assume that the naming patterns in other social classes should not diverge between the two countries as well.

Yet establishing clear distinction between Icelandic and Norwegian customs is rendered difficult by the close relationship of these countries, even if they developed in different directions after the initial settlement period, and especially conversion had a great effect on the name-stock (Gunnes 1983; Johannessen 2002). Still, naming customs did probably not change completely during the relatively short period between 870 and the Bergen inscriptions (ca. 1120-1413), and single **idionyms** from the sample may show similar distributions. The  $\chi^2$ -test was therefore run again for each single **idionym**. With the code altered accordingly (**F.10**), the results indeed show that some **idionyms** distribute differently (Table **F.2**):

$p < .01$  = 102 **idionyms**

$p > .01$  = 80 **idionyms**

Corpus	Median	Mean	Standard deviation	Range	Total
DI	24	41.90	46.37	1-204	5,978
DN	134	203.46	233.79	1-1,435	35,074

Figure 5.3. **Median**, **mean**, standard deviation and range of the frequency of the **idionyms** in DI and DN. They were calculated by using the code snippets shown in F.18; alternatively they can be calculated by **Query F.19** and **F.20**. The statistical population for these calculations is the sum of all tokens in the respective sample.

80 **idionyms** show a **p-value** greater than 1%; therefore  $H_0$  = the **idionym** appears with the same frequency in both corpora *cannot* be rejected. Either the distribution of these **idionyms** is therefore the same in both corpora, or there is not enough evidence to reject  $H_0$ .

Applying the  $\chi^2$ -test to the single **idionyms** has therefore provided the means to establish two categories of **idionyms** within the sample: 102 **idionyms** where use in the Norwegian and Icelandic corpora shows statistically significant differences, and 80 where at present no difference in distribution can be shown. This aligns well with what previous scholarship suspected; while there are notable preferences in Icelandic and Norwegian name usage regarding the individuals partaking in manuscript writing, there are still several similarities, almost certainly owing to the fact that Icelandic naming customs were inherited from Norway.<sup>26</sup> This provides the backdrop for the analysis of the Bergen **idionyms** and their potential relevance as markers of social status. For this purpose, a framework for interpreting an **idionym**'s position within its group needs to be established.

## 5.4. Determining the potential social status of idionyms

Within the categories established by means of the  $\chi^2$ -test, there is quite a range in terms of raw numbers of tokens (Figure 5.3), or in other words, some were used more, some less frequently. Without comparable corpora reflecting the naming customs of the lower social scales in Norway and/or Iceland, conclusive statements on the potential social status of an **idionym** are not possible at the current point in time.<sup>27</sup> Still, if an **idionym** is used rarely in the manuscript corpora in general, it is more likely that it might be carried by someone who generally does not engage in manuscript writing, presupposing that the **idionym** is not rare in the population in general. It is therefore important to determine what is, to use Lind's words, a "well-used" **idionym**.

To get a better idea of the distribution of **idionyms** across the corpora, **mean**, **median**, standard deviation, ranges and totals were calculated for the tokens in the diplomataria (Figure 5.3, see Sirkin 2006 for precise information on what information each provides). The **mean** in DN

<sup>26</sup>It should, at this point, be remembered though that because of the impossibility to properly date each name from the diplomataria, the samples comprise the whole period either diplomatarium covers. The results might differ drastically if a proper chronology were established.

<sup>27</sup>To my best knowledge, such a corpus has not been compiled yet, should it even exist; cf. the hindrances in compiling name corpora from people not belonging to the upper echelons of society, for example Halvorsen 1981, 205-206.



is 203.46, 41.90 for DI, a comparatively big gap which suggests that single **idionyms** occur less frequently in DI than they do in DN; there are different explanations as to why. To begin with, DN contains more diplomas from the start, so the **idionyms** generally have higher counts than in DI. However, the percentages, calculated on the somewhat shaky basis of the number of diplomas, also suggest that **idionyms** distribute differently amongst the Norwegian diplomas (Table F.2, columns DI/6640\*100 and DN/20000\*100).

This could also be due to other factors: DI could contain more diplomas in which only a few **idionyms** are mentioned, or Icelanders did not stick as faithfully to the principle of **name transfer** as the Norwegians did, thereby introducing greater variation. Since the current sample is limited to **idionyms** appearing in Bergen, the great difference in **mean** might also be due to the sample being prejudiced toward Norwegian name fashion, lacking the most popular **idionyms** from Iceland. That does indeed appear a likely reason, since the highest percentage in Norway is 7.18% (*Erlingr*), while the highest in Iceland is 3.07% (*Narfi*) (Table F.2). Further sampling of different **idionyms** from NID; NID-S might shed some light on that question.

The **mean** could theoretically be used to mark the difference between “well-” and “little-used”, provided name spread is indeed greater in the Icelandic corpus. The data range is quite large, though: 1 to 204 for DI, 1 to 1435 for DN (Figure 5.3). Additionally, standard deviation is greater than the **mean** itself for both corpora, and the numbers in Table F.1 suggest that one might be looking at some quite extreme outliers at the upper end of the range (the closest value to 1435 in DN is 1016, a gap of more than 400). The **mean** might therefore not be the most reliable measurement to choose in this case. Calculating it based on a selection of the data without outliers (**idionyms** with either very few or many tokens) is a questionable approach, since there is no comparable corpus which could be used to determine whether **idionyms** like *Erlingr* are statistical outliers or merely at the upper end of a scale. Stem-and-leaf plots calculated by F.18 on the same two datasets also illustrate that if outliers were eliminated at the upper end of the scale, one would also have to eliminate the main body of data at the lower end (Figures F.3 and F.4). This observation suggests that the phenomenon of a lot of **idionyms** being given to only a small number of individuals applies here as well (page 76). The distributions observed within both samples could therefore be typical.

Alternatively, the **median** can be used.<sup>28</sup> Unlike the **mean**/average, which is calculated by using the number of tokens and the total of different **idionyms**, the **median** relies on the position of items within an ordered list, and is therefore not influenced by outliers at either end of the spectrum like the **mean** (it is, however, strongly influenced by the number of items in question) or the size of the statistical population. The **median** values for DI and DN are quite far off the **mean**'s (Figure 5.3). 50% of the **idionyms** in DN count fewer than 134 and 50% in DI count fewer than 24 tokens, opposed to **means** of 203.46 and 41.90. Since the **median** is calculated according to position, it might therefore be cutting off the data at too low a value.

**Quartiles** provide an alternative way to further examining the corpus. Again, they are based on a list of items ordered by count of token, but provide a more fine-grained division than the **median**. By calculating **quartiles**, the corpora are divided into four groups, the first cutting off the data at the point where the first 25% are reached, the second at 50%, the third at 75%, while the fourth **quartile** then encompasses the last 25% of the data.

<sup>28</sup>For further information on how to calculate the **median**, see Sirkin (2006, 90-98).



Corpus	25%	50%	75%	100%
DI	8.25	24	61.75	204
DN	23.75	134	308.25	1435

Figure 5.4. **Quartiles** for DI and DN, calculated by F.18 on the results sets from F.17.

In practice, calculating **quartiles** merely means establishing two more **medians**, one for the lower, one for the upper half of the data, and this is problematic in the same way as using the **median** by itself is. It does have the benefit though of providing not two, but four groups which can then be considered by themselves and against what is already known about the corpora.

Like **mean**, **median** and standard deviation, **quartiles** were calculated separately for the corpora (F.18) in spite of the  $\chi^2$ -test showing some **idionyms** with similar distribution patterns. However, calculating **quartiles** based on the result set encompassing all 182 **idionyms** would have meant including a few **idionyms** with 0 tokens in each corpus. Since the express purpose is to calculate **quartiles** with a view to establishing frequency of usage, including **idionyms** listing 0 tokens seemed rather counterproductive. They needed to be included in the  $\chi^2$ -test samples on the basis of the respective other sample listing one or more tokens; when calculating **quartiles**, they could skew the results by pushing **idionyms** up the list. Additionally, stem-and-leaf plots as well as percentages showing how many diplomas contain certain **idionyms** indicate that different measures are needed regardless for Iceland and Norway (page 93).

As Figure 5.4 shows, the higher the **quartile**, the bigger the gap between the values of the previous and the **quartile** in question, mirroring the stem-and-leaf results, where number of **idionym** declines the higher up the scale one proceeds. This, again, is expected in a big name corpus: condensation causes a few **idionyms** to become very popular, while at the same time there is a great number of **idionyms** at the lower end of the scale carried by few individuals. Since we can approximate the years the diplomataria span, it appears indeed as if the lowest **quartile** can be considered to hold **idionyms** in comparatively little use among the manuscript-using population. They appear only between one and four times every century based on the following calculations:

DN spans 540 years:

$$\frac{23.75}{5.4} = 4.4 \quad (5.1)$$

DI spans 755 years:

$$\frac{8.25}{7.5} = 1.1 \quad (5.2)$$

The generational turnover is often estimated at around 30 years for the medieval period, meaning one century encompasses three generations. For DN, this translates to an **idionym** being used once or twice every generation, for DI to once every third generation amongst the manuscript-using population.<sup>29</sup> Therefore, all **idionyms** below the 25%-mark (showing values below 23.75

<sup>29</sup>I am fully aware that this may be due to the **idionym** only gaining popularity at a stage or in a geographic region which the diplomataria do not properly cover. But as mentioned before, it was impossible to date/locate every single occurrence from the diplomataria and use this to establish an **idionym** usage curve for every single **idionym**,

in DN, below 8.25 in DI) will be considered as “little used”.

The second and third **quartile** are more difficult; since the range is so large in both corpora and there is quite a gap in number between the third and the fourth **quartile**, they could be regarded as the same group. The first three **quartiles** are all somewhat closer in range than the fourth is to the third, and taking into account Chareille’s observations, everything below the fourth **quartile** could be regarded as “little used”. Yet the third **quartile** in both corpora starts at a value more than twice of that separating the first and second **quartiles**. In the third **quartile**, **idionyms** already appear up to 27 times/century in DI, up to 57 times/century in DN, using the same calculation as above. Even without knowing the total of the manuscript-using population, that is considerably more than for the first **quartile**. Therefore, the second **quartile**, below 50%, will be considered “moderately used”, all **idionyms** in the third **quartile**, up to 75%, shall be considered “commonly used”, and the last group “often used”. This may contradict prior statements by Lind on name usage. Such statements as well as the results of this study should anyway be taken with a grain of salt, and this study in particular understands itself as a suggestion of how to tackle the problem rather than a final solution.

## 5.5. **TAKERUN: Onomastic research tables**

Before moving on to the actual results and analyses, it is once more necessary to take a closer look at where the numbers are coming from in the first place, and how they are calculated. The analyses undertaken here rely on data stored within the onomastic section of **TAKERUN**, the first part considered as **research database**; these tables pertain to a specific aspect of my research on the Bergen inscriptions, while other scholars may focus on different aspects. While the **research database** parts of **TAKERUN** are all based on their own **entity model**, they refer back to the original core tables, for example by making use of the **PKs** from **PATTERNING** as **FKs**. In this instance, the purpose of using a **RDBMS** was to determine whether the process of counting tokens of an **idionym** in a corpus of runic inscriptions could be translated into an **entity model** which, turned into a **DB**, returned correct results.

Admittedly, in many cases scholars will concentrate on a small sample and look for those **idionyms** especially. However, as Peterson (2004, 2007) shows, there is a need for comprehensive lists of **idionyms** appearing in runic inscriptions, as they aid scholars in identifying and finding inscriptions easily. **SRDB**, as well, offers the possibility to look for **PNs**. So to aid scholars in their work, being able to trace every **idionym** back to all inscriptions in which it appears was one of the most important requirements. Additionally, I also wanted **TAKERUN** to mirror conflicting scholarly opinions, and to store more than one scholar’s interpretation so it would be possible to directly compare which scholar had identified which **idionyms** in which inscription.

Given that the data was going to be digitised anyway, I considered it only feasible to design the onomastic **research database** to also return counts and numbers which could aid statistical analyses of the kind I was attempting. In other words, the **RDBMS** should do the counting of tokens of distinct **idionyms** in the Bergen runic inscriptions for me. The resulting **entity model** with its technological implementation is documented in the following sections.

---

so, for the time being, this crude estimate will have to do.

### 5.5.1. PATTERNING, SEQUENCES and INSCRIPTIONNAMES

The onomastic **research database** branches off from **PATTERNING** in the **core database**, as it is within this table (and the process it is based on) that scholars determine whether there are names in a **transrunification/transliteration**, and if so, how many and which. Thereafter the structure becomes more complicated (Figure 5.5). As explained, **N:M-relationships** between tables cannot exist in **RDBMS**, yet they would be created if names were linked directly to patterns. Additionally, each name appearing in the inscriptions can be regarded as its own separate **entity**, which led to **INSCRIPTIONNAMES** being created (Figure 5.6).

This table is built specifically to provide a unique reference for each *character sequence* identified as a name (*insnid*, inscription name id), whether that character sequence be runic or Roman (*spelling*). **INSCRIPTIONNAMES** also contains three **BOOLEAN** value **attributes**. *Invocation* and *interlocutor* refer to the status of the individual/entity within the inscription. These two columns play an important role for research, because a distinction needs to be made whether the **idionym** is used as a reference to a real person or used in a context that implies there is no real person being referred to. In the Bergen inscriptions, interlocutor-**idionyms** show the names of Norse gods alongside Christian saints and Greek mythological figures. These can be given to children, but when used as a reference to the original mythological name-bearer, their value for studying the potential socio-cultural aspects of **PN** in **Björgvin** is limited. There are 35 masculine and 5 feminine **idionyms** appearing at least once in a context where reference to a mythological being is more likely than reference to a real person, marked in Table F.1 with “Myt.” following Lind’s convention. Some are easily recognisable, like *Jesus*. In cases like *Óláfr* or *Sigurðr*, the distinction is not quite so clear-cut. Either can refer to a mythological being or a real person; by the time the Bergen inscriptions are carved, it is not that long since *Óláfr hinn helgi* has died, although whether *Sigurðr* the Dragonslayer from the Poetic Edda was a historical person is doubtful. In marking the instances of these **idionyms** as *interlocutor/invocation*, I have stuck to prior interpretations (Figure 5.14).

The **BOOLEAN** columns *hasbyname* and *isbyname* indicate that the character sequence in this case is considered to be or possess a byname, for example *narfasun*, *Narfasonr*, son of *Narfi*. The *pmnym*-column marks whether it is a patro- or metronymic. This option was included to begin with, but has no bearing on the current study (a patronymic still refers to an existing person). Still, the **idionyms** which only appear in patronymics were marked as *isbyname:1*, *pmnym:p*, whereas the preceding **idionyms** were marked *hasbyname:1*, *pmnym:p*.

**INSCRIPTIONNAMES** serves two purposes: first, to establish the precise letter sequence identified as a name as its own entity separate from the transliteration. Secondly, even when two scholars reach the same conclusion on how to transrunify/transliterate/pattern an inscription, their results will still be added as their own separate entries in the database. The same principle applies here: character sequences in **INSCRIPTIONNAMES** are added by scholar.

There are two issues with only making use of **PATTERNING** and **INSCRIPTIONNAMES**, though: one, if there are two possible ways of transliterating a character sequence, but the difference does not affect the potential names, one would either have to decide with which pattern to connect the names, thereby making it impossible to reverse-search for all **transliterations** containing particular **idionyms**. Figure 5.7 illustrates that the letter necessitating different **transliterations** is the last one in the first section, potentially <sup>1</sup> judging by the **transliteration**. It does not influence the

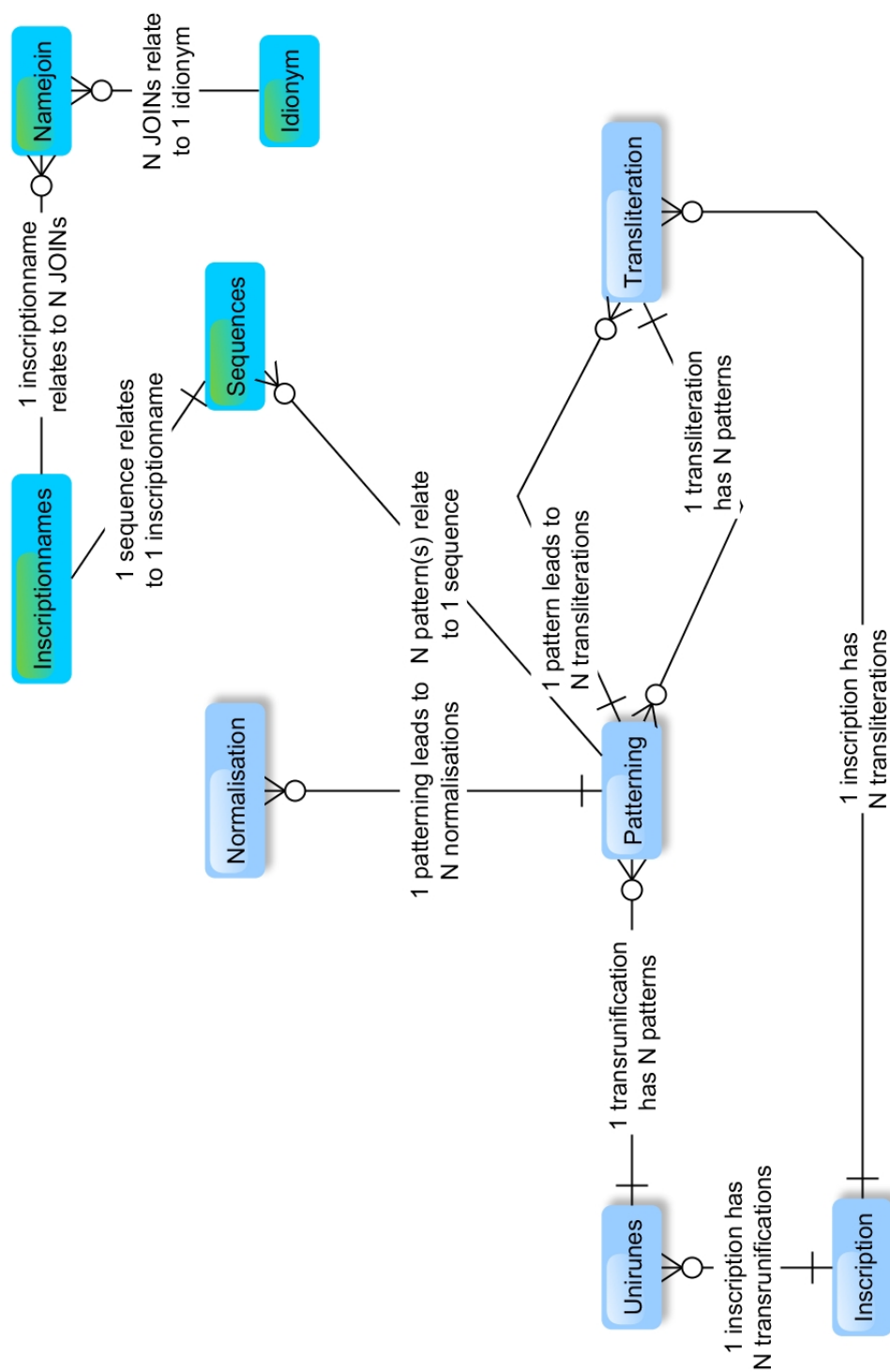


Figure 5.5. **Entity model** including core and onomastic research tables.

Column Name	Data Type	Length	PK?	Not Null?
insnid	varchar	10	true	true
spelling	varchar	30	false	false
invocation	tinyint	1	false	false
interlocutor	tinyint	1	false	false
hasbyname	tinyint	1	false	false
isbyname	tinyint	1	false	false
pmnym	varchar	1	false	false
insncom	varchar	300	false	false

Figure 5.6. Table structure **INSCRIPTIONNAMES**.

reading of the following character sequences, **halle:margarita**.

The sequences **halle** and **margarita** could be added twice, once for each **transliteration**, but this is problematic since **INSCRIPTIONNAMES** is supposed to provide the total number of character sequences in the corpus which can (and have) be(en) identified as names. If the sequences are added two times, there are two entries too many in **INSCRIPTIONNAMES**. Additionally, data integrity rules are violated by doubling an entry that only represents *one* real-life item.<sup>30</sup> It is therefore unacceptable.

insid	tlitid	transliteration	patid	insnid	spelling	normalised
ins539	tlit2247	--]dpz:halle:mārgarita	pat1119	insn744	halle	Halli
ins539	tlit2247	--]dpz:halle:mārgarita	pat1119	insn808	mārgarita	Margrét(a)
ins539	tlit2246	--]dpc:halle:mārgarita	pat781	insn744	halle	Halli
ins539	tlit2246	--]dpc:halle:mārgarita	pat781	insn808	mārgarita	Margrét(a)

Figure 5.7. Example of different transliterations necessitating two entries in **TRANSLITERATION**, but having no influence on the actual spelling of the names.

Issue two, somewhat related but slightly different, concerns the cases where **transliterations** directly influence name spelling, exemplified in Figure 5.8. Again, the two different sequences could be added as their own entity in **INSCRIPTIONNAMES**, accounting for the spelling. They would still only refer to *one* actual item, though.<sup>31</sup>

These issues have to be resolved differently. The first one can be remedied by another **JOIN** table between **PATTERNING** and **INSCRIPTIONNAMES**, called **SEQUENCES** (Figures 5.5 and 5.9). It is designed to avoid adding the same character sequence several times. To spare scholars the trouble of either choosing only one **transliteration** to attach the names to, or having to attach them three

<sup>30</sup>Theoretically this also applies to the sequences added several times because of different scholars, but this problem can be solved more easily.

<sup>31</sup>The problem is exacerbated by most scholars relying on **transliterations** instead of **transrunifications**. If the entry were linked to the runic instead of the Roman sequence, the character in question would simply be represented by l.

insid	tltid	transliteration	patid	insnid	spelling	normalised
ins299	tlit2017	ahe af allabogokr	pat546	insn979	ahe	Agi
ins299	tlit2018	ahi af allabogokr	pat547	(NULL)	(NULL)	(NULL)
ins299	tlit2019	ahe af allabogokb	pat548	insn979	ahe	Agi
ins299	tlit2020	ahi af allabogokb	(NULL)	(NULL)	(NULL)	(NULL)

Figure 5.8. Example for different transliterations influencing the spelling of a name.

Column Name	Data Type	Length	PK?	Not Null?
patid	varchar	9	true	true
insnid	varchar	10	true	true

Figure 5.9. Table structure **SEQUENCES**.

times, *patid* and *insnid* are combined in **SEQUENCES** to create the link. This way, both patterns refer to the same two entries in **INSCRIPTIONNAMES** (Figure 5.7). These remain unique, and so is the link in **SEQUENCES**, since the two columns form the compound **PK**. Creating the same link twice by accident or design is therefore impossible.

The second issue cannot be solved by introducing more **JOINS**, unless one were to take the inscription apart character by character. E is not i, no matter how one looks at it. One solution would have been to delete the *spelling*-column completely; however, how would another scholar then be able to identify the character sequence in question? In the end, this approach was deemed too confusing. Instead **replacement characters (RCs)** were introduced. Their purpose is very simple, in that they stand for another character, which for some reason cannot be displayed. In **INSCRIPTIONNAMES**, the **RCs** are used to signify that a certain character can be identified in more than one way, and scholars should refer to the **transliterations** for clarification. **RCs** are therefore only used in cases where the **transliterations** present alternatives of how the name could be spelled. They are not used when a different reading results in identification of a verb or a noun rather than a name.

Unicode offers a bespoke **RC** at code point U+FFFD (Figure 5.10). This could have been used, but technically, the characters *can* be displayed. There is just no agreement on which character *should* be displayed. Therefore, the uncertainty sign at U+2BD1 was chosen instead. Unfortunately, this character, which should look like Figure 5.11, is not yet present in many **fonts**. In lieu of finding a **font** containing this particular sign, and following the example of West (n.d.[b]), I have taken the liberty of instead injecting ✱, the presently still unencoded Symbol of Chaos in its stead into the bespoke **font** I created as a result of experimenting with runic encoding in Chapter 3. Since *spelling* mainly serves as a crutch to help scholars identify the sequences in question, this was deemed acceptable; searches for specific spellings of **idionyms** can still be run by including **transliterations**.

By way of **SEQUENCES** and **RCs**, **INSCRIPTIONNAMES** is now restricted to contain exactly what it represents as an **entity type**: unique character sequences identified as names. It is therefore also possible to use **SQL** for calculations and to automatically update other tables (Section 5.5.5).





Figure 5.10. Replacement character.



Figure 5.11. Uncertainty sign.

### 5.5.2. NAMEJOIN

Still missing from the **entity model** is the part where sequences are normalised, since **INSCRIPTIONNAMES** itself does not provide the normalisation of the character sequence. This was done for good reason: even if scholars can agree on the character sequence identified as a name, it does not follow that they agree on which **idionym** it should be normalised as.

While the **N:M-relationship** between **PATTERNING** and **IDIONYM** was avoided by introducing **SEQUENCES** and **INSCRIPTIONNAMES** as separate **entity types**, linking the latter directly to **IDIONYM** would only push the issue back one table, as N character sequences would then be identified as M **idionyms**. Resolving the **N:M-relationship** required introducing another **JOIN** table, called **NAMEJOIN**. It uses two **FKs** as a compound **PK**, *insnid* and *idioid* to prevent inputting the same combination twice. It also contains two columns that **INSCRIPTIONNAMES** lacks: *source* containing the **bibtexkey** and *sourcepg*, providing literature and page reference where this particular normalisation can be found.

*Source*, so far present in every table representing an **entity type**, was not included in **INSCRIPTIONNAMES** because **INSCRIPTIONNAMES** and **NAMEJOIN** are linked by *insnid* and **IDIONYM** must be linked to **INSCRIPTIONNAMES** through **NAMEJOIN**. It is this juncture that needs to be referenced properly, the decision to which **idionym** to normalise a character sequence, not so much the character sequence in itself, although, if required, these columns could easily be added to **INSCRIPTIONNAMES**



Column Name	Data Type	Length	PK?	Not Null?
insnid	varchar	10	false	true
idioid	varchar	10	false	true
source	varchar	30	false	false
sourcepg	varchar	8	false	false

Figure 5.12. Table structure **NAMEJOIN**.

as well.

**NAMEJOIN** links to the final table in the onomastic **research database**, **IDIONYM**.

### 5.5.3. IDIONYM

**IDIONYM** stores all **idionyms** found in the Bergen material (Section 5.6) as well as additional information about the **idionym** itself, like origin or number of tokens in other corpora. The backbone of the **entity type**'s content is formed by the **idionyms** identified by Markali (1983), which represents the most thorough study of **PNs** in the Bergen inscriptions. Where necessary, i.e. where an **idionym** was not included in her original list, it was added to the table as well (refer also to Section 5.6 for more information on the table's actual contents).

According to this table, the Bergen inscriptions show up to 242 different **idionyms**, some of which appear up to 19 times within the corpus. This count includes **idionyms**, **idionyms** only found in bynames, bynames and names which cannot be conclusively identified as **idionyms**, but are suggested by SRDB; NIYR VI; Markali 1983. Some of the **idionyms** may be open for discussion, since it is by no means certain that the **idionym** identified is actually the one intended by the rune-carver, for example "Benedikt/Benedikta".<sup>32</sup> The question often cannot be resolved satisfactorily. I decided to err on the side of caution and include them in **IDIONYM**. The decision was guided by the reasoning that an **idionym** being uncommon or unknown within the known Norwegian corpus is not sufficient reason to exclude it from the name corpus of a town that was repeatedly shown to house people of several different ethnic and linguistic backgrounds. Much the same applies to previously unattested **idionyms** like *Agnbjørg*.

Beside the obligatory **PK idioid** (**idionym** id), *normalised* contains a standardised spelling of the **idionym** (see Section 5.6 for issues concerning normalised spellings), and *idionym* and *byname*. The latter were designed as **BOOLEAN** to account for the possibility of an **idionym** being both used as an **idionym** and a byname (patronymics are not considered bynames, because every **idionym** can function as one). *Gender* indicates whether the **idionym** can be used for men, women, or either by the letters *m*, *f*, *mf*, and additionally offers the possibility of being set to **NULL** in cases where it is not possible to determine which gender the **idionym** indicates. This only refers to grammatical gender of the **idionym**, although in the majority of cases, that will coincide with the

<sup>32</sup>INS65 only reads **binitik[k<t]t a**. **a** can thus be understood as part of the name, in which case the whole should be read as *Benedikta*. It can also be understood as the **OWN** 3.pers.sg. form of the verb *eiga*, *á*, in which case the inscription translates as *Benedikt owns*. Markali (1983) also ponders the likelihood of the **idionym** being identified correctly.

Column Name	Data Type	Length	PK?	Not Null?
idioid	varchar	9	true	true
normalised	varchar	40	false	true
idionym	tinyint	1	false	true
byname	tinyint	1	false	true
gender	varchar	2	false	false
origin	varchar	10	false	false
di	int	6	false	false
dn	int	6	false	false
sverressaga	int	6	false	false
hakonarsaga	int	6	false	false
tollruller	varchar	6	false	false
bergeninsid	tinyint	2	false	false
bergeninsnid	tinyint	2	false	false
insnidnoin	tinyint	2	false	false
idiocom	varchar	150	false	false
idiosource	varchar	30	false	false
idiosourcepg	varchar	8	false	false
lindlocalisation	varchar	1	false	false
pred	varchar	2	false	false
sostat	varchar	5	false	false
quarti	int	1	false	false
quartn	int	1	false	false

Figure 5.13. Table structure **IDIONYM**.

perceived gender of the name-bearer (*Auðr* being the exception, which can be used by men and women alike).

*DI* and *DN* contain the numbers based on the counting of tokens in Lind (NID, NID-S). Calculations and statistical analyses are based on the numbers stored within them, which in turn were entered manually after counting the tokens.

*Bergeninsid*, *bergeninsnid* and *insnidnoin*, in contrast, are dynamic columns. The first contains the maximum count of inscriptions where this particular **idionym** might occur, while the latter two contain the maximum count of tokens, once in total and once with *invocations* subtracted (Section 5.5.5 for how these columns are updated based on the query results from the whole onomastic **research database**).

*Sverressaga*, *bakonarsaga* and *tollruller* contain numbers from corpora which were also used as a means to shed more light on the Bergen corpus (Section 5.7.2). *Origin*, while it should probably have been its own **entity type**, provides information on which language the **idionym** is originally taken from, i.e. whether it is etymologically Scandinavian or can be traced back to Aramaic, Greek, German or Latin imports. This column hardly does the complicated history of borrowed **idionyms** justice, but since neither this study nor **TAKERUN** was aimed at providing a full history of an **idionym**'s way into medieval Norway, it was deemed sufficient for the purposes.

*Idiocom* is the generic comment-column included in every table, which also goes for *idiosource* and *idiosourcepg*. The letter stored in *lindlocalisation* indicates where Lind (NID, NID-S) thought the **idionym** was used predominantly (Section 5.7). The last four columns, *pred*, *sostat*, *quarti*, *quartn* are once again columns meant to be updated according to the results of the statistical calculations presented in Section 5.4. *Pred*, for example, indicates in which country a particular **idionym** shows a higher relative frequency, while *sostat* is updated based on this and the *quarti/quartn*-columns to mirror the social status as well as the country prevalence of an **idionym**.

Data entry and retrieval into/from the onomastic **research database** are illustrated next, hopefully clarifying how it is supposed to be used, and why its structure is so complicated.

#### 5.5.4. Data entry

The inscriptions chosen for this purpose are INS12 and INS108. INS12 has two sides: a reads **aria**, b **santi:ulab**. While the names are spelled the same regardless of transliteration, the patterns for the b-side differ. Side a is by general consensus identified as the **OWN** phrase *Ari á*, *Ari owns*. Side b however could read either *Sancti Ólafr*, referencing the Norwegian king-turned-saint Ólafr hinn helgi, or it could be the **OWN** verb *sendi*, thus translating to “Ólafr sent/may send” (NIYR VI, 24-25; SRDB). Either way, the name is Ólafr, which is reflected in the two patterns for side b: Figure F.1 The **transliteration** is doubled in the result set because it relates to two different patterns.

The process of adding said patterns is visualised in Figure 5.14, with the difference consisting of the **BOOLEAN** values in the **OWN** and **LATIN** fields. *Patids* are then added to **SEQUENCES**, along with the **PK** for the name character sequence, INSN431. The crucial link is created between one *insnid* and both *patids*. One **transliteration** thus links to two patterns to one character sequence. All that remains is to create the link between **INSCRIPTIONNAMES** and **IDIONYM** by connecting character sequence to normalised **idionym** by adding the combination of *insnid* and *idioid* Ólafr to **NAMEJOIN**.

The crucial step here is to make sure that *all* possible patterns for a particular **transliteration** are connected to the same character sequence, and that no second entry is created in **INSCRIPTIONNAMES** despite there being contradictory patterns. In this particular case, *interlocutor* and *invocation* in **INSCRIPTIONNAMES** need to be set to 1 to reflect that this particular instance could refer to a real person or a saint (page 97). It also impacts query formulation (Section 5.5.5).

The second example has a different catch: the name in INS108 cannot be identified with complete certainty. The actual inscription reads either **kolbiænna** (Markali 1983, 64), *kolbiøna* (NIYR VI) or *kolbiøn a* (SRDB) (Figure F.2). The latter two agree on normalising the name in question as *Kolbjørn*; Markali (1983) offers *Kolbeinn* as an alternative. Figure 5.14 illustrates the differences in process to the prior example: the process is straightforward until **NAMEJOIN**, where two entries need to be created to properly link the character sequence to both potential **normalisations** (see also Figure F.2).

The question may be asked which purpose the complicated **entity model** of the onomastic **research database** serves. A case could be made that a scholar's job is to decide which interpretation to support based on evidence. This would void the need to accommodate possible variations; besides, if every possible interpretation is to be considered, the **DB** might contain several entries which most scholars would disregard for weakness of argument.

This is undoubtedly true, but fails to recognise the purpose of **TAKERUN** and the nature of the data. The **entity model** only reflects the real-life circumstances, and they are such that at times, a clear-cut decision which interpretation is the more reliable is impossible. Deciding on one may be the right way to go when arguing a point, but that is not what **TAKERUN** was built to do. On the contrary, it is supposed to support scholars in deciding which interpretation they deem the most reliable by enabling them to compare as many of them as possible. This cannot happen when the choice is already limited by prior decisions to exclude certain data. Therefore even interpretations from an unpublished master's thesis are entered. It is not a question of quantity over quality, it is one of providing a full record of scholarship on a particular inscription. Regardless of whether one agrees with an interpretation, it is still part of the research done on the object. Nothing prevents a scholar from exporting a result set and excluding particular interpretations from it. This can even be done in the **RDBMS** itself when querying for particular aspects, and as this is one of the most important tasks of **TAKERUN**, the next section will focus on how result sets are obtained.

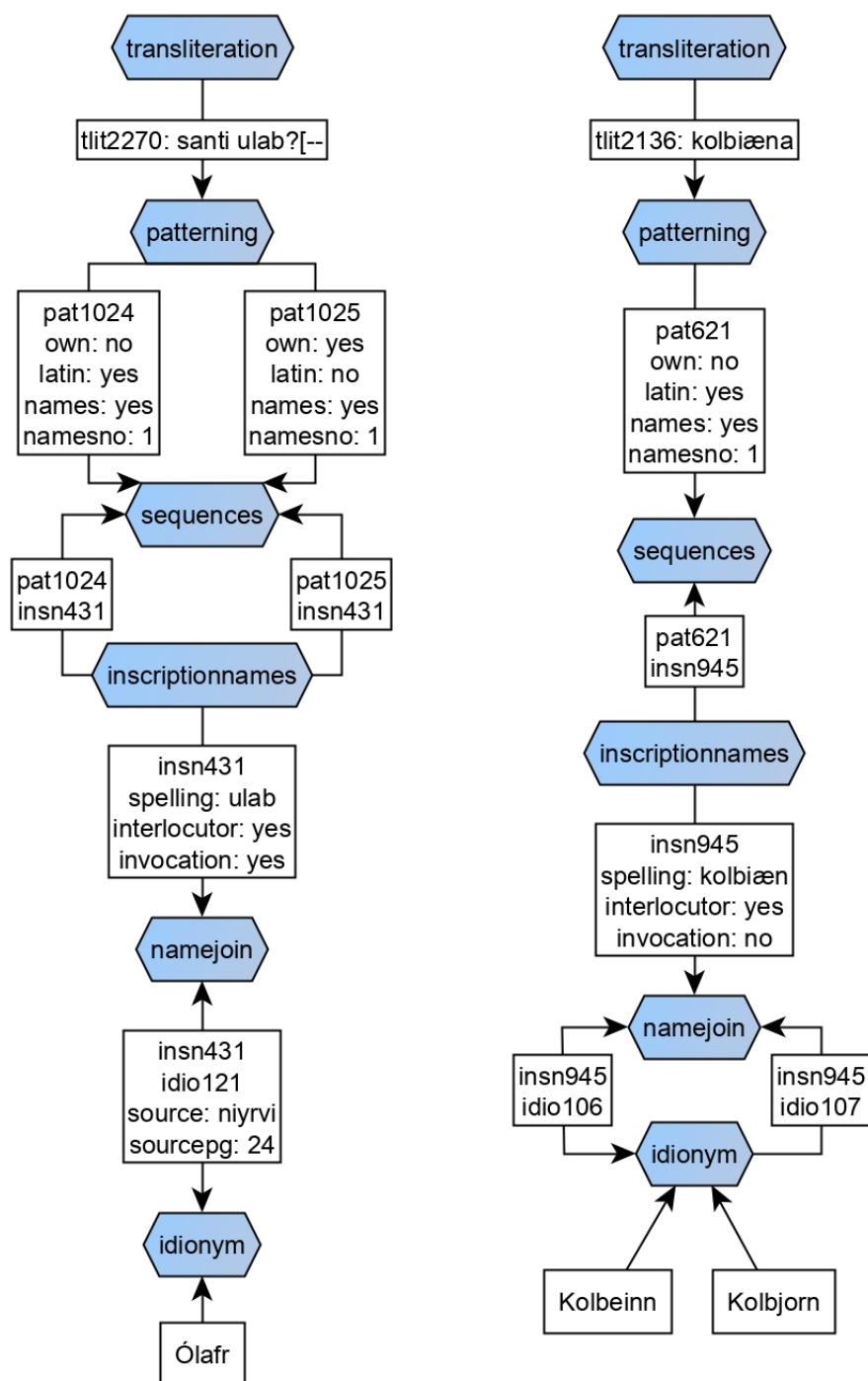


Figure 5.14. Two examples of adding data to the onomastic **research database**, INS12 left and INS108 right.

### 5.5.5. Data retrieval

A **DB** is useless if it is not possible to retrieve meaningful results from it. Basic query formulation was explained in Section 4.7.1; here it is necessary to delve into how data modelling impacts on data retrieval and retrieving result sets with the purpose of using them for research. The **core database** was built with a view to how runological data could best be stored, while the onomastic **research database** is an example of how **TAKERUN** can be expanded to support a variety of research questions. In the interest of fluent reading, only the thought process behind a query is outlined; the queries themselves are provided in the Appendix.

Before a query is written, one needs to be clear on what one needs the result set for. I wanted **TAKERUN** to do three things:

1. Link all **idionyms** back to the inscriptions in which they appear;
2. store and return prior interpretations;
3. count the Bergen tokens of different **idionyms**.

Together with the count of tokens from NID; NID-S in the *dn-/di-*columns in **IDIONYM** (Query F.1), these are the basis of all statistical analyses of the material. Counting the Bergen tokens is not an easy task, though. Due to the nature of runic inscriptions, a character sequence may or may not be identified as a name, may be normalised into one or more different **idionyms**, and may have been normalised (differently) by different scholars. Scholars may have looked at the whole corpus or only some part of it, concentrated on inscriptions of a particular type or restricted their study to specific names.<sup>33</sup>

One potential way of doing this would be to query for all **idionyms** and their tokens; the result set looks similar to Figure F.1. Then each entry can be evaluated by itself. The other option is to make the **RDBMS** do the work and get the counts out of the data accumulated in **TAKERUN**. The retrieval process requires some thought, care and knowledge of the **entity model**, though. A full list of all **idionyms** identified in the corpus is the starting point for either approach. From **TRANSLITERATION**, all tables until **IDIONYM** are included in this query, contributing different bits of information to the final result set:

1. **TRANSLITERATION**: *insid, tlitid, transliteration, tlitsource*;
2. **PATTERNING**: *patid, own, latin, nonlexical, names, namesno, bynames, bynamesno*;
3. **INSCRIPTIONNAMES**: *insnid, spelling, interlocutor, invocation*;
4. **IDIONYM** *normalised*;

The result set can further be restricted and sorted by

1. *names* in **PATTERNING** is 1 (only inscriptions containing names);

---

<sup>33</sup>Markali (1983), for example, did not consider names not referring to real people (marked *invocation* in **IDIONYM**).

2. *insid*, *tlitsource*, *tlitid*, *insnid* in exactly that order, as it first sorts the result set by the **PK** of the inscription, thereby keeping all entries for the inscription together, then by scholar, thirdly by *tlitid*, which equates one side of the inscription, and finally by *insnid* to make sure that different interpretations of the same character sequence still appear together.

The sorting is mainly for the purpose of counting manually, though, and so are several of the fields included in the query. The six tables the query runs through need to be linked by means of the **JOIN**-clause as explained in Section 4.7.1.<sup>34</sup> Running **Query F.3** returns 1063 results, which can then either be exported and printed for manual counting, or used as a basis for further queries. For automatic counting, only *insid*, *insnid*, *normalised/idioid* and *tlitsource* are important. Restricting the query to these and using **DISTINCT** returns only 1005 results (the multiplied entries are from examples like Figure 5.14, which would have to be subtracted when counting by hand).

Once done, a new query can be built on top, a process called “query nesting” or “subqueries”. It refers to running several queries in one go by including one in the other; they are then run from the innermost to the outermost query, and the result set is only shown after the last query has finished. Running them one after another is possible, but the result sets must be saved as so-called **VIEWS**, which are then queried in turn, a more arduous process (similar to how result sets can be narrowed down in SRDB).

In this example, the new query uses the **COUNT** function to add up all distinct *insids* and *insnids*, but, and this is very important, counting them by normalised **idionym** and scholar who identified this normalisation (**GROUP BY**) to avoid adding up interpretations by different scholars in the total count. The new result set now shows how many tokens a particular **idionym** counts in the Bergen corpus according to scholar. This is important because neither NIYR VI nor Markali (1983) list the **idionyms** from the whole corpus; only SRDB contains a (mostly) full account of all **idionyms**. The counts by scholar therefore vary significantly.

To alleviate this problem and thanks to how the data is structured, the maximum number of tokens for one **idionym** can be calculated, though, by comparing the tokens counted by individual scholars and selecting the highest count. Therefore a third query is built on top using the **MAX()** function and disregarding *tlitsource* (**Query F.4**). So, by running one single nested query, the maximum count of one **idionym**’s tokens in the Bergen corpus can be calculated, which saves about four days of work counting manually.<sup>35</sup> If new tokens/**idionyms** are identified in the corpus, as long as they are added in the same way as the others, the result set will then include those when **Query F.4** is run anew. Moreover, the result set from this query can be used to run an **UPDATE** query on **IDIONYM**, automatically adding the counts to *bergeninsid* and *bergeninsnid*. This way, errors in manually copying numbers are avoided.

The downside of this approach is that using the maximum number of tokens as calculated per this approach is only feasible if one is reasonably sure that the studies from which the names are taken, cover approximately the same range of inscriptions. In this case, the three works used clearly state the range of inscriptions they are covering, and based on this information, I knew that NIYR VI was likely to return the fewest, SRDB the most tokens, with Markali

<sup>34</sup>Although, as can be gleaned from **Query F.3**, I am using a **LEFT** instead of an **INNER JOIN**. w3schools (2020) explains the basic difference between **INNER**, **LEFT** and **RIGHT JOINs**.

<sup>35</sup>Done to verify that the queries worked in the intended way.



(1983) somewhere in between. I also knew that the latter would not list any **idionyms** marked as *invocation* in **INSCRIPTIONNAMES** since her study focuses on **PNs**. The other two works provided information about **idionyms** referring to mythological beings.

If working with a **DB** where the data background is unknown, there is always the danger that one scholar identifies one *Ari* in one inscription, and another scholar finds a second one in a second inscription, without mentioning the first. Then the maximum tokens for *Ari* in the whole corpus would be wrongly returned as 1 by this query. In such cases, it is more feasible to use a query returning a result set which lists maximum number of tokens *per inscription* for each scholar. These two result sets can then be compared with the help of the **RDBMS** by using **IN**, **NOT IN** and subqueries. Theoretically this applies to my dataset as well, but having reviewed it manually, I am reasonably certain this is not the case, and the scholars for the most part disagree on the **normalisation**.

One last catch needs to be mentioned, tying in with the problem already discussed in Section 5.5.1: *Ólafr* can either be identified as an interlocutor or as an invocation (Section 5.5.4), and this study looks at **PNs**. In **TAKERUN**, a token referencing a supernatural/mythological entity is indicated by the *invocation*-value in **INSCRIPTIONNAMES** set to 1. In this case, *interlocutor* and *invocation* in **IDIONYM** need to be set to 1 to reflect this fact.<sup>36</sup>

This character sequence therefore appears in result sets with the **WHERE**-clause *interlocutor=1* or *invocation=1* – in other words, appears in a map showing inscriptions referring to real people and in one showing the distribution of inscriptions with invocations. To avoid this, a second **WHERE**-condition needs to be added so that the phrase reads

**WHERE** interlocutor=1 AND invocation=0

Whenever using **Query F.4**, I therefore ran it two times, once with this **WHERE**-clause and once without to see the difference. Table F.1 shows that the counts for some of the **idionyms** changes noticeably once *invocation*-names are excluded. Still, the **idionyms** to which tokens marked with *invocation* refer were included in the  $\chi^2$ -test for the diplomataria, along with all other **idionyms** attested in Bergen, because in the diplomataria, they refer to real people. Some of them, along with other tokens where the normalisation presented difficulties, are listed in the next section taking a closer look at the contents of **IDIONYM**.

## 5.6. Survey of the names in **IDIONYM**

**IDIONYM** contains the normalised versions of the names appearing in the Bergen corpus; however the spelling of these **normalisations** by themselves differs between scholars. For the most part, NID; NID-S; Markali 1983 normalise names the same way, but in some cases, they follow different customs, e.g. Lind preferring -i- over -j- to express /j/. **IDIONYM** provides both variations separated by /. In other cases, however, they disagree on how much difference in spelling justifies identifying a combination of runes/letters as a different form of the name. The list below provides an overview and also lists other cases which require a more detailed explanation, with the whole list included in the appendix (Table F.1).

<sup>36</sup>The relevant columns are included in **INSCRIPTIONNAMES** because this is decided on a case-by-case basis.

- *Andreas/Andrés*: NID; NID-S list both variations as the same, Markali (1983) none.
- *Eygísl/Eygils*: While NID only lists the former, NID-S only lists the latter. Considering the first entry in NID is “Oygísl”, it seems reasonable to assume that Lind did not distinguish between the variations. Markali (1983, 58) as well as Kruken (2013) make a point about *-gísl* having turned into *-gils* over the course of time, and in terms of dating, this is of course an important factor, but it may well be a misspelling in the inscriptions. Besides, with the Bergen inscriptions being archaeologically (therefore independently) datable, normalising to the same name was deemed more reasonable. Should the inscriptions in question turn out to date to different periods, this would provide sufficient reason to return to the original spelling and determine whether there are convincing chronological reasons to normalise differently.
- *Eyjólfr/Eyíólfr*: Another possible **normalisation** is *Eyjólfr/Eyíólfr*, but since NID; NID-S; Markali 1983 normalise with *-o-*, it was kept streamlined.
- *Gyrðr, Gyrid, Gyrðir, Gýriðr*: While NID; NID-S lists *Gyrðr, Gýriðr, Gýriða* and Markali (1983) only suggests *Gyrðr* as a normalised form, SRDB normalises two tokens as respectively *Gyrid* and *Gyrðir*. Unfortunately, neither is to be found in NID; NID-S, so while they have been added as potential normalisations, they have to be treated with care. SRDB gives no information on where the **normalisation** originated.
- *Hallgísl/Hallgils*: Lacking the first as an entry, the numbers pertaining to *Hallgils* were used instead, but there are no tokens in DI or DN. See *Eygísl/Eygils*.
- *Heríkr*: Not in NID; NID-S, Markali (1983, 36) lists it as an alternative to *Eiríkr* in one inscription (ibid., 23).
- *Hrólfir (Rolfir)*: The latter is a modern spelling of **OWN** *Hrólfir*, which appears as such in Lind (NID, 587), and was given preference.
- *Ió(h)an/Jón*: Every token of *Jón* or *Jóan* is listed under *Ióhan* in Lind (NID, 647, NID-S), however Markali (1983, 38-39) lists *Jó(h)an-* and *Jón-*tokens separately. Since one is disyllabic and the other monosyllabic, and it is possible in runic orthography to determine which version it is, they were given their own entry each; where calculations are concerned, the sum is used. *Jóan* and *Jóhan* are not distinguished.
- *Johannes*: While *Ió(h)an/Jón* are variations of this **idionym** and counted as tokens of only one variation due to Lind’s approach, *Johannes* is listed separately. Not only is it trisyllabic, it is also the saint’s name. It may have been used as a **PN**, but as this has not been studied yet and with a view to what this study is trying to accomplish, it was deemed opportune to differentiate.
- *Margrét(a)*: Lind (NID, 760) lists *Margrét* and *Margréta* as separate **idionyms**, yet a look at the tokens reveals that the same potential form can be counted as either (for example *Margréttá*, which appears in the list for both in column 761 and 762, albeit from different

diplomas). In NID-S, they are there listed as one, which Markali (1983) does as well. They are not distinguished in this study.

- *Michael/Mikiáll*: Similar to *Johannes* and its variations, in cases where *Michael/Mikiáll* are used, it can be difficult to establish whether the saint or a real person are referred to. In the Bergen material, it is most likely the saint, whereas the entries listed in NID; NID-S appear to refer to existing people. It was therefore included in the analysis as a potential given name, regardless of who it refers to in the Bergen material, as it may be important as an indicator of different name patterns (*María* was included for the same reason).
- *Þorgísl/Þorgils*: Like *Eygísl/Eygils*, only the latter is used in NID; NID-S; Markali 1983. A similar rationale applies to not differentiating between *Þorgísl/Þorgils* and *Þyrgísl/Þyrgils* at this point in time. Markali (1983, 58) states that there is little reason to prefer a reading of  $\mathfrak{h}$  as *-y-* over the more common reading *-o-*, and at present, it indeed appears to be preferable to wait for further onomastic research to decide whether these two variations are, in fact, distinct or simply came about owing to different transliteration traditions. The pertinent information is available in the *spelling*-column and can be called up at any point in time.
- *Týhvatr/Tivatr*: NID; NID-S normalises as the former, Markali (1983, 67) as the latter, therefore both variations are given, although they are spelled quite differently.

With these peculiarities now explained, the  $\chi^2$ -test run and different groups of **idionyms** established, interpretation of the results concerning potential social implications can be attempted.

## 5.7. Social stratification of the Bergen idionyms

Since the aim of this particular study is to establish whether it is possible to make educated guesses at the potential social status of the Bergen rune-carvers, the  $\chi^2$ -test results for the diplomataria provide the backdrop against which the appearance(s) of an **idionym** in Bergen is/are interpreted. The  $\chi^2$ -test is also used for direct comparison of the Bergen corpus to either of the diplomataria to determine whether they markedly differ in frequency of **idionym** usage.

Based on the  $\chi^2$ -test (page 92) results and the two groups into which it divides the corpus, the following categories are established:

1. **Idionyms** with a significant difference in use between the corpora = **idionyms** where  $H_0$  could be rejected = **idionyms** where  $p < .01$ 
  - a) **Idionyms** with a higher frequency in DI ( $DI > DN$ )
  - b) **Idionyms** with a higher frequency in DN ( $DN > DI$ )
2. **Idionyms** equally in use within both corpora = **idionyms** where  $H_0$  could not be rejected = **idionyms** where  $p > .01$
3. **Idionyms** appearing in neither diplomatarium

Category 1 comprises all **idionyms** where the difference in use is significant, while Category 1a and 1b focus on where the **idionym** is more common. This is decided by the relative frequency of the **idionym** within one corpus. For example, *Anna* occurs eight times each in DI and DN. However, due to the vastly different sizes of the two corpora, the relative frequency of *Anna* in DI is 0.13%, while in DN it is only 0.02%.<sup>37</sup> Since the  $\chi^2$ -test affirms that in this case, the difference in relative frequency is statistically significant, *Anna* can be considered more frequent in DI than DN, although the difference in percentage seems negligible. The **idionyms** from Category 1 distribute as shown in Figure 5.15.

By some inexplicable, but entertaining coincidence, both subcategories contain exactly 51 **idionyms**. Some of the **idionyms** in either subcategory were assigned to one or the other country already by Lind. Within 1b, his localisation corresponds to where the  $\chi^2$ -test results indicate the **idionym** is more common. In Category 1a, on the other hand, there are two exceptions. One of them is *Ragnarr*, which Lind (NID) considers Norwegian, while the test results place it in the Icelandic group (Query F.16). The same applies to *Didrik*. For the majority of **idionyms** in Category 1, though, he does not give any indication of the prevalent country, at least not in the sense that he would clearly designate them as “N./Isl.”. Since this study does not consider evidence from sagas and other documents, the test results are given preference over his opinion on the matter, and the **idionyms** in Category 1 regarded as either “predominantly Icelandic” (1a) or “predominantly Norwegian” (1b). “Predominantly”, in this case, has to be understood from the statistician’s point of view: these **idionyms** are shown to be in more frequent use in one of the corpora. It does not mean they are exclusively used by Icelanders/Norwegians, nor should the term be understood to imply they were coined in Iceland/Norway, and there is no quantification attached of how frequently an **idionym** would have been used in Iceland/Norway as compared to others in the same corpus.<sup>38</sup> The percentages in Category 1a range from DI=0.08%, DN=0.00% (*Ími*) to DI=3.41%, DN=1.19% (*Narfi*), thereby exemplifying that significant differences need not only apply to **idionyms** which occur many times in one of the corpora, and very few in another. Category 1a-**idionyms** span almost the whole range of percentages observed in the DI sample, and have therefore likely not been in equal usage in Iceland either (excepting feminine **idionyms**, since their lack in written sources can be attributed to a variety of reasons). The same holds true for Category 1b, even if the percentage range is greater than in the first group, from *Fólkvarðr*, DN=0.13%, DI=0.00% to *Erlingr*, DN=4.09%, DI=0.82%.

<sup>37</sup>The relative frequencies/percentages are calculated based on the total sum of tokens in each corpus: 5,978 in DI, 35,074 in DN and 409 in *Björgvin*.

<sup>38</sup>Especially the first is a frequent assumption, for example in (Johnsen 1987, 735).

	DI > Diplomatarium Norvegicum (DN) = 1a	DN > DI = 1b
A	Ámundi, Anna (f), Ari, Arnbjörn, Arni, Ásgrímr	Arnbjörg (f), Ása (f), Áslákr, Auðun
B	Benedikt, Bergþórr, Brandr, Búi	Bárðr, Bergsveinn, Birgir, Bótolfr
D	Didrik	
E	Egill, Eindriði, Eldjarn/Eldiárn, Erendr, Eyjolftr/Eyiólfr	Eiríkr, Erlingr, Eysteinn, Eyvindr
F	Finnr	Fólkvarðr
G	Gísl, Glúmr, Guðríðr (f), Gunnsteinn	Guðrún (f), Gyrðr
H	Hákon, Hálfðan	Halldórr, Hallvarðr, Haraldr, Hávarðr, Helga (f), Helgi, Hrólfr (Rolftr)
I	Illugi, Ími, Ingimundr	Ívarr
J		Jórunn/Lórunn (f)
K	Kárr, Kolbeinn	Karl, Klémetr, Kolbjörn
L	Ljótr/Liotr	Lafranz, Loðinn
M	Markús, Mat(t)heus	
N	Narfi	Nikulás/Nikolás
O/Q	Oddr	Qgmundr, Ólafr, Qlvir/Ølvir, Qnundr, Ótto
P		Pétr
R	Ragnarr, Rúnolftr	
S	Sighvatr, Skeggi, Sólveig (f)	Sigurðr, Símon, Smiðr, Steinarr
T	Thomás	
V	Vémundr, Vígdís (f), Vilhelmus/Vilhíalmr	
Y	Yngvildr (f)	
Þ	Þorbergr, Þorbjörg (f), Þorfinnr, Þorgrímr, Þórhallr, Þorlákr, Þorvaldr, Þorvarðr	Þólftr, Þóraldi, Þóraldr, Þorbjörn, Þórðr, Þorgarðr, Þorgeirr, Þorgils/Þorgísl, Þórir, Þorkell, Þorsteinn

Figure 5.15. Distribution of the **idionyms** in Category 1a (51) and 1b (51) ( $H_0$  rejected).

### 5.7.1. Predominantly Icelandic idionyms

Finding *Egill* in Category 1a is no surprise, Egill Skallagrímssonr being a famous Icelandic skald living in perpetual conflict with the Norwegian royal family, detailed in his saga. Others are more of a surprise, especially *Vilhelmus/Vilhiálmr* and *Didrik*. These are foreign **idionyms** not connected to Christianity like for example *Markús*. *Vilhelmus/Vilhiálmr*, originally from Old High German (Kruken 2013, 599), in particular has been ascribed to either ties to the Orkneys or marriages in England when it appears in Norway (Halvorsen 1984, 121; see also Halvorsen 1975, 165). However, according to the  $\chi^2$ -test, it is more commonly found in Icelandic diplomas. Yet close ties existed between Iceland and the Orkneys and England as well.

Another interesting factor is the distribution of *þór*-**idionyms**. Apparently each country had preferences concerning god-inspired **idionyms**. The only **idionym** with *-þórr* as its second theme, *Berghórr*, sorts into Category 1a as well.

The ratio of feminine to masculine **idionyms** is 6:45 in Category 1a, 5:46 in Category 1b. This is particularly interesting since the question of whether women could act as (long-distance) traders was brought up in connection with the Bergen inscriptions (NIYR VI, see feminine **idionyms** on name-tags). This observation, as well as the frankly astonishing number (a 50-50 split was certainly not the expected outcome) of predominantly Icelandic **idionyms** in such a (comparatively) small corpus raises an important question: can these **idionyms** be interpreted as confirmation for the presence of Icelandic traders in *Björgvin*? Manuscripts mention frequent presence of Icelanders, and Hagland (1988a,b, 1989) interprets “names which are part of Icelandic naming customs” (Hagland 1989, 91, my translation) as evidence of Icelandic traders being physically present in the town. The possibility should not be discounted, although the presence of one’s name-tag need not imply physical presence of the owner as well.

But can the categorisation of an **idionym** as being predominantly Icelandic actually support this conclusion? In light of the supposed workings of **OWN** naming customs, there is another possible interpretation: the runic inscriptions in question might have been carved by Norwegians from the non-manuscript-using parts of the population.

Why consider the possibility of the rune-carver being Norwegian, though? In my opinion, this alternative cannot be discounted for the simple reason that the part of the population reflected in the diplomataria is a distinct group of wealthy, land-owning men able to afford, and in need of, manuscript writing. It does not reflect the Norwegian population as a whole, and assuming it would provide reliable insights into the naming customs of the whole population would be jumping to conclusions. We do not know how widespread a custom like **name transfer** was, and whether it was used across social strata. Even if it was, that some **idionyms** do not, or only infrequently, appear in the Norwegian, yet do appear in the Icelandic diplomas can also be explained by the settlement process. Many land-owning families left for Iceland during the 900s, bringing with them their names and customs. This would explain why certain **idionyms**, based on the source material available to us, appear to be predominantly Icelandic, when they could very well also have remained in use in Norway amongst those parts of the population not appearing in manuscripts.

Lacking knowledge about this part of the population, it is difficult to support this hypothesis by evidence. Considering the total tokens of predominantly Icelandic **idionyms** in the Bergen corpus and their overall number (86 without potential invocations, 98 with) the total tokens



Quartile	Idionyms
≤ 8.25 (5)	Glúmr, Ími, Búi, Anna (f), Vémundr
≤ 24 (8)	Gunnstein, Ámundi, Didrik, Eldjarn/Eldiárn, Ragnarr, Mat(t)heus, Þórhallr, Þorbergr
≤ 61.75 (13)	Vígdís (f), Kárr, Brandr, Þorvaldr, Þorbjörg (f), Arni, Hálfðan, Gísl, Þorvarðr, Sólveig (f), Eyjolftr/Eyiólfr, Skeggi, Ljótr/Liotr
≤ 204 (25)	Guðríðr (f), Eindriði, Þorfinnr, Vilhelmus/Vilhiálmr, Þorlákr, Arnbjörn, Yngvildr (f), Bergþórr, Oddr, Finnrr, Markús, Sighvatr, Þorgrímr, Thomás, Egill, Hákon, Benedikt, Illugi, Ingimundr, Ásgrímr, Kolbeinn, Rúnolftr, Erlendr, Ari, Narfi

Figure 5.16. Predominantly Icelandic **idionyms** sorted by **quartiles**, listed according to count of tokens, feminine **idionyms** marked with (f).

of predominantly Norwegian **idionyms** (139 without, 147 with potential invocations), the gap between the two groups is certainly not large (Query F.5). Presupposing that the use of runes is restricted to the upper social echelons, it would be most logical to assume that the inscriptions are evidence of Icelandic traders of some social importance (and enough wealth to travel to Björgvin).

Yet if runes were not exclusively used by the upper social echelons, then an explanation like the one presented above is equally plausible. If the latter is the case, the inscriptions may mirror the upper social classes and/or have been carved by just about anyone living in or visiting the town (see Chapter 7 for a discussion on the importance of the material for potential social status of rune-carver). With the exception of foreign **idionyms**, very little work has been done on this aspect so far, and therefore it remains an open question.

Generally, an attempt could be made to determine the likelihood of each solution object by object, yet very little information regarding the social status of the name-bearers can be gleaned from the objects themselves either (Chapter 7). Carefully interpreting the Category-1a-**idionyms** as signifying Icelandic ties, and certainly in some cases actual presence of an Icelander, appears to be the best compromise, especially when taking into account that Icelandic ties might also be present in the form of a child of mixed background (Section 5.1.2). At this point in time, immigration can go either way between those two countries, and this is a valid possibility, not to mention a potential diaspora. Interpreting the supposedly predominantly Icelandic **idionyms** as signifying a person of the non-manuscript-using population in Bergen carving runic inscriptions cannot be ruled out on the premise that absence of evidence cannot be considered evidence of absence, though. Not knowing how those not partaking in manuscript writing named their children does not imply that they followed different customs, or used another set of **idionyms**.

Figure 5.16 provides an overview of all Category-1a-**idionyms** sorted by **quartile** (Section 5.4; the number of **idionyms** does not fit with the respective **quartile** encompassing 25% of the corpus, because the **quartiles** have been calculated on *all* **idionyms** appearing in DI/DN. The missing ones belong to Category 2, Section 5.7.3). Some **idionyms** need to be excluded, since *Markús*, *Mat(t)heus* and *Thomás* only appear as *invocations* in Bergen.



The 51 **idionyms** in Category 1a distribute around the **median** 38:13, leading to the conclusion that the majority of **idionyms** in Category 1a are either commonly or often used in Iceland. The **idionyms** from the two groups above the **median** at the very least appear more frequently in DI; when one of them is found in Bergen, it is therefore more likely to have belonged to an Icelander of high social status than those in the two groups below the **median**. This interpretation aligns well with prior interpretations of some **idionyms**, in particular *Gísl* and *Rúnolfr* (NIYR VI, 167, 189). Interpreting those inscriptions as having been carved by, or at least referring to wealthy Icelanders appears reasonable.

For other **idionyms**, the **quartile** does not align with prior interpretation, for example *Ragnarr*, which has traditionally been identified as belonging to a Norwegian (NIYR VI, 187). This does not contradict the argument presented here, since the location of *Ragnarr* in the second **quartile** might indicate that one is looking at a Norwegian of low social status, whose name became more frequent in Iceland, but did not make it all the way to the top. That the **idionym** itself is part of the Icelandic group contradicts prior scholarship, though, insofar as *Ragnarr* is considered Norwegian by Lind (NID, 838), and Kruken 2013 believe it to be borrowed from Denmark. The contradiction cannot be resolved without further research.

Strikingly, some **idionyms** considered typically Icelandic like *Eldjarn/Eldiárn* or *Þórballr* (NIYR VI, 159, 208) are still below the **median**. Apparently “typical” does not necessarily translate to “frequent”, even if Johnsen comments that “After that time [when a Norwegian bearer of said name emigrated to Iceland during the 900s], it only appears in Iceland, where it becomes common” (my translation NIYR VI, 208). Considering this, perhaps it might be appropriate in future research to distinguish between the terms “typical” and “common”. An **idionym** can be “typical” for a certain subgroup of the population *if and when* it is *exclusively* used within that part of the population; it does not have to be carried by a significant proportion of said group as well to serve as an indicator that a single name-bearer is part of the group. Yet designating every **idionym** appearing only once as “typical” would take conclusions too far; the **idionym** needs to appear with reasonable frequency in one group opposed to not at all in control groups to justify labelling it as “typical”. Still, high frequency is not enough to consider usage of a certain **idionym** indicative for a certain group.

Also interestingly, only one feminine **idionym** sorts into **quartile** 1, whereas *Vigdís*, *Sólveig*, *Þorbjörg* appear in **quartile** 3 and *Guðríður*, *Yngvildr* in **quartile** 4. Does this support the idea of female Icelandic long-distance traders? Only *Anna* sorts into the same **quartile** in DN. *Vigdís*, *Sólveig* sort into **quartile** 1 in DN as opposed to 3 in DI, *Þorbjörg* into 2 instead of 3. The difference in **quartiles** is even more noticeable for *Yngvildr*, which sorts into **quartile** 1 in DN as opposed to 4 in DI. *Guðríður* shows less of a gap, being in 3 instead of 4 in DN. As far as the feminine **idionyms** are concerned, differences in use between both countries appear obvious. It is tempting to explain those differences in **quartile** positioning by regarding these name-bearers as Icelandic women visiting/being in **Björgvin** for some purpose.

However, without studying a different sample of feminine **idionyms**, preferably one encompassing all feminine **idionyms** known from either country, there is no way of knowing whether the **quartile** distribution of the current sample can actually be considered representative for Iceland, or whether this observation is owed to the sample being prejudiced towards Norwegian customs. There is also the real possibility of these **idionyms** belonging to women from the lower social scales in **Björgvin**.

This also raises the question of how the patterns in Bergen and DI compare. To use  $\chi^2$ -testing for this comparison, the 6 tokens for *Ió(h)an/Jó(h)an* and 9 of *Jón* from Bergen were added up to 15, since they were subsumed under *Ió(h)an/Jó(h)an* in NID; NID-S. Therefore the same needed to be done for comparing Bergen to the diplomataria. *Invocation*-marked tokens were discounted, although they may appear as interlocutor-**idionyms** in DI. The result indicates that the differences are not quite as great as those between the diplomataria, although still well below  $p < .01$ :

Pearson's Chi-squared test with simulated p-value (based on 10000 replicates)

X-squared = 2089.2, df = NA, p-value = 9.999e-05

$H_0$  can again be rejected; the two corpora differ either in distribution of **idionyms** or regarding the population behind the sample, with the latter being the more likely explanation. Yet from the sample of 218 **idionyms** which fulfil the requirements (they appear at least once either in Bergen or DI), only 31 show  $p < .01$ . Patterns therefore differ only where these 31 **idionyms** are concerned, whereas for all other **idionyms**,  $H_0$  cannot be rejected.

This result provides a first glimpse at a potential answer to the questions above; it suggests that the Bergen rune-carvers might have been named in accordance with naming customs also observed in Iceland.<sup>39</sup> This makes an interpretation of some inscriptions indicating Icelandic visitors to Bergen more likely and at the same time, makes it more difficult to decide whether for example the feminine **idionyms** indicate Icelandic or local women. It also lends some credence to the shift described above – since so many **idionyms** show similar distribution patterns, their presence in DI might be due to some **idionyms** having gained more prevalence in Iceland after the settlement. It would at this point be interesting to know how many families from Vestlandet, in particular the areas around Bergen, emigrated to Iceland, and what their names were.

With apparently greater similarities between these two corpora than differences, the 31 **idionyms** in the latter group are particularly interesting. Only eight show higher relative frequencies in DI than in the Bergen inscriptions, whereas 21 have higher frequencies in the Bergen corpus (Query F.24, Figure 5.17), and two, *Anne*, *Hermaðr* have *iceperc* IS NULL – since they do not appear in the diplomataria, it is safe to say that their relative frequencies are greater in Bergen.

Eight **idionyms** belong to Category 1a: *Ari*, *Ásgrímr*, *Hákon*, *Illugi*, *Ingimundr*, *Narfi*, *Rúnolfr*, *Thomás*. Since they appear more often in DI than in both Bergen and DN, the likelihood of the men in question being Icelanders arises once more, and their high ranking in the **quartiles** suggests that they may indeed be Icelandic elite (except *Thomás*, which does not appear as a **PN** in Bergen).

Seven **idionyms** have higher relative frequencies in the Bergen corpus and belong to Category 1b (Query F.24). In other words, regardless of the **quartile** in which they appear and considering their geographical find location, their name-bearers can be regarded as almost certainly Norwegian (page 122). This conclusion is further reinforced by the fact that with the exception of *Þóraldi*, which comes from **quartile** 2, they all sort into **quartiles** 3 or 4 in DN (Table F.2). However, that does not mean they appear infrequently in DI. *Sigurðr* sorts into **quartile** 4 in Iceland as well, and *Eiríkr*, *Ívarr*, *Ólafr*, *Þóraldi* only sort one **quartile** lower in DI than they do for DN. While the  $\chi^2$ -test marks them out as being predominantly Norwegian, this should be kept in mind; the

<sup>39</sup>How the sample compares to DN, and by extension, Norwegian naming customs, is discussed separately.

Category	Bergen/DI	Idionyms
I	DI	Ari, Ásgrímr, Hákon, Illugi, Ingimundr, Narfi, Rúnolfr, Thomás
I	B	Arni
N	B	Eiríkr, Eysteinn, Ívarr, Ólafr, Sigurðr, Þóraldi, Þórir
P	B	Án(n), Áni, Einarr, Gunnarr, Hallkatla, Ió(h)an-/Jó(h)an, Lúcia, María, Sámr, Sigvaldr, Vígi, Þórr
	B	Anne, Auðr, Hermaður

Figure 5.17. The 31 **idionyms** showing different distributions when comparing the Bergen corpus to DI (second column), and how they sort into the categories based on the comparison of diplomataria. Categories are indicated by I(celand), N(orway), P(an-Scandinavian), nothing if the **idionym** only appears in Bergen ([Query F.24](#)).

probability that these **idionyms** were carried by Icelanders visiting **Björgvin** is much higher than, for example, *Eysteinn*, which sorts respectively into **quartile** 4 and 1 in DN and DI, or *Þórir* (3/1).

Looking at the Category-1a-**idionyms** with higher relative frequencies in DI, this also applies to *Narfi* (4/4). *Hákon*, *Ingimundr*, *Thomás* show a gap of one **quartile** (DI 4/3 DN), while the **quartiles** for *Ari*, *Ásgrímr*, *Rúnolfr* are separated by the **median** (2/4) and *Illugi* is in DI 4 and DN 1.

Further complications arise when looking at the inscriptions and possible combinations of **idionyms**. *Narfi* only appears as a patronymic on INS549, potentially combined with *Þorgarðr*, which belongs to Category 1b and can be found in DI 1 or DN 2. This favours this particular name-bearer being Norwegian. However, should the proper **normalisation** be *Þorfinnr* or *Þorviðr*, then the evidence would be in favour of the man having been an Icelander considering that both **idionyms** sort into Category 1a. If it is the last possibility, either is equally possible considering that *Þorviðr* does not sort into any group. Explanations for all versions are thinkable. *Þorfinnr* *Narfasonr* is most likely Icelandic given the current evidence. *Þorviðr* *Narfasonr*/*Þorgarðr* *Narfasonr* could have been Icelandic or Norwegian – perhaps he had an Icelandic father? If that should be the case, this inscription would represent a child of mixed background. With three possible **normalisations**, it is impossible to decide. For another combination on the same object, *Erlendr* *Birgisonr*, there is little doubt about the correct **normalisation**; in this case, a Category-1a-given name is combined with a Category-1b-patronymic. Two results of Icelandic-Norwegian intermarriages?

These **idionyms** are the ones with a statistically significant difference between Bergen and DI as well. The same observations can also be made when looking at all 218 appearing in one or the other corpus: **quartile** placement is often so similar that it is difficult to accept the **idionym** is more prevalent in one country.

Since the sample is likely strongly prejudiced towards Norwegian naming customs, **idionyms** sorting into the upper **quartiles** for DI at present might be pushed down once a larger, better balanced sample has been taken (there is a big gap between the two ranges, see [Figure 5.3](#)). There is also a good chance that with a different, larger sample, new calculations might change individual **idionyms'** current country allocation. Lastly, since the corpus is from Bergen, meaning

Norway, there is by default a higher probability that whoever carved a rune-stick in town would have been Norwegian. In the end, doubts remain attached to the current categorisation.

On the other hand, disregarding the  $\chi^2$ -test results by arguing that the **quartile** placement for both corpora coincides or is not markedly different is hardly justifiable either, especially since the **quartiles** were calculated on different samples (page 95). The less-than-satisfying, but honest conclusion is that a caveat along the lines of “but the name-bearer could also be a Norwegian, potentially of low social status” always needs to be attached to the Category-1a-**idionyms**. Because of the test results, the **idionyms** shall still be considered predominantly Icelandic, and depending on their **quartile** positioning, high- or low-status. However, especially when distribution patterns do not differ between DI and Bergen, regardless of the potential social status, there is a very good chance that when these **idionyms** are encountered in Bergen, they were carried by a local – even when they sort into a high **quartile** in DI.

Interpretation is somewhat less difficult for those **idionyms** in Category 1a sorting into the lower two **quartiles**, like *Eldjarn/Eldiárn*, which are not in frequent use amongst the Icelandic population, or at least not the manuscript-using part of it. Since the non-manuscript writing part of the population might not have had the means to afford trade with or travel to Bergen, it is also less likely that these inscriptions were carved by less wealthy Icelanders. They could, of course, have come to Bergen as part of a ship’s crew as suggested by Liestøl (1964a). Nevertheless, considering them as potential indications of a Norwegian of low social status is feasible, although again, the caveat of “it could still be an Iclander” has to be attached.

The only **idionyms** which appear to be somewhat reliable markers of social status and geographic origin alike are *Ari*, *Ásgrímr*, *Illugi*, *Rúnolfr*. That their distribution in Icelandic manuscripts when compared to Bergen indicates a greater use in Iceland, adds to the evidence that when they appear, there is a fair chance they signify Icelandic ties. Combined with the fact that *Ari* appears only twice in Bergen, all other **idionyms** only once, if they were used by the non-manuscript-using, but rune-carving population of Norway, then they were probably used sparsely in that part of the population as well, unless the manuscript-using and rune-carving population consists of roughly the same group. For these four **idionyms**, Icelandic origin in addition to high social status of name-bearer appears to be the best-fitting conclusion. *Hákon*, *Ingimundr*, *Narfi*, due to their **quartile** positioning, have a greater caveat attached, and since *Thomás* does not appear as a **PN**, the question is moot.

One Category-1a-**idionym** appears in the other group, though: *Arni*, while supposedly predominantly used in Iceland, is apparently even more common in *Björgvin*. The current evidence favours interpreting this particular **idionym** as signifying local or long-distance traders. Its positioning in **quartile** 3 in DI indicates that the name-bearers possibly held a comparatively high social status and it sorts into Category 1a, and when testing DN against Bergen, the  $\chi^2$ -test shows a statistically significant difference favouring Bergen. Since *Arni* also appears twice in the English custom accounts (Sørli 1950, 10), which record traders coming to the ports in Lynn, Boston, Hull, Scarborough and Ravenser (ibid., 3), a case might be made that *Arni* might have been in use in traders’ families, who could certainly acquire enough wealth over time to also afford manuscript writing, but perhaps more so in Iceland than in Norway. The acquisition of wealth and rise in social status of merchant families is certainly a trend observable across all of Europe during the time (Fuhrmann 2014, 174–177, 212–223). Since most of the Bergen tokens come from name-tags, which were likely used in trading activities, this seems to be a feasible conclusion. The

number of tokens in Bergen could then be ascribed to it being one of the major trading harbours for Icelandic traders.

Concluding this survey, the two corpora are more alike, and where there is a difference in distribution, the patterns generally favour the name-bearers being Norwegian rather than Icelandic, although considering the **quartile** positioning, this cannot be entirely discounted either for those **idionyms** appearing in the upper **quartiles** in DI.

The 42 **idionyms** in Category 1a showing no statistically significant deviation when compared to Bergen, but still considered predominantly Icelandic remain. They, too, are designated according to the test results as IL (Icelandic low-status) or IH (Icelandic high-status) with the caveats discussed here attached, even *Narfi*, which presents a complicated case.<sup>40</sup> Interpretation of this group is even more difficult. Especially **idionyms** sorting into the lower two **quartiles** could, again, be considered evidence that rune-carving and -writing was by no means restricted to the upper social echelons in **Björgvin**. They could, however, also be interpreted as evidence that families were able to protect “their” **idionyms**, and that Icelandic name customs differ from Norwegian ones because people from lower social scales rose in importance in Iceland. Another possible interpretation is that **Björgvin** was much more of a melting pot than previously assumed, at least where the Icelandic/Norwegian population was concerned – which, considering that a lot of these inscriptions can be interpreted as **owner’s tags**, and therefore, related to trading activities, is not unlikely.

With little knowledge of how families might be able to protect “their” **idionyms**, the first and last option appear the most likely, depending on where in the **quartiles** the respective **idionym** sorts. It is more likely that wealthy Icelanders would undertake the journey to **Björgvin**, therefore it is also more likely that these **idionyms** could have belonged to an Icelandic visitor. With 17 **idionyms** in **quartile** 4 in this group and 12 in **quartile** 3 (Table F.2), they make up a substantial number, opposed to 8 **idionyms** in **quartile** 2 and 5 in **quartile** 1.

The caveats still apply, especially where **quartile** placement is very similar at present; still, against the backdrop of **Björgvin** being such an important harbour for Icelanders, some of these **idionyms** were probably carried by Icelanders, potentially Icelanders who visited **Björgvin** frequently.

### 5.7.2. Predominantly Norwegian idionyms

The Category-1b-**idionyms**, as well, were split up according to the **quartiles**. Astonishingly, none of the Category-1b-**idionyms** sorts into **quartile** 1, and 2 does not encompass many either. Figure 5.18 shows that most **idionyms** in Category 1b are also located above the **median**, and the majority are etymologically Scandinavian. Several recall either royal personages (*Eiríkr*, *Erlingr*, *Haraldr*, *Ólafur*) or heroes from the Poetic Edda, the eponymous *Helgi Hundingsbani*, half-brother to the potentially most famous Nordic hero, *Sigurðr*, the Dragonslayer. The presence of the latter **idionym** in the uppermost **quartile** is no surprise at all given how popular the *Sigurðr*-character appears to have been in general in Scandinavia (Gunnes 1983, 155; Nordanskog 2006, 231–262), nor is it surprising that it also appears in **quartile** 4 in DI.

---

<sup>40</sup>This inscription illustrates why and where studies such as this reach their limit when applied to closely related cultures.



Quartiles	Idionyms
$\leq 23.75$	
$\leq 134$ (8)	Arnbjörg (f), Fólkvarðr, Þorgarðr, Þóraldi, Ótto, Bergsveinn, Smiðr, Ólvir/Ólvir
$\leq 308.25$ (15)	Helga (f), Birgir, Jórunn/Iórunn (f), Þorgeirr, Þórir, Ása (f), Þorbjörn, Bárðr, Guðrún (f), Loðinn, Lafranz, Helgi, Ívarr, Þorkell, Karl
$\leq 1435$ (28)	Eysteinn, Klémetr, Gyrðr, Oddr, Þorsteinn, Þóraldr, Þórðr, Ólafr, Halldórr, Pétur, Þorgils/Þorgísl, Þólftr, Steinarr, Hrólfr (Rólfr), Bótolfr, Kolbjörn, Símon, Eiríkr, Nikulás/Nikolás, Haraldr, Eyvindr, Qgmundr, Qnundr, Hallvarðr, Hávarðr, Auðun, Áslákr, Sigurðr, Erlingr

Figure 5.18. Predominantly Norwegian **idionyms** sorted by **quartiles**, listed according to count of tokens, feminine **idionyms** marked with (f).

Category	Bergen/DN	Idionyms
I	B	Arni, Eldjarn/Eldiárn, Þórhallr
N	DN	Áslákr, Auðun, Erlingr, Hávarðr, Qnundr
N	B	Þórir
P	B	Áni, Gunnarr, Hallkatla, Ió(h)an/Jó(h)an, María, Sámr, Vígi, Þorkatla
	B	Anne, Auðr, Hermaðr, Sørkviðr

Figure 5.19. The 21 **idionyms** showing different distributions when comparing the Bergen corpus to DN (second column), and how they sort into the categories based on the comparison of diplomataria. Categories are indicated by I(celand), N(orway), P(an-Scandinavian), nothing if the **idionym** only appears in Bergen ([Query F.24](#)).

Category-1b-**idionyms** reference *þórr* in their first theme, too. Out of 26 **dithematic idionyms**, 10 belong to Category 1b. Category 1a has eight which appear to distribute across the **quartiles** in approximately the same fashion (Figure 5.16). Although in different variations, these **idionyms** were apparently common in both countries (cf. Gunnes 1983, 155).

A  $\chi^2$ -test comparing the Bergen and DN-samples was run, resulting in an overall  $\chi$ -value of 6042.4 and a **p-value** of 0.00009999 (F.22). The following  $\chi^2$ -test revealed that for 21 of 220 **idionyms**,  $H_0$  cannot be rejected. This chimes in with the result of the comparison between DI and Bergen, where  $H_0$  could only be rejected for 31 **idionyms**; the similarities however appear to be greater between DN and Bergen. 16 **idionyms** favour Bergen (although three do not appear in the diplomataria), whereas five appear more often in DN. The **idionyms** sorting into Category 2 are discussed in Section 5.7.3.

12 **idionyms** from Figure 5.17 reappear in Figure 5.19, but only one also falls into Category 1b: *Þórir*. It sorts into **Quartile** 3 in Category 1b. However, when DN and Bergen are com-

pared, Bergen shows the higher frequency. This could be interpreted as *Þórir* being a high-status **idionym** in Norway, whose bearers in *Björgvin* somewhat frequently used runes as a medium of communication, or that the **idionym** was used amongst both the manuscript-using and the rune-writing parts of the population. Interestingly, *Þórir* does not appear in either *Sverris saga* or *Hákonar saga* according to the lists compiled by Johannessen (2002), yet appears in the custom accounts (Sørli 1950, 14). This could be considered as evidence for *Þórir* being used by moderately high-social status merchants. Alternatively, since the Bergen/DN-comparison implies it was more commonly used in *Björgvin* and *Þórr-idionyms* are very popular in both countries, the name-bearers could also have been men of lower social status who shared this particular **idionym** with men higher up the social ladder.

Five other **idionyms** also point towards Norwegian men of potentially higher social status appearing as rune-carvers in *Björgvin*: *Áslákr*, *Auðun*, *Erlingr*, *Hávarðr*, *Qnundr*. They appear in **quartile** 4, so they are very common in Norwegian diplomas; yet in Bergen they appear once or twice (*Erlingr*). Since about  $\frac{2}{3}$  of the Bergen **idionyms** only have one token, this need not mean anything. Yet considering the other **idionyms** known to have been carried by literary figures or men of high social status (page 120), this does not seem to be an isolated occurrence. Still, *Áslákr* and *Erlingr* appear in *Hákonar saga* (Johannessen 2002, 5 and 7 tokens) and the custom accounts (3 and 1 tokens), and *Qnundr* also appears in the custom accounts (1 token). They do, however, not appear in Johannessen's list of the most popular **idionyms** in *Sverris saga*.<sup>41</sup> Considering their placement within the **quartiles** (*Erlingr* ranks first, *Áslákr* third), it seems strange that they do not make the list in *Sverris saga*, especially since *Sverrir*'s enemy was named *Erlingr skakki*. Equally difficult to explain is the lack of *Áslákr* unless one assumes that the **idionym** rapidly gained popularity after the Civil Wars to account for the exceptionally high count of tokens. While this goes beyond the scope of the current study, it would be very interesting to examine whether *Áslákr* might have been an **idionym** favoured by families with mercantile interests, and its increasing presence in manuscripts mirrors their growing wealth, which in turn enabled them to acquire land and take part in the kind of transactions often attested in diplomas (Buttinger 2012, 120; Johnsen 1987, 717).

Whatever the reason behind the saga distributions, as far as high-status **idionyms** in Bergen are concerned, *Erlingr* and *Áslákr* are counted amongst them due to their placement in **Quartile** 4. Since DN shows higher frequencies and patterns diverge for DI, the men in the runic inscriptions potentially belong to the Norwegian elite occasionally making use of runes. Icelanders made less use of either **idionym**, which could explain why they turn up equally infrequently in Bergen and DI. Similar reasoning can be applied to *Auðun*, *Hávarðr*, *Qnundr* since they can be found in place four, five and six after *Áslákr* and thus, very much at the top of the ranking as well.<sup>42</sup>

Seven more **idionyms** from Figure 5.17 need to be discussed at this point: *Eiríkr*, *Eysteinn*, *Ívarr*, *Ólafr*, *Sigurðr*, *Þóraldi*, *Þórir*. Their distribution in DI and Bergen differs in favour of Bergen, but all of them sort into Category 1b. Comparing Bergen and DN, **H<sub>0</sub>** could not be rejected, except for *Þórir* (page 121).

That they favour Bergen in a comparison between DI and Bergen is no surprise, considering

<sup>41</sup>He counts by individual instead of occurrence and only lists the most popular 18 **idionyms** from *Sverris saga*, 32 from *Hákonar saga*.

<sup>42</sup>Although *Auðun* also sorts into **quartile** 4 in Iceland.



they sort into Category 1b. That they show the same distribution in DN as in Bergen can, where they sort into the upper **quartiles** (all except *Þóraldi*, **quartile** 2), be interpreted as Norwegian men of high social status making use of runes. Still, as with the Category-1a-**idionyms**, there is a caveat: they could have been popular across the whole population, as is probably the case for *Ólaf*; none of these **idionyms** appears less than three times in the Bergen corpus (page 120, Table F.1). There is a chance that when they appear in Bergen, they designate men of comparatively high social status, but they could also represent men of lower social status carrying very common **idionyms**.

The opposite is the case for the last two **idionyms**: *Eldjarn/Eldiárn*, *Þórballr*. Like *Arni* (page 119), they sort into Category 1a, but favour Bergen over DN. Neither is particularly common in DI, however (Figure 5.16), and *Þórballr* has only two tokens in Bergen, *Eldjarn/Eldiárn* one. Interpretation is tricky; since  $H_0$  cannot be rejected for the DI/Bergen-comparison, but either **idionym** is still more common in Bergen than in DN, are those two/three individuals low-status Icelanders visiting Bergen, low-status Bergensere or fairly high-ranking Icelanders carrying a rare **idionym**? In the end, the available evidence allows no final conclusion, especially since low-status Icelanders could, for example, have been hired sailors and reached *Björgvin* that way; they need not have been merchants themselves.

For Category 1b, the question is less one of geographic origin and more one of how common certain **idionyms** would have been amongst the population in general, not just the manuscript-using group. As with the Category-1a-**idionyms**, Category-1b-**idionyms** will be labelled NH (Norwegian high-status) or NL (Norwegian low-status) according to their **quartile** positioning, and caveats also apply. One caveat, illustrated by *Eldjarn/Eldiárn*, *Þórballr*, is that **idionyms** in the lower two **quartiles** could just have been used sparingly even within those families “owning” them, thus resulting in a low number of tokens. The other caveat concerns the spread of popular **idionyms** across the population, although the probability of the name-bearer in question being of fairly high social status is higher if the **idionym** sorts into the upper **quartiles**.

This brings the discussion to the so far ignored foreign **idionyms**. The presence of etymologically non-Scandinavian **idionyms** in the third or fourth **quartile** either in DI or DN raises the question of why they are there. In the lower **quartiles** (*Fólkvarðr*, *Ótto*), an explanation can be found in correspondence or occasional business dealings with foreigners, but that can hardly be the explanation for **idionyms** occurring in the upper **quartiles**. This subgroup consists of **idionyms** either of Hebrew, Aramaic, Latin, Greek or common-Germanic origin (*origin-column*, **IDIONYM**, based on Kruken 2013). One explanation may be that all of these **idionyms** are inspired by the Christian religion, either because they occur in the Bible, or because they are the names of saints or (wo)men otherwise connected to Christianity (cf. the story of the first use of *Magnús* in Norway in *Ólaf*s *saga helga*, Johannessen 2002, 30).

The adoption of Christianity-associated **idionyms** in medieval Scandinavia has been the topic of much research (for example Gunnes 1983; Meldgaard 1994; Johannessen 2002), and shall therefore not be gone into in detail; one hypothesis is that Christianity-inspired **idionyms** were first used in royal families for female children as well as younger and illegitimate sons (Meldgaard 1994, 207). In Norway, however, the adoption of Christianity-inspired masculine **idionyms** does not start with the royal families (Johannessen 2002, 31, 52).

The expectation was that Category 1b would include more foreign **idionyms** than Category 1a, but in fact, they differ only by one. Instead, 39 sort into Category 2, pan-Scandinavian

**idionyms**, while Category 1a only contains seven, Category 1b eight (Table F.1). In all categories, they distribute across all **quartiles** without discernible trends, which makes it difficult to draw conclusions on a larger scale. Additionally, the speed with which these foreign **idionyms** spread amongst the population has to be taken into account. *Lafranz* and *Nikulás/Nikolás*, for example, are considered amongst the first international saint **idionyms** being used in Norway (Halvorsen 1975, 158), yet they might only have come into frequent use in later years (Gunnes 1983, 161). In Bergen, they appear once and twice, respectively, once each in an invocation, and they sort into Category 1b (**quartile** 4 DN, 3 DI, *Nikulás/Nikolás*; DN 3, DI 1, *Lafranz*). But with regard to their potential social status at the time of the Bergen rune-carvers, very little can be said. It certainly is unlikely that by coincidence, a lot of men whose social status would not normally necessitate mention in a manuscript, would just so happen to be mentioned in the diplomas. Yet should all of the imported **idionyms**, regardless of their **quartile** placement, be considered as high-status indicators based on the hypothesis that the rich families were responsible for their import? How important is, in this specific case, the time dimension?

Since it was impossible to date every single diploma, and it is therefore also not possible to pinpoint when exactly these **idionyms** start becoming more common amongst the manuscript-using group, could foreign **idionyms** in the lower **quartiles** represent early imports, subsequently abandoned in favour of others? And most importantly: how frequent were these **idionyms** amongst people who generally do *not* appear in manuscripts, but who might use runes?

Again, the lack of a control group of **idionyms** clearly borne by people from the lower social scales restricts further interpretation. It is simply not possible to decide whether the sudden preference for certain Christianity-inspired **idionyms** encompassed the whole population or only parts of it, and how exclusive these **idionyms** were. Very simply put, the whole premise of this study only works if families were able to “protect” their distinctive **idionyms** against being appropriated by people from other, unrelated families, which in turn would lead to those being underrepresented in the diplomataria.

The newly imported **idionyms**, however, might have proven much more difficult to appropriate and protect, not least because Biblical stories were becoming commonly known. Additionally, **Björgvin** was a town, and changes in naming customs in Norway took longer in the rural areas than in towns (Meldgaard 1994, 210–211). It is therefore entirely possible that the corpus based on the inscriptions, in which borrowed **idionyms** appear quite frequently, is indicative of naming customs changing amongst the lower social scales in **Björgvin**, keeping step with the changes in higher social circles due to the closer proximity and the less traditional setting of the newly-established town. For inscriptions showing foreign **idionyms**, the potential explanation can therefore include

- person of high social status named in accordance with a new trend, using both manuscripts and runes;
- person of low social status named in accordance with a new trend, capable of using runes;
- child of mixed background, of high or low social status;
- non-Scandinavian, either capable of using runes or appearing in runic inscriptions owing to dealings with the local rune-carving population.

Although previous scholars lean toward one or the other explanation (for example Sørli 1950, 9), I prefer excluding the whole group of etymologically non-Scandinavian **idionyms** from any analysis regarding the social background of name-bearers for the moment, since I believe more research is needed before conclusive statements can be made, especially concerning the time-frame. This excludes several **idionyms** from analysis, but if this survey has shown anything so far, it is that the results are far from conclusive for most **idionyms**, and difficulties inherent in the samples render what few conclusions can be drawn preliminary as well. Still, they also show that using  $\chi^2$ -testing and **quartiles** on this corpus can expose certain tendencies in the onomastic material, including previously debated questions about the geographic origin of name-bearers. Two groups remain.

### 5.7.3. Idionyms in equal use in both diplomataria

80 **idionyms** belong to Category 2, where  $H_0$  cannot be rejected (Table F.1). As in Category 1, the two lower **quartiles** do not contain many **idionyms**, because **quartiles** are calculated on the basis of DN/DI, and 54 **idionyms** sort into different **quartiles** in the two corpora (Table F.2). These are excluded from analysis.

For 26 **idionyms**, the **quartile** placement aligns (Figure 5.20). They appear to hold the same social status across the corpora, and have been designated as PSL (pan-Scandinavian low-status) and PSH (pan-Scandinavian high-status) respectively. **Idionyms** only appearing as invocations in Bergen from this category are *Andreas/Andrés*, *Elisabet(h)*, *Gabriel*, *Lukas*, *Michael/Mikjáll*, *Óðinn*. Potentially *María* also belongs to this group, but for two inscriptions, the scholar is not clear on whether these are considered invocations; they are therefore included (see page 75 about *María*'s status as a taboo name). For 23 **idionyms**, patterns between all three corpora and **quartiles** coincide:

- **Quartile 1:** *Hallbjörg* (f), *Kormakr*, *Lukas*, *Vébrandr*
- **Quartile 2:** *Halli*, *Hermann*, *Styrkár*
- **Quartile 3:** *Andreas/Andrés*, *Björn/Björn*, *Hallkell*, *Heinrekr*, *Ingiríðr* (f), *Ingjaldr/Ingjaldr*, *Magnús*

Quartile	Idionyms
1 (5)	Hallbjörg (f), Kormakr, Lukas, Vébrandr, Þorkatla (f)
2 (4)	Einarr, Halli, Hermann, Styrkár
3 (8)	Andreas/Andrés, Björn/Björn, Hallkell, Heinrekr, Ingiríðr (f), Ingjaldr/Ingjaldr, Ió(h)an/Jó(h)an, Magnús
4 (9)	Arnfinnr, Ásmundr, Guðmundr, Guðþormr, Ingibjörg/Ingibjörg (f), Margrét(a) (f), Sigríðr (f), Þorleifr, Þormóðr

Figure 5.20. **Idionyms** in equal use in both diplomataria and within the same **quartiles** in DI and DN; feminine **idionyms** are marked with (f).

- **Quartile 4:** *Arnfinnr, Ásmundr, Guðmundr, Guðþormr, Ingibjörg/Ingibiörg* (f), *Margrét(a)* (f), *Sigríðr* (f), *Þorleifr, Þormóðr*

It is likely no coincidence that this list is almost the same as Figure 5.20. Placing these **idionyms** geographically is not possible, but it is interesting that most of them cluster in the upper two **quartiles**. They appear to be fairly common amongst the manuscript-using population in Norway and Iceland as well as the rune-carvers in Bergen. Since their patterns correspond in all corpora, though, it is again difficult to say whether the rune-carvers were men/women of high social status or the **idionyms** are generally popular. Both possibilities should therefore be considered as valid interpretations, while the ones in the lower **quartiles** might be ascribed to name-bearers of a lower social status – perhaps especially since their distribution does not differ between Bergen and the diplomataria. Again, merchants located somewhere in the middle of the societal order come to mind as potential name-bearers.

Noteworthy is that of five feminine **idionyms** in this group, four sort above the **median**, *Ingiríðr* (f), *Ingibjörg/Ingibiörg*, *Margrét(a)*, *Sigríðr*. This is unusual for feminine **idionyms** on the whole owing to the skewed gender balance in the source material; the number of name-bearers (or their correspondence) must have been staggering for so many tokens to appear in the diplomataria. This leaves two possible conclusions: either the **Björgvin** name-bearers were women of high social status, or these **idionyms** were extremely common amongst the population in either country as a whole, low- and high-status groups included. This is a question that can only be answered on the basis of more evidence (Chapter 7).

There are two more possibilities for combination of results for this group: Bergen can either have a higher or lower relative frequency than both manuscript corpora. **Quartiles** distribution needs to coincide so the potential social status can be determined. There is no **idionym** in Category 2 where Bergen has lower relative frequencies than both DI and DN, but for *Ió(h)an/Jó(h)an*, Bergen shows higher relative frequencies.<sup>43</sup> It appears that regardless of variation, different versions of *Johannes* appeared frequently in **Björgvin**, and with a **quartile 3**-placement, the result supports Johannessen (2002, 42) in that *Jón* has become very popular amongst those of higher social status. How variations fare by themselves is more difficult to gauge without having counted up the tokens for each. Conclusive statements regarding the higher relative frequency in Bergen therefore remain difficult, other than that it could, once more, hint at men of comparatively high social status having a, perhaps mercantile, interest in **Björgvin**.

Category 2 yields a surprisingly low number of **idionyms** where results can be used for drawing conclusions, especially considering that two of the corpora tested against each other come from the same country, and that naming customs based on the samples from DI and DN are more alike than divergent. However, the main reason behind many of the **idionyms** having to be discarded for analysis is their contradictory **quartiles** placement. This problem does not present itself with the last group of **idionyms**.

#### 5.7.4. Idionyms absent in the diplomataria

This group consists of 47 (48 including *Jón*) **idionyms** which have so far not been observed in the diplomataria or were even unknown before the Bergen inscriptions (Section 5.3.4).

<sup>43</sup>Technically, it is two **idionyms**, since all tokens of *Jón* were added to those of *Ió(h)an/Jó(h)an*.

Normalised	Inscription(s)	Token(s)
Agnbjörg (f)	1	1
Alfvarðr	1	1
Anne (f)	3	3
Auðmundr	1	1
Auðr (mf)	2	2
Bergþóra (f)	1	1
Bótleifr	1	1
Búr-Almarr	1	1
Einri	1	1
Gusir	1	1
Hallgísl/Hallgils	1	1
Herikr	1	1
Jón	7	9
Klas	1	1
Lunaney (f)	1	1
Ormríkr	1	1
Poppe	1	1
Reiðarr	1	1
Sægunni	1	1
Sigbaldr	1	1
Sigvaldi	1	1
Sørkviðr	1	1
Sverðolftr	1	1
Tonna (f)	1	1
Þiðrikr	1	1
Þjóðarr	1	1
Þóri	1	1

Figure 5.21. **Idionyms** from Category 3, not found in either diplomatarium. The list includes *Jón*, although technically this **idionym** is listed in NID; NID-S under *Ió(h)an* (page 110). “Inscription(s)” gives the number of how many inscriptions contain the **idionym** at most, while “Token(s)” shows how often an **idionym** was identified at most in the whole corpus. In cases where they do not coincide, the same **idionym** can be found twice in one inscription (Section 5.5; Query F.25).

A variety of **idionyms** also belonging to this category were dismissed as **personal names** in the Bergen population at once (*Abed-Nego, Amor, Constantinus, Dionysius, Jesus, Malchus, Martinianus, Maximianus, Mesak, Philomena, Raphael, Sadrak, Serapion, Tereus, Yggjar/Yggr*), since they are clearly not being used as **PNs**. In some cases, this is obvious even without the inscription context (*Jesus*), while in other cases, the question can only be answered by looking at the inscription context (for example *Grímnir, Yggjar/Yggr, Hafðjarfr*; see also Section 5.6). The remaining group is varied: *Alfvarðr, Klas, Poppe* can probably be ascribed to visitors from countries like Germany or the Netherlands (Markali 1983), *Bótleifr* probably originates from the Swedish island of Gotland (for example Johnsen 1981; Markali 1983) and *Lunaney* may have had Irish connections or even ancestry (NIYR VI, 108-110).

Several **idionyms** were encountered the first time in the Bergen corpus and are difficult to even identify as a proper given name, like *Búr-Almarr*. The vast majority of them is etymologically Scandinavian though; following the approach established in Section 5.1.3, the name-bearers are consequently considered Scandinavians. Some, like *Tonna*, may have been of Swedish origin (Markali 1983), but as this study shows, it is difficult to say that with certainty based on only manuscript-written sources, since they represent a very particular sample of the population. With these **idionyms** absent in the diplomataria, very little can be said about the social status they indicate, although an argument could be made that since they do not appear in the diplomataria, they are not likely to be used by the upper echelons of society. However, the argument can also be made that the **idionym** in question does belong to a person of high social status, but that it is rare even in this peer group, and therefore was not preserved in the diplomataria. Two examples illustrate the problem.

*Auðr* is known as a feminine **idionym** from sagas and historical sources, with two carriers being princesses and/or kings' wives, and one a settler in Iceland.<sup>44</sup> Another *Auðr* is wife to the eponymous hero of *Gísla* saga, who despite his being outlawed, stays loyal and even fights to protect him. An **idionym** connected so strongly with virtues and royalty could gain quite some popularity amongst the population, yet it lists zero tokens in either diplomatarium. Women named *Auðr* did apparently not contribute enough written material to have even one document survive, either because the **idionym** was not all that common amongst the upper social scales after all, or because it was common amongst those not participating in manuscript writing. That it turns up twice in the Bergen corpus is therefore quite interesting.

Almost the same applies to *Berghóra*. She is wife to *Njál* from *Brennu-Njáls* saga, and also considered a good wife, although her retaliation for the actions of *Hallgerðr*, wife to *Njál's* friend *Gunnarr*, greatly helps the plot along by furthering the rift between the two families. Again, one might think that this **idionym** might turn up more often in manuscript sources, yet it, too, has zero tokens in the diplomataria. Considering these two **idionyms** as high social status indicators based on the sagas would therefore completely ignore contradictory evidence in the form of diplomataria tokens. It appears more feasible to exclude these **idionyms** from the present study along with the other non-status associated **idionyms** from this group.

<sup>44</sup>Although it represents one of the rare cases where an **idionym** can be used for either gender.



### 5.7.5. Feminine idionyms

Feminine **idionyms** on the whole present greater difficulties for interpretation than masculine ones, since the imbalance between tokens of feminine and masculine **idionyms** results in most of the feminine **idionyms** likely being sorted into a **quartile** not mirroring their proper social status (page 83). Calculating new **quartiles** on the basis of tokens only for feminine **idionyms** is no solution either – the sample is prejudiced by **idionyms** appearing in the Bergen inscriptions, and therefore comprises too few and random feminine **idionyms**. The issues inherent in this mismatch were discussed already (pages 116 and 126), so a short summary must suffice. The ratio of feminine to masculine **idionyms** in Categories 1a and b is almost the same (6:45 and 5:46, Figures 5.16 and 5.18), so Category 1a does not contain fewer feminine **idionyms**, which could be interpreted as an argument against women being long-distance traders. Additionally, three of the **idionyms** in question sort into a considerably lower **quartile** in DN than they do in DI; then again, the count of tokens also varies significantly between the two corpora (Figure 5.3), and said feminine **idionyms** would sort into a much lower **quartile** as well if the DI-tokens were similarly numerous.

None of the six, respectively five, feminine **idionyms** from Category 1a and b show different distributions when compared to the Bergen corpus either (Figures 5.17 and 5.19). Instead, the feminine **idionyms** which differ in distribution (all in favour of Bergen), are *Anne*, *Hallkatla*, *María*, *Lúcia*, *Þorkatla*, which are found either in Category 2 or 3 (Section 5.7.4). Category 2 contains 39 feminine **idionyms** in total (Table F.1), but not necessarily in the same **quartiles**, so again, they cannot be used for analysis. Additionally, arguing that women must be from Iceland, when it is equally likely that they were from Norway, is difficult. As far as the feminine **idionyms** from Category 1a are concerned, the possibility that these were Icelandic women, potentially involved in trading activities, must at least be considered seriously. Those in Category 1b, on the contrary, point towards local women, whereas those from Category 3 could be Icelandic, but considering where the inscriptions were found, the probability for them having been Norwegian is higher.

This raises another important question, whether the social status of these women can be determined on the current evidence. It is easier to answer for those feminine **idionyms** sorting into the upper two **quartiles**, because the sheer number of tokens raises the likelihood for women of high social status to have carved or be mentioned in a runic inscription (page 126). Yet there is also a greater likelihood that these particular **idionyms** were simply extremely common. Concerning feminine **idionyms** in the lower two **quartiles** and those absent from the diplomataria (Section 5.7.4), I would argue that the skewed gender balance needs to be taken into account in these cases. Feminine **idionyms** sorting into the lower two **quartiles** cannot be considered as low-status by default, regardless of potential country location, in the same way that masculine ones can be. Instead, the same caveat already introduced before for **idionyms** below the **median** is applicable in a slightly altered fashion: there is always the possibility that the **idionym** is indicative of a woman of high social status, but imbalances in the samples prevents us from recognising it as such. This applies to a certain extent also to the feminine **idionyms** sorting into Category 3. The fact that they do not appear in the diplomataria makes their social status incredibly difficult to judge, as illustrated on page 128.

## 5.8. Names as markers of social status and runic literacy

To conclude this survey of the **idionyms** appearing in the Bergen runic inscriptions, given the nature of the sample, its likely prejudice towards Norway, and the lack of knowledge about the social background of the diplomataria name-bearers, even the conclusions drawn remain preliminary and tentative and have caveats attached. The discussion shows the main reservation against this approach, the question of whether **idionyms** are even all that indicative of social status or can be used in such a way without a control group mirroring the part of the population that does not appear in diplomas. If **idionyms** are not as indicative of social status as this survey assumes, do current scholarly hypotheses about naming customs even mirror real-life circumstances in Scandinavia at the time all that well?

Other factors play into this, not least whether families were able to protect “their” **idionyms**, or if only a few families managed to monopolise very few **idionyms**. In this study, these **idionyms** would then be interpreted as low-status, although they might have belonged to those with the highest social status. Conversely, all **idionyms** identified as “high-status” can equally have been used by the lower social scales of society, in other words, may have been so common that they do not really indicate high social status after all. Too little is known in particular about the adoption of Christianity-inspired **idionyms** both among the higher and lower social scales.

Time and other constraints also prevented working out which tokens might have belonged to the same individual. While it is close to impossible to determine whether two runic inscriptions refer to one or two individuals of the same name, with the diplomataria, one might be more successful, for they often offer more information about the individuals than just their **idionyms**.<sup>45</sup> If approached in the proper fashion, it might even to some extent be possible to establish family trees based on the diplomataria material, which in turn would enable scholars to trace **idionyms** through these. A study of **OWN** family trees and cases of **name transfer** in these would provide a useful counterpoint to this study. In short, more studies and numbers are required, for example the possibility to trace name usage according to dating of diplomas and more insight into the background of the men and women mentioned in the diplomas and their social status.

With the lack of comparative corpora and the complications regarding frequency of name usage, all observations, but especially those concerning the social status of an **idionym**, should therefore be taken as at most signifying tendencies in the material. Apart from the complications introduced by the lack of comparable studies and application of statistical measures, name usage in Scandinavia might have been a lot more flexible than was assumed for the purposes of this study.

Considering these objections, using the results to make statements about the rune-carving abilities of the broader population of **Björgvin** are risky as well. However, this survey was not conducted with a view to presenting a final conclusion, rather as an experiment testing the limitations of using a **RDBMS** for the purpose (Section 5.7.1). As such, it is to be expected that the results presented here will change when the sample size is increased/decreased, or when a different test is applied, which would offer the opportunity of independently verifying or dismissing the results for single **idionyms** or the whole corpus.

---

<sup>45</sup>It is impossible as well to prove whether or not two **idionyms** on one and the same rune-stick belonged to more than one person. There is, of course, the possibility that they belonged to the same person, however probability and known customs suggest two different name-bearers.

On the understanding that these issues exist and more research is needed, a few concluding words on runic literacy in Bergen on the basis of the rune-carvers' names can be offered. That 51 **idionyms** showing higher relative frequencies in DI appear in the Bergen inscriptions supports the hypothesis that Icelanders likely used runes in **Björgvin**, potentially in connection with trade. The men and women carrying the Category-1a-**idionyms** may have lived in **Björgvin** or may have been visiting; without a doubt migration was a factor, but so is common usage of certain **idionyms** across the whole population and in Norway and Iceland. The Category-1a-**idionyms** can therefore not be taken as certain indicators for geographic origin; each case needs to be judged by itself. Pan-Scandinavian high-status **idionyms** from **quartiles** 3 and 4, which either distribute equally in the Bergen corpus or are prevalent in the diplomataria could theoretically have been carved by Icelanders, too, although they as well might have been carved by Norwegian locals lower on the social scale. **Björgvin** was still a Norwegian town, and even if the  $\chi^2$ -test results currently indicate that naming customs went in different directions in Iceland and Norway, probably right after the initial settlement period, there are still strong similarities. When distribution patterns differ between one of the diplomataria corpora and Bergen, they often favour the diplomatarium in question, indicating that the **idionyms** appear more frequently in the diplomas, which could suggest that those name-bearers are from the parts of society appearing in diplomas. The 28 **idionyms** used as **PNs** in Category 3, in turn, could be taken to indicate people of lower social status using runes on occasion. Yet most of these only appear one time in the Bergen corpus, so it remains to be determined whether that can be ascribed to the relative rarity of the **idionym** or their bearers simply not making use of runes frequently.

Without arguing that runes and rune-carving were activities *restricted* to the upper echelons of society in **Björgvin**, there are certainly indications that men and women from the upper social scales at least *engaged* in rune-carving, and that people from the lower social scales did so as well. In short, it was probably an activity not restricted to a specific social group, something the nature of the objects also suggests, as they are often everyday items. This supports the hypothesis that the Bergen inscriptions indeed provide written evidence from a part of the population usually not attested in writing; whether this part of the population might have been merchants is a question that remains to be answered. How the names relate to the objects they are carved into will be discussed in Chapter 7; the next section focuses on the actual content of the inscriptions.

## 6. Qualitative text analysis: runic literacy and usage at different levels of society

While the analyses in the previous chapter aimed to investigate the rune-carver's potential social status by means of their **idionyms**, this chapter focuses on what they had to communicate and how this affects conclusions about the rune-carvers' potential social status. In this context, Liestøl (1974, 21) speaks of the "language of things" and how runic inscriptions, by virtue of relaying textual information, can help to expand knowledge and provide insights into areas of daily life that do not generally leave material traces. As texts, they are subject to content-related analyses; the text resulting from the philological-linguistic analysis is to be considered as textual evidence set against the background of a particular epoch of human (literary) history, in which capacity its content has meaning and, often, a communicative purpose (Düwel 2008, 16).

When every runic inscription has to be considered and interpreted against the circumstances surrounding its carving, and the relationship between inscription and the literary, social, economic, religious and various other facets of society at large need to be explored, it often boils down to asking "who could have carved this inscription" and "why did they carve it". This search for what Düwel (ibid., 22) calls "Sitz im Leben"<sup>1</sup> is a natural consequence of the desire expressed by Liestøl (1974, 18), to make sense of an inscription that would otherwise remain obscure from a modern perspective. Yet due to our far from comprehensive knowledge of rune-carving societies, conclusive interpretations of inscriptions are not set in stone and remain open to re-interpretation and discussion at any point in time (Düwel 2008, 22). At the same time, the "Sitz im Leben", the outcome of considering an inscription's text and its supposed purpose, often serves as a way of classifying runic inscriptions. This is, for example, visible in the section headings in NIYR VI: first those written in Latin, including *Ave Maria*- and *Pater noster*-inscriptions, then those pertaining to trade and lastly, the **owner's tags**.

This short overview illustrates how the grouping of inscriptions by certain criteria provides the basis for consistent publication, but also further analysis. Grouping inscriptions like this allowed for the realisation that wooden sticks with runic inscriptions apparently constituted a common and frequently-employed means of communication for a variety of purposes (Dyvik 1985, 135; also Liestøl 1968, 17; Düwel 2008, 203-204) and that they could contribute a very different and much more direct angle from which to re-examine historically attested events (Liestøl 1974, 33). The variety of topics, contexts and purposes exhibited in the Bergen inscriptions was nevertheless unanticipated and presented a challenge for scholars, since there are many different criteria by which to group. For example, quotes from famous poems are generally attributed to a very particular group within society, highly-educated men who were either wandering scholars or had spent at least part of their education abroad at universities in France (**Vagantenlyrik**; Liestøl 1974;

---

<sup>1</sup>Maybe best translated as "situational context".

Dyvik 1985; Knirk 1997; Marold 2000). This statement alone provides three choices of categorising inscriptions: quote, metrical/poetic inscription, carved by an educated person.

This list can be extended almost ad infinitum by also considering Futhark used, language of inscription (Latin/**OWN**), content/topic, a variety of stylistic criteria and so on. All of these approaches to categorisation are valid and serve their own purpose in analyses (Liestøl 1973, 129–130). It is hardly ever possible, when looking at a whole group of inscriptions, to do full justice to the peculiarities of each single one. Yet micro-analyses of a single inscription may do more or less full justice to all aspects of that inscription, but are hardly a reliable basis to draw conclusions about runic writing in general. Therefore the characteristics larger analyses (or categorisation systems) build upon often concern one specific aspect or a restricted number of aspects of an inscription, generally related to the research question. Unfortunately, many of the characteristics mentioned may appear in the same inscription, for example, any message may be noted down in any writing system available. A classification system based on the writing system may therefore group together very different inscriptions than one based on content/topic of the message itself.

Since the aim was to include these categorisations in **TAKERUN** to allow for analysing the relationship between different types of inscriptions and **idionyms**, the following sections provide an overview of how runic inscriptions have been classified by different scholars and how their varying systems were integrated into **TAKERUN**. The second part of the chapter illustrates how combining text classifications with the results from Chapter 5 helps to further our understanding of the “Sitz im Leben” of the various inscription groups in **Björgvin**.

## 6.1. “Sitz im Leben”: the importance of “who” and “why”

One main problem in integrating classification systems into **TAKERUN** originated from the difficulties of establishing categories so that there is no overlap (amongst others Liestøl 1973; Knirk 1997; Marold 2000). To illustrate the point, the different categories/types of inscriptions as presented by Liestøl (1973, 1974) are discussed in this section, along with how they were used to paint a picture of the **Björgvin** rune-carvers.

The major groups (without the author explicitly stating so) appear to be poetic inscriptions, inscriptions in Latin, inscriptions with a magical purpose, letters of trade, and notes and writing exercises (Liestøl 1973), subsequently split into sub-categories. Poetic inscriptions, for example, include Eddic and Skaldic poetry, quotes of Latin poems, love poems and poetry written by and popular with medieval university students and scholars, which is generally referred to as “**Vagantenlyrik**” (for example Liestøl 1973, 131; Dyvik 1985, 147). These inscriptions received particular attention since they represent important evidence for the literary history of Iceland and Norway (Dyvik 1985, 147) in that the group consists of text snippets quoting continental (“*Amor vincit omnia*”) as well as Eddic and Skaldic poetry, which are characteristic for Scandinavia. Icelandic sources comprise the bulk of evidence for either of the latter two, leading to a discussion of what the new finds meant for the literary history of Norway. Liestøl (1964a, 35, 50–51) concluded that the Bergen inscriptions composed in the Scandinavian styles were to be seen as pieces of evidence filling a previously unrealised void, evening out the disparity in availability of evidence (Liestøl 1973, 130). The inscriptions, he argued, were proof that the literary and cultural framework in the two countries was more similar than different and that only the lack of evidence from Norway

had previously skewed the picture, thus creating the impression that Iceland stood alone as the preserver of poetic tradition. In Liestøl (1974, 29), he expanded this to include a re-evaluation of the previous rough dating for the cessation of usage of the characteristic alliterative poetry in Norway.

Given the evidence, other scholars readily accepted this conclusion and focused their attention on the specifics of the poetic inscriptions and their content with a view to identifying those who had composed them in the first place. Since poetic inscriptions in the continental styles appear in Bjørgvin, at times even physically alongside metrical inscriptions utilising Scandinavian forms of poetry, the relationship between the two traditions came into focus.<sup>2</sup> Of particular note is Marold (2000), who discussed what practical purpose these inscriptions might have fulfilled in daily life, and the wider implications regarding cultural exchange between Norway/Bjørgvin and the continent by paying special attention to the parallels between the inscriptions and the literary motifs employed in traditional courtly poetry on the continent. She corroborated Liestøl's conclusion that these inscriptions were most likely composed and carved by those inhabitants of Bjørgvin who had enjoyed education abroad, mostly clerical personnel and people of high social status (Liestøl 1973, 135; Marold 2000, 196). These carvers were therefore most likely capable of utilising runes and Roman script depending on context. This in turn ties into the results of the onomastic analysis, which indicates that (wo)men carrying *idionyms* used among the diplomataria-writing population also carved runes.

While the scholarly importance of these inscriptions can be agreed upon, their classification is a very different matter. That some of these poems are actual quotes has proven important in re-evaluating prior assumptions about the kind of literature received in Bjørgvin through the mediation of well-travelled and -educated scholars (Liestøl 1973, 135) and the abeyance of the old forms of poetry in Norway (*ibid.*, 130) does not help determine whether they should be classified as quotes, texts with parallels elsewhere or simply poetry. Moreover, if they are classified as poetry, should the *topic* also be taken into account, and should "love poetry" then constitute its own subgroup? Eddic as well as Skaldic and *Vagantenlyrik* verses may centre around it, as is amply proven by INS1, INS511 and INS331 (Marold 2000, 190), but if this approach is chosen, decisions have to be made about the hierarchy within the classification system. Is it the *style* or the *topic* of a poetic inscription that decides which group it belongs to?

The situation is equally unclear when inscriptions quoting Latin phrases, which appear for example in the form of *Ave Maria*-inscriptions or quotes from Christian ritual (Liestøl 1973, 132), are considered distinct from quotes in OWN. The purpose of many of these inscriptions was likely not restricted to serving as a reminder; they may instead have served as protective measures for example for food and drink, or even writing exercises (see the arguments in Seim 1998). The language of inscription, however, is the same, so one can only assume that Liestøl (1973) was still thinking along the lines of text genre at this point; this distinction is not made in NIYR VI. In 1973, he also still mentions prayers, benedictions and invocations as belonging to the Latin inscriptions. Yet magical inscriptions (amulets and charms) form their own group as well, and benedictions quoting Christian texts are mentioned as belonging to this group, too (Liestøl 1973, 133).

While they certainly pose difficulties in terms of classification, in the case of poetic inscriptions

---

<sup>2</sup>Most notably on B-145/INS267, see also Liestøl (1964a, 1973); NIYR VI.



scholars can at least fall back on using well-established classification systems from literary studies. The nature and content of other inscriptions, however, is not what most literary scholars deal with on a daily basis. Liestøl (1973, 135, my translation) states that “to all appearances, runic literacy was wide-spread amongst the Bergen population”; it certainly seems that people have made enthusiastic use of their skill to record all kinds of messages, possibly the most lewd of which can be interpreted as an advertisement for (or recommendation of) a local prostitute: “You shall fuck Rannveig the Red. It will be bigger than a man’s penis and smaller than a horse’s penis” (INS595).

Classification systems for literature, in general, do not account for such messages and notably, whenever the off-colour inscriptions from Bergen are quoted as a previously unexpected use of runic script, this inscription is delicately omitted (except in Knirk 1997, 27). Nonetheless, Liestøl (1970) devotes a whole article to a similar inscription (INS470), a play on **OWN** “fuð” (cunt) and three historically known men’s bynames. He designates such inscriptions, in turn, “ufin”, “uartig” (dirty; naughty) or “unorthodox” (Liestøl 1974, 24, 1964a). Dyvik (1985, 135), rather aptly, describes them as “toalettvegg-innskrifter” (toilet stall inscriptions), and Liestøl (1974, 23–24) refers to them as “tavern” or “pub” messages. This is, of course, a modern term and interpretation; these days, one might perhaps be tempted to label some of these inscriptions “medieval tweets” or “Facebook status messages”. That does not mean they were carved in a pub or similar contexts, so this particular classification should be taken with a grain of salt.

This group of and other inscriptions which may have been writing exercises (Liestøl 1974, 32; Seim 1998) appear to have contributed a great deal to the re-evaluation of who exactly made use of runes in **Björgvin**, which had consequences for how runes as a writing system were perceived: instead of a system restricted to the upper echelons of society, much like the Roman script, and to very specific purposes, it was now termed “den alminnelige manns og kvinnes alfabet” (everybody’s alphabet) (Dyvik 1985, 142). Yet that raises other questions; the three men from INS470 can potentially be identified as belonging to some of the highest-ranking Norwegian families (Liestøl 1970), but did they carve the inscription themselves to make fun of their own bynames, or was someone else making fun of them? Neither possibility can be discounted (Liestøl 1973, 138, 1974, 24–25; Knirk 1997, 28), and the crudeness of an inscription cannot be used as an indicator of low social status, regardless of how tempting it may seem.

If anything, it is the sheer number of inscriptions which suggests carvers from different social circles. Seim (2013, 149–150) also offers as an explanation that the sudden rise in the numbers of inscriptions may have been due to writing becoming more common in society as a whole. Following a similar train of thought, Liestøl (1973, 138) suggests another re-evaluation concerning the driving forces behind the use of runes in **Björgvin**, the merchant community at Bryggen. Inscriptions connected to them are characterised as a group more by their common topic than their form, although the so-called **owner’s tags** also have very distinctive physical characteristics, mainly holes through which a piece of string could be threaded, or hooks keeping them attached to for example skins they were stuck into. Given how many of these inscriptions appear in Bergen, Liestøl (ibid., 138) ponders whether knowledge and use of runes might therefore be more prevalent within the merchant community than the upper social classes, quoting the need for an easy way of communication between merchants in different trading towns and similar finds from said towns, an argument picked up by Johnsen (1987).

It is, again, an intriguing hypothesis difficult to prove or disprove. Using wooden sticks for

correspondence to be transported across large bodies of water seems vastly preferable than to convey the same message orally or by means of parchment and ink. Wooden tally sticks serve similar purposes and are found in Bergen material, so the practice is known.

Poetic and off-colour inscriptions as well as **owner's tags** are the most common types of inscriptions in Bergen, but there remains a plethora of others: business correspondence, debtor's lists, private correspondence, compliments ("Asbjørg the best child", INS622), magical inscriptions, the list is extensive, and so was the number of purposes these inscriptions fulfilled. Another well-known example is INS478, a letter written by Sigurðr Lavarðr, heir to King Sverrir, where he either requests a longship owned by the unknown addressee (Liestøl 1968, 19–21, 1973, 137) or weapons to be fashioned from the provided amount of iron (Dyvik 1985, 144). The historical value of this rune-stick can hardly be overestimated – this is a contemporary document giving direct insight into military matters, and while too much context is lacking to tie INS478 to a certain event during the Norwegian Civil Wars, it is nevertheless an astonishing document.

Storing information about the "Sitz im Leben" of runic inscriptions in a runic **DB** is desirable since the ability to search for inscriptions with shared characteristics ensures that future scholars can compile corpora for certain studies more easily and quickly. In fact, I suspect that in actual use, this would be the *preferred* way for most runologists to look for a single inscription – it is by far easier to remember the contents than the actual character sequences involved – not to mention that different **normalisation** systems present their very own obstacle. Yet normalising the interpretations into an accessible system compliant with **data normalisation** rules is difficult owing to the above-mentioned contradictory possibilities for categorisation; as far as Liestøl's is concerned, it is easy to see that it consists of a mixture of genre attributions (poetry; Eddic, Skaldic, **Vag-antenlyrik**), text content (love, love-sickness etc.), purpose (benediction, charm, invocation) and what may for lack of a better word be termed "literary observations", i.e. whether an inscription is a recognisable quote from a different source. These are all important pieces of information, but they are so disparate that it is hard to combine them into one overarching, consistent classification system. Liestøl was not aiming to produce such a system either, merely looking to present the newly discovered inscriptions in some sort of order (Liestøl 1964a, 5), which is turned around in Liestøl (1974), where roughly the same inscriptions are presented in a re-arranged order. While inscriptions presented and classification thereof remain mostly the same, this is further indication that said classifications were not necessarily meant as a strict system to help future scholars classify more inscriptions, but rather as a means of presentation.

Storing "Sitz im Leben" for a runic inscription is therefore a challenge in terms of data modelling, and instead of developing a full-blown, consistent and overarching classification system, I opted for developing a **DB**-friendly workaround building on prior classifications, namely NIYR VI, Liestøl (1964a,b, 1968), Knirk (1997) and Marold (2000). This list, it should be noted, does not include all publications either presenting an overview of all or concerning themselves with a few select inscriptions; the aim was to collect as many interpretations of different inscriptions as possible. It therefore seemed prudent not to spend too much time on trying to catch every interpretation available, but rather work with a smaller dataset sufficiently large enough for testing the workaround. All in all, 209 inscriptions were tied to interpretations regarding their broader context (**Query G.1**, **G.2**). The following sections concern themselves with the technological implementation before the analysis will be taken further by using the classifications in conjunction with the results obtained from the analyses in the onomastic chapter.

Column Name	Data Type	Length	PK?	Not Null?
ttagid	varchar	5	true	true
ttagname	varchar	25	false	true
ttagcriteria	varchar	255	false	true

Figure 6.1. Table structure **TTAGS**.

## 6.2. **TAKERUN: classification labels for runic messages**

The greater flexibility of a **RDBMS** as opposed to a printed publication, can solve the problem of overlapping categories by using data structures permitting different aspects to be appropriately captured, stored and utilised to find certain inscriptions. The simplest solution is to use a tagging system permitting scholars to assign more than one label to any given runic text, thus mirroring different possible classifications. There cannot be an unlimited number of different labels, however; discretion needs to be applied when deciding which aspects of pre-existing classification systems will be used. **TAKERUN** already addresses several possible ways of classifying inscriptions in other **entity types**. Language of inscription, for example, was shifted into **PATTERNING**. Nothing is lost by doing so, either, since querying for all inscriptions containing Latin remains possible. **PATTERNING** even includes several more options not used in the present study, for example **BOOLEAN** columns indicating whether inscriptions contain characters other than runes. This also helps separate different ways of establishing classifications systems based on qualitatively diverse criteria, like text genre and language of inscription. The next sections outline the variety of labels/tags.

### 6.2.1. **TTAGS: label entity**

Despite best attempts to keep the number of labels restricted, the diversity of the Bergen inscriptions still resulted in 41 labels being used to represent scholarly conclusions and comprehensive interpretations in **TAKERUN**, stored in **TTAGS** (Figure 6.1). The **entity type** itself has only three **attributes**: the required **PK** in the form of *ttagid*, a longer version of the tag's designation in *ttagname* and a definition of the criteria triggering a specific tag, *ttagcriteria* (Table G.1). Since flexibility and the opportunity to include prior classification systems into **TAKERUN** were given preference, the tags in **TTAGS** are not restricted to text type/genre; they include tags for as many aspects of a comprehensive interpretation of a runic inscription as possible. While Liestøl's classifications may lack consistency, there is a lot of merit to them, namely in how they focus on the text and which emotions, experiences and activities it reflects – something which could loosely be termed “topics”.<sup>3</sup> While a classification system based on formal criteria can help runologists find their way through the corpus, the topics provide additional information, “what people talked about”.

Several authors also take interpretation a step further and attempt to provide information about

<sup>3</sup>This descriptor was chosen because, as in conversation, the topics of one runic inscription may be manifold, overlap, cross, go off-topic and return.

the carver's educational background (for example NIYR VI, 18, 69; Marold 2000, 194), the (assumed) original purpose of the inscription (Liestøl 1964a, 16; Marold 2000, 195; Knirk 1997, 28) and/or the possible situational context in which it was carved (mainly Liestøl 1964a). Seim (1998, 35) also adds “funksjon, bruk og hensikt”, which can be translated to “purpose”, “use” and “underlying intention”, while at the same time cautioning against broad statements concerning either, for there is often little actual evidence to base any conclusions upon. All of these, in turn, provide yet other means of classifying inscriptions, however speculative. Moreover, they are situated within the level of interpretation referred to as “Sitz im Leben” and thus important pieces of scholarship.

Fully incorporating such comprehensive interpretations into a **RDBMS**-based system is tricky in terms of technological implementation and potentially inadvisable with a view to usage by the broader public. As a means of collecting interpretations within a runic **DB** meant for use by scholars, however, it can be quite useful to include such comprehensive interpretations, if only to enable comparison between several scholars' takes on different inscriptions. At the same time, with the level of **data normalisation** required to render the comprehensive interpretations into a **DB**-compatible format, it goes almost without saying that the complexity involved in these interpretations is beyond the scope of what the **entity model** can mirror. However, even by storing an abbreviated version, it is possible to generate subsets of inscriptions and then access the literature in question, where the full discussion can be found by making use of the *-source*-columns. Again, it is important to remember that **TAKERUN** is a tool meant to support scholars in building an argument by providing information and a way to quickly build data subsets for possible analyses; it is not a replacement for engaging with the scholarly debate.

### 6.2.2. Rune message “types”

17 items in **TTAGS** can be considered as referring to different “types” of runic inscriptions, mostly based on some formal criterion, e.g. whether the inscription is metrical or contains some formal greeting (Table **G.1**). Of these, *ambiguous, not interpretable* are used when the type is not clear (meaning none of the other tags apply) or when the text is too damaged for interpretation.<sup>4</sup>

*Balance sheet, list* are used, respectively, if listed items appear in a text, with the former being a very specific kind of list. *Følgeseddel (label), owner's tag* are texts either providing information about who an item or goods belong to, or who is sending whom what kind of item/goods. *Personal name (PN)* is a specific category; while many inscriptions carrying only **idionyms** are considered to be ownership declarations, that does not necessarily mean they were, and therefore the two tags are kept separate.

Of the tags *poetry, quote, motto, word play*, the first two were discussed above, whereas the third is only applied to one single inscription (NIYR VI, 19). The fourth concerns texts (supposedly) being plays on words.

*Incantation, prayer* were both included, although they need not be mutually exclusive. Yet “prayer” is often coded as specifically Christian, and was used in the literature in such a way that I felt it necessary to include it. On a less spiritual level are the tags *comment, letter, writing exercise*. The main difference between a “comment” and a “letter” appears to be the form of address, and

<sup>4</sup>Scholars can disagree on that as on everything else.

this, again was accepted as a distinction.

The last tag is *unfinished*. Very little explanation should be required; the tag can be used in combination with any of the others.

### 6.2.3. Rune message “topics”

While the labels presented in Section 6.2.2 all refer to one or more formalistic criteria, the 22 tags here are considered “topics” or “content-related”. *Incantation*, *not interpretable*, *owner’s tag*, *prayer* and *writing exercise* already appear in Section 6.2.2 as a result of the tags being in use as either (see Section 6.2.5 for the reason).

*Bad* indicates that one of the other content-related tags is in some way negative – in combination with *love*, *magic* for example, the original interpretation can have been “love-sickness” or “dark magic”.

*Instruction*, *liturgy*, *official*, refer to, in order, a set of instructions being given, the text content being related to Christian liturgy, and the last is reserved for text content concerning affairs of state, like for example taxes.

*Compliment* is self-explanatory; the difference between *sex*, *smut* is the level of explicitness (the above-quoted Rannveig-inscription warrants the first, the second is used mainly when no explicit language is used).

*Teaching* refers to content that was supposed to be learnt.

Two more tags concern religion, *christian* and *religious*, with the first specifically used for anything concerning Christian mythology, ritual or liturgy, while the second is more of an open tag and refers to any content somehow connected to religious aspects of society, Christian or heathen. It is not to be confused with *references*, also used for mythological connections, but specifically meant for *literary* references to mythology, for example in quotes of classical poems, where they serve as a literary device.

Further, the tag *period context* is quite important; again, the content of the text references some event or person, but as opposed to *references*, these have to be historically attested events and persons. It cannot be used for an inscription mentioning Þórr, whereas Óláfr hinn helgi qualifies when not referenced as a saint.

The *carver formula*-tag would probably fit better into the prior section, but the text in question is listed as an *owner’s tag* in NIYR VI, (192) (Section 6.2.5); it therefore does not appear as a “type-”tag.

The final item on the list, *trade*, is self-explanatory as well.

### 6.2.4. Carver, purpose and situational context

The last group again reuses some prior tags: *ambiguous*, *incantation*, *magic*, *owner’s tag*, *teaching* already appeared. When used within this context, they refer to the identity of the carver, the (supposed) purpose of the text and the situation in which it was carved. It is easy to see why for example *incantation* can be considered either: incantations can be distinguished from other types of inscriptions by phrasing (for example “hail [insert god of choice]”), but they are also meant to fulfil a specific function, namely establishing contact with a supernatural entity. *Incantation* therefore doubles as a descriptor for the characteristics of the text and its purpose. It depends on

the scholar and their particular classification system whether they use *incantation* as a reference to the text structure or the purpose. Similarly, *owner's tags* distinguish themselves from other inscriptions by consisting of a set expression, but they are also meant to indicate possession. These two examples illustrate why it is so difficult to establish a clear-cut classification system.

Two more tags not used as type within this particular corpus refer to either type or purpose: *amulet*, *mnemo-device*. The first is closely related to *incantation* and describes an item meant to protect the carrier against some sort of misfortune. The last item, *mnemo-device*, is meant to help their user recall specific information, for example the phrasing of a particular poem Marold (2000, 195) suggests that several of the metrical inscriptions could have been used as such mnemo-devices in a reading or staging of a poem, an interpretation opening up interesting venues of investigation concerning community activities in Bjørgvin.

This leads to the tags concerning the identity of the carvers, or rather, their level of knowledge. In all five publications the system is based on, the three levels of actual runic knowledge appear to be *analphabet*, *regular*, *learned*. The first only appears once in connection with a ring (NIYR VI, 69). The other two are more frequently used, although the level of runic knowledge is not ascertained for every inscription in the corpus. A rune-carver with *regular* knowledge may, for example, have carved INS46, in which “[t]he use of punctuation marks, or rather the lack of them, is confusing [...]” (Liestøl 1968, 23). The tag is used when the use of runes and punctuation (so it exists) shows a certain degree of familiarity alongside some inconsistencies. Whether that actually indicates that the carvers were not exceptionally well-versed in the use of runes is another question; this may well have been common amongst those not overly familiar with the standardisation of Roman script and Latin.

The tag *learned* appears most often. It applies when the carver is considered to possess good knowledge of runes as well as Latin and possibly received their education abroad – basically a very specific group of men right at the top of society.

Opinions concerning rune-carvers’ familiarity with the medium they are using are, on the whole, rare in the scholarly literature. Even rarer are suggestions in which social context a runic inscription may have been carved, and only one tag so far, *pub environment*. It is based on and mostly used for the inscriptions mentioned above, which Dyvik (1985, 135) refers to as “toilet stall inscriptions”.

This is likely the farthest the interpretation of an inscription can be taken to when its “Sitz im Leben” is established, and as mentioned above, considering an inscription as a “pub joke” presents a modern assumption concerning the kind of situation where such utterances would be considered acceptable today.

The survey of tags and their varying application to text type, content and purpose illustrates why a flexible system is preferable, especially when the aim is to mirror prior scholarship. However, that also applies to mirroring their use of the tag in question.

#### 6.2.5. TEXTTAGS

Since a text can have multiple tags and a tag can be applied to multiple texts, a JOIN is required, **TEXTTAGS**. Its compound key consists of the FKs *textid*, *ttagid* from, respectively, **texts** and **TAGS**, and *tagsource* as an additional FK to prevent data redundancy. Because of the difficulties of establishing clear distinctions between different text types, content, usage and purpose,



Column Name	Data Type	Length	PK?	Not Null?
textid	varchar	10	true	true
ttagid	varchar	5	true	true
pctw	varchar	10	false	false
tagsource	varchar	30	true	true
tagsource	varchar	10	false	false

Figure 6.2. Table structure **TEXTTAGS**.

notwithstanding the frequent overlap, creating several **entity types** for tags would have resulted in redundant entries. However, being able to store whether the scholar in question considered a certain label as referring to type, content, purpose or usage was decidedly desirable. Since the views on which label belongs to which category can differ as well, it did not seem prudent to attach a firm categorisation to each label by itself, but rather attach the reference to each token as it was entered. The column designated *pctw* contains what the tag refers to in this particular instance, with five options available: *purpose*, *content*, *type*, *writer* and *situation*, indicated by the letter *p*, *c*, *t*, *w*, *s*.

The **attribute** can, and probably should often be left empty, but it is thus possible to indicate for each individual instance whether the tag is used as referring to the “type” of the inscription or its content, and the two *source*-columns provide the literature reference – although it is at times difficult to decide what it refers to. The publications often do not differentiate between “type, content, purpose”, so entering a value in that field was educated guesswork. It has the benefit though of being able to mirror a scholar’s classification system, if there is one; querying **TAKERUN** for all tags used by a particular scholar used as indication of “type” thus becomes possible, but it is equally possible to only query for all inscriptions with a particular tag attached, whether it refers to type, content or purpose.

By nature of the data, this approach is neither clear-cut nor fail-safe. Within the present sample, it worked, but that may be owing to the fact that three of the publications on which it is based were written by the same author – albeit with a number of years in-between – and that all other scholars quoted were working with materials he compiled.

Since not all texts are tagged at present, in the current state the system can at best provide some orientation within the corpus. If applied at a larger scale, this approach could prove quite useful, although larger-scale research on various classification systems of runic inscriptions is advisable before the *pctw*-column can be used properly. The tagging system by itself works quite well, especially since there is no restriction on how many tags can be connected to a single inscription. Provided the choice of tags is restricted (and the criteria for applying each tag are clearly defined), this system provides another, much more philologically-oriented approach to querying the **DB**. One last aspect needs to be discussed in regard to this section of the **research database**: which **entities** are the tags actually attached to?

### 6.2.6. TEXTS: what counts as one?

Seeing as the inscriptions themselves are broken up into their separate sides in every table from **UNIRUNES** to **PATTERNING**, the contents themselves are, accordingly, also broken up into fragments if they stretch over several sides of the inscription, so the **entities** that **TEXTTAGS** connects to are not easy to define either. The problem is that, while from a **DB**-designer perspective, each fragment is still its own **entity**, from the philologist's perspective, the fragments are very much connected and can only be understood (and subsequently tagged) when considered as a whole. Both of them are right, too, so there is no middle ground to be found here.

For the philologist, the definition of what constitutes a “text” is not easy to begin with, since a collection of different stories (like the Bible) can be considered a “text”, but then so can one instance of an **idionym**. The problem was mentioned in relation to the **entities** in **INSCRIPTION** (Section 4.8.1), but in principle, it again boils down to the observation by Seim (1998, 10-11; page 48).

When designing **INSCRIPTION**, the decision was made to use the second, and broader, definition for what constitutes an “**inscription**” as a basis for what should be considered an **entity** within the table. Throughout **UNIRUNES**, **TRANSLITERATION**, **PATTERNING** and **NORMALISATION**, each side of an object was also considered its own separate **entity**, following the practice of distinguishing them by a letter.

Starting from **TEXTS**, the first definition of “**inscription**” applies: a “text” is therefore defined by its inner coherency and “consistent linguistic structure” (Düwel 2008, 16). In other words, from here on, the definition of a “text” depends on what a scholar considers to be a coherent, independent **entity**.

The decision to push the re-definition of “inscription/text” so far back in the **entity model** needs some explanation. There are three different points in the deciphering process where this can reasonably be expected to become a problem, represented by **PATTERNING**, **NORMALISATION** and anything that follows. The argument could be made that it is at the stage of **patterning** an inscription that the runologist first has to consider which sides of the object belong to each other so they form a coherent text, so the corresponding **entity type** in the **DB** is where the different sides should be tied together and then interpreted as a whole. Yet **PATTERNING**, at least in **TAKERUN**, represents the stage of the deciphering process where the runologist is still more or less free to consider possibilities, and not every possible pattern will result in an interpretable piece of text. That does not mean that these possibilities should not be considered and entered as such. The Bergen inscriptions in particular are known to have been altered after their usefulness had expired, they were purposefully destroyed, broken, burnt or otherwise maculated (Liestøl 1973, 129).

Runologists are therefore left with, not a ready-to-read piece of text, but fragments interspersed with lacunæ and hard-to-identify runes. Any pattern derived from this is necessarily one possibility, and others cannot be ruled out, even if they do not at present provide an interpretable piece of text. Restricting the freedom of the runologist during the process of deciding on an interpretation already at the **patterning**-stage does therefore not strike me as wise.

Once **NORMALISATION** is reached, runologists have reached a conclusion about which pattern is likely correct and provide what they think the sequence of signs should look like in grammatic-

Column Name	Data Type	Length	PK?	Not Null?
foreignid	varchar	10	true	true
textid	varchar	10	true	true
textorder	int	2	false	false
textsource	varchar	30	false	true
textsourcepg	varchar	8	false	true

Figure 6.3. Table structure of **TEXTS**.

ally and orthographically correct Latin/**OWN**.<sup>5</sup> This necessarily entails making statements about which parts of the text belong together in which order. Therefore **NORMALISATION** seems to be the **entity type** where the broken-up pieces of text should be reconnected. I decided against it for what may be considered a contentious reason: **normalisations** are still fairly close to the original sentence structure and word order of the **transliteration**. Yet if the **normalisation** collects all parts of the inscription, it becomes more difficult to tell which sequence from a **transliteration** was normalised into which word in **OWN**. While **TAKERUN** is at present not the most convenient tool to study how runic sequences are normalised, I wanted to at least retain some possibility of conducting such a study, for example by querying for a specific combination of runes in **UNIRUNES**, where the **NORMALISATION** needs to contain a certain combination of Roman letters. It would be much more cumbersome if **NORMALISATIONS** contained the whole of the sequence without providing any hint which rune transliterates to which Roman letter sequence. Certainly this can be worked out, but the longer the text, the more likely it is that character combinations appear, which would impact on result sets. In view of this, and until a better solution can be developed, **NORMALISATION** therefore retains the structure of the preceding tables.

Recombining fragments into a text therefore happens after **NORMALISATION**. **TEXTS** contains five columns, two of which form the **PK** for the **entity type**. Two other columns contain the relevant literature reference. In this table the text fragments are reconnected by being linked to the same *textid*, and *textorder* provides the order in which they should be reconnected (which may differ from the reading order the letters of the respective sides indicate). However, they are not connected in quite the way they are on the object itself, because the **entity type** **TEXTS** switches from relying on the physical reality of the object sides to the more abstract concept of textual **entities**. Therefore, one side of an inscription can carry more than one text, and three sides of an inscription still make up only one. Here the philologist part of **TAKERUN** begins and continues into **TTAGS** (see also Section 6.2.7).

The **entity model** for this part of the **research database** is thus made up of three additional **entity types** connecting to either **NORMALISATION** or **PATTERNING** (Figure 6.4). The reason why some of the texts connect to **NORMALISATION**, while others take their **FK** from **PATTERNING** is that **NORMALISATION** only contains sections of inscriptions where a **normalisation** into **OWN**/Latin can actually be provided. Therefore a number of texts do not appear in it, including single **idionyms**, futharks or uninterpretable sequences. From a philologist's perspective, these are still texts and

<sup>5</sup>Since the latter normalises differently depending on where the runologist has learnt their **OWN**, there can be variations.

can therefore be interpreted and tagged, for example a futhark as a *writing exercise* (Seim 1998). In these cases, the only **PKs** available are those from **PATTERNING**. This necessitates running two slightly different queries to make sure all results are returned (**Query G.8, G.9**); the results can still be combined into one result set by using the **UNION**-clause.

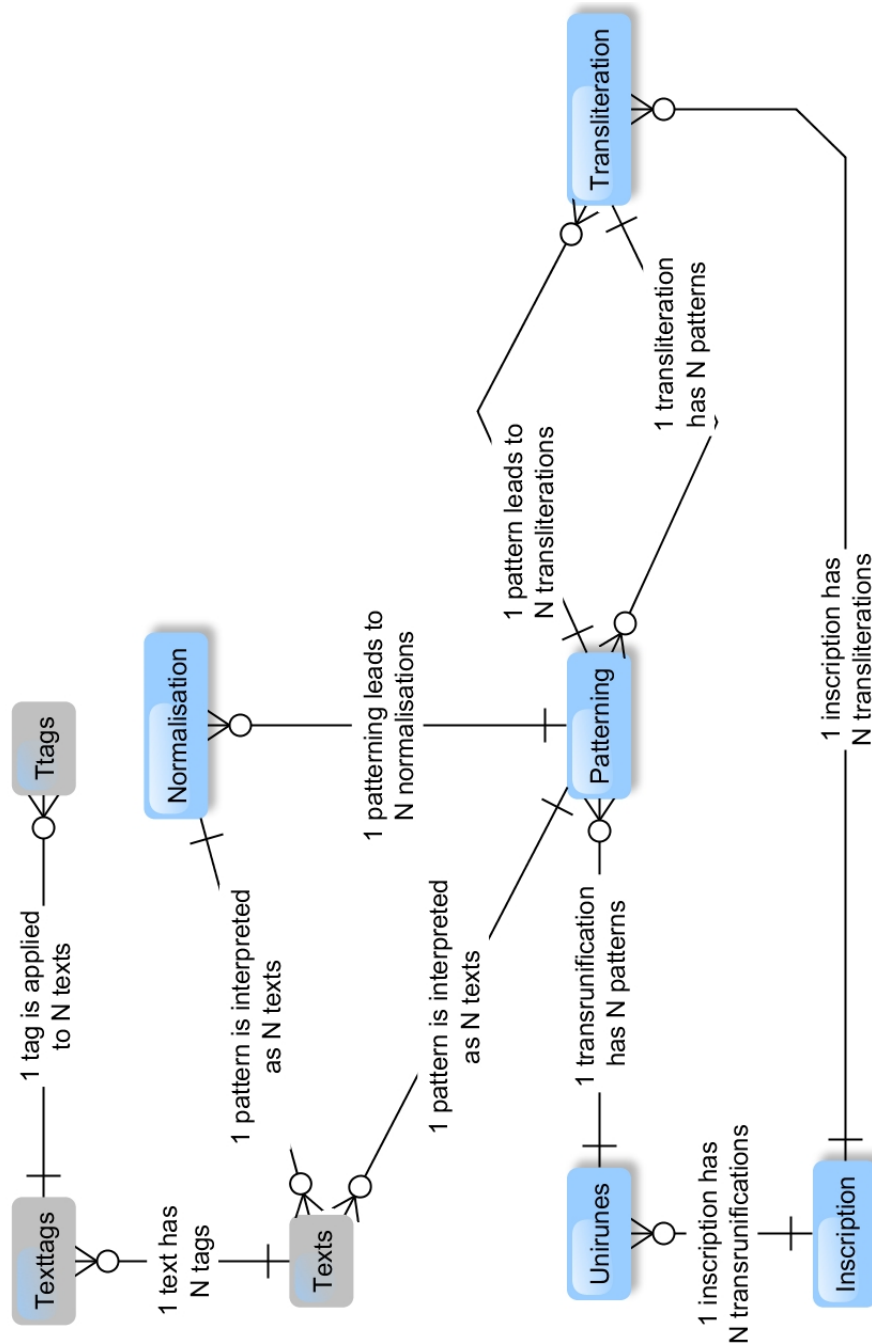


Figure 6.4. **Entity model** including core and qualitative text analysis **entity types**.

### 6.2.7. Implementation difficulties

To illustrate how the transition from the purely physical **entity** of an inscription to the abstract **entity** of a text is mirrored in **TAKERUN**, two examples. When a scholar identifies two (or more) distinct texts on the same side of an object (see page 142), as in the case of the d-side of INS267 (carrying the last line of a Skaldic poem and “omnia vincit amor”), they are identified as separate texts by being given different **PKs**. The *normid* is connected to either *textid*, thus linking either text back to the inscription.

In cases like INS38, which was potentially carved by three different people, perhaps even at different points in time (NIYR VI, 85), it is more complicated. INS38 is a collection of phrases potentially connected to healing magic, but are they five different texts, or are they *one* text consisting of different magical formulae meant to work in conjunction? The object also sports an owner’s inscription reading “Klas owns” (NIYR VI, 83-85). To properly mirror these different possibilities, seven new *textids* were entered as separate entities into **texts**. Five of them consider each side as a text by itself, whereas option six combines the two sides which Liestøl and Johnsen (NIYR VI, 85) state were carved by the same man, and option seven considers the four magical formulae as one text opposed to the ownership formula (**Query G.10**).

Each of those seven texts needs to be tagged separately, which explains why this part of the **research database** is not suited to conducting statistical analyses in its present state. There are too many options of constituting a text, and if there are different **normalisations** for even one side of an inscription, there are automatically two different texts as well. Equally, if there are four patterns for the same side of an inscription, this results in four different texts being logged. While the **RDBMS** still mirrors reality, at this stage reality is too diffuse and varied to be of use for statistical analyses, and as a result, **TEXTS** logs a lot of entries.

A particular problem likely to also appear in connection to other inscriptions, presented itself when using literature that did not include **transliterations** of its own, or, for that matter, inscription numbers, for example Liestøl (1964a). Therefore some interpretations could not be attached to their respective inscription, simply because it was not entirely clear which he was referring to. Knirk (1997) made use of both B- and N-numbers (the latter referring to NIYR VI), and Marold (2000, 196) also stated which transliterations were used as the basis for her article (equally a mixture of B- and N-numbers). The text was then attached to the *patid* or *normid* quoting the relevant publication. Where no indication was given, they were attached to the **SRDB-normalisation/patterning**, since it would otherwise not have been possible to use the tagging system as a supplement to see which information could be gleaned by combining tags with the results from Chapter 5.

## 6.3. Idionyms and texts

Adding the tagging system to **TAKERUN** was an experiment aimed at determining which insights combining different kinds of information about groups of inscriptions and the use of certain **idionyms** in **Björgvin** could yield. For this purpose, only the 129 **idionyms** considered high-status or low-status Norwegian/Icelandic/pan-Scandinavian (**Query G.11**, Section 5.8) were used.  $\chi^2$ -**tests** were not employed, since only 209 inscriptions were tagged and because of the problematic situation with the **entities** in **texts**. This section is therefore a presentation of observations and



how they support or contradict the diplomataria evidence, and how they fit with the conclusions the above-mentioned scholars drew regarding the composition of the rune-carving population of Björgvin based on their examination of the corpus. This includes considering what evidence supports merchants as the driving forces behind the continued use of runes in medieval Bergen, and how high-status *idionyms* relate to inscriptions referencing classical sources, making use of poetry.

While modern views may influence the picture, the Bergen inscriptions indicate that runes were a writing system available to and used by a number of citizens in Björgvin (Knirk 1997, 26; Johnsen 1987, 717). The question is whether asking “who” and “why” for single inscriptions or groups thereof coincides with what the *idionyms* currently indicate concerning the rune-carvers’ social status. The six groups of *idionyms* the onomastic analyses resulted in, are therefore considered in relation to the tags those inscriptions were given. This can be achieved for each single *idionym* by using Query G.12, or by making use of a VIEW combining *idionyms*, tags and social status into one (Query G.13). It is then possible to query how often a specific *idionym* was connected to a certain tag. Query G.14 works like Query F.4, counting up different instances of each token. Owing to how *idionyms* received their social status-association, no distinction is made at this stage between interlocutor- and invocation-marked tokens.

For ease of reading, the different groups are referred to in shorthand: IH (Icelandic high-status), IL (Icelandic low-status), NH (Norwegian high-status), NL (Norwegian low-status), PSH (pan-Scandinavian high-status), PSL (pan-Scandinavian low-status).

### 6.3.1. High-status Icelandic *idionyms*

Potentially Icelandic high-status *idionyms* are connected to 22 different tags (Query G.15): *ambiguous, amulet, balance sheet, carver formula, christian, comment, incantation, letter, magic, not interpretable, owner’s tag, period context, PN, poetry, prayer, pub environment, quote, religious, teaching, trade, unfinished, writing exercise*.

The range of tags indicates that IH-*idionyms* appear in inscriptions (although not necessarily texts, Section 6.2.6) covering a broad range of activities taking place in Björgvin, trade being part of this as much as politics (period context) and magic. The majority are connected to tags implying some sort of trade or ownership signalling (*owner’s tag*, Table G.2), although *owner’s tags* more or less by default get tagged as “trade”, which does not need to apply. People can mark items in their possession with a tag without having any intention to sell/trade them; nonetheless, since the tags were added according to the literature, *owner’s tag* and *trade* often appear together.

Those tagged differently, or with tags in addition to *owner’s tag*/trade, for the most part had a religious/magical purpose according to the literature. One notable example is *Egill*, connected to poetry.<sup>6</sup> *Erlendr*, despite being a high-status *idionym*, appears with “pub environment”. That this *idionym* only appears in an inscription tagged as “pub environment” raises the question of whether this observation presents a contradiction with reality, or merely a contradiction with scholarly expectations of which types of inscriptions a man given a high-status *idionym* like *Erlendr* should appear in.

<sup>6</sup>Saga-hero Egill Skallagrímsson, despite being a renowned poet, is almost certainly not who the inscription refers to.

*Hákon* is within expected parameters, being a high-status **idionym** carried by several Norwegian kings and in Bergen part of an *unfinished letter* that possibly relates to historical events.

These three examples illustrate some of the problems when working with social status and social identities of people from the Middle Ages: while literature, stories and contemporary sources provide some insight into the social framework these people operated within, in reality these social frameworks were much more extensive and complicated than the glimpses afforded to us. Just like we do not know whether some of the Bergen inscriptions were really carved during a “fun night out”, because we do not know if they were only considered appropriate within that particular setting, we also glean only glimpses of the rune-carvers’ lives and identities via inscriptions. It is not a question of “was Erlendr really of high social status considering the kind of inscription he is connected to”, but rather a question of “what kind of social situation was Erlendr in when that inscription was carved, how old was he, was he conforming to or deliberately breaking societal norms”, and the list could be extended almost indefinitely.<sup>7</sup>

Rune-carvers were products of their time and circumstances, and their actions and decisions governed by more than one set of rules, which depended on circumstances. For some archaeological artefact categories, this has little bearing on their distribution patterns, especially when activities had to be carried out within a certain area. Rune-sticks however are artefacts that can be manufactured anywhere, in any kind of situation, and discarded the moment after they are carved. There is no reason to assume that those capable of carving runes would have reserved their skills for “special occasions”. It is unlikely that the average **Björgvin** citizen carved inscriptions like INS478 (page 136), but then, only a few were part of these political spheres. The question is therefore one of access, also to Latin/continental poetry. The native Eddic and Skaldic verses could well have been known to large parts of the population. At the present stage of scholarship, too little is known for definite statements.

Returning to the topic of **idionyms** and text tags, the **idionyms** connected to *incantation*, *magic* and similar tags are almost all foreign. In the Bergen corpus, most of them appear only as invocations, tying in with the reservations already discussed (pages 123 to 125). On the whole, most IH-**idionyms** appear in inscriptions or on objects connected to trade, supporting previous statements about **Björgvin** being an important port specifically for Icelanders.

### 6.3.2. Low-status Icelandic idionyms

Fewer IL-**idionyms** are connected to fewer tags: *ambiguous*, *bad*, *christian*, *følgeseddel*, *incantation*, *letter*, *magic*, *owner’s tag*, *PN*, *poetry*, *prayer*, *quote*, *trade*, *unfinished* (Table G.2).

Within this smaller group, there is more of a balance between different types of inscriptions (perhaps owing in part to lacking interpretations of the remaining inscriptions). Notwithstanding the complications of some of these **idionyms** being different **normalisations** of the same character sequence, just over half of the **idionyms** are connected to trade, while the others are tagged either *prayer*, *incantation*, *magic* or *poetry*, apart from *Gunnsteinn*, tagged as *følgeseddel/unfinished letter*.

In terms of the religious/magic inscriptions, *Mat(t)heus* refers to an evangelist/apostle, and the other probably represents a heathen reference to an ill-willed spirit, *Ími*.

Despite inscriptions of another nature tied to IL-**idionyms**, potential Icelanders of potentially

---

<sup>7</sup>There is no reason to assume that all rune-carvers were adults.

low social status were apparently taking part in trading activities in Björgvin; that there are fewer of these **idionyms** may well be because they could afford travelling on fewer occasions than wealthier Icelanders. The caveats established in Section 5.7.1 apply, but even so the result fits the expected patterns. A more interesting picture emerges when looking at tags connected to IH- as opposed to IL-**idionyms** (Query G.16): *bad*, *følgeseddel* are connected only to IL-, whereas *amulet*, *balance sheet*, *carver formula*, *comment*, *not interpretable*, *period context*, *pub environment*, *religious*, *teaching*, *writing exercise* are only connected to IH-**idionyms**. However, the latter group contains more **idionyms** and also more inscriptions (Figure 5.16, page 115), and to a certain extent, the deviation in tags also does not mean anything; that an inscription containing an IL-**idionym** has a negative content/meaning (*bad*) can hardly be interpreted such that people carrying IH-**idionyms** never had any bad experiences or ill-intent (the inscription in question being the same carrying *Ími*, INS328).

*Følgeseddel*, *balance sheet* are connected to trading activities and these are attested for IH in the form of **owner's tags**, so the activities these inscriptions imply overlap. The same rationale can be applied to *amulet*, *religious*, which can be roughly equated to *prayer*, *incantation*.<sup>8</sup>

*Not interpretable* has no consequence for this comparison. *Carver formula*, *comment*, *period context*, *pub environment*, *teaching* and *writing exercise*, though, are interesting deviations. *Carver formula*, *teaching*, *writing exercise* appear to imply some sort of learning/teaching activities, although proper evaluation of whether this implies differences in the activities Icelanders partook in when in Björgvin as opposed to Norwegians would require a thorough evaluation of every single inscription and a sound argument concerning the geographic origin of the name-bearer in question. That IH-**idionyms** appear in contexts relating to historical events and, possibly, local entertainment establishments, is also worthy of investigation in the future. This study, looking at general trends in the material, is not the right place for this.

Without the in-depth evaluation of the inscriptions in question, though, these deviations are merely potential indications of different activity patterns and/or the use of runes for different purposes by potentially Icelandic name-bearers.

### 6.3.3. High-status Norwegian idionyms

Fewer NH-**idionyms** are connected to tags than in IH (20:22), surprising since both groups contain 51 **idionyms** (Table G.2). On the other hand, there is one, potentially two (depending on which **normalisation** is correct) feminine **idionyms** in this group. One case of *Ása* (page 182) appears in connection with *learned*, *love*, *mnemo-device*, *poetry*, *quote*, suggesting that the inscription does not refer to a real person; if it does, the woman in question is the object of admiration. The other feminine **idionym** is *Helga*, connected to trade in an inscription that was apparently hard to pin down for scholars, hence the additional *not interpretable*-tag. If the **normalisation** was secure, this would be evidence that women were part of trading ventures, or at least took part in trading; but with the **normalisation** insecure, a question mark has to remain attached to it.

Masculine **idionyms** list the following tags: *amulet*, *balance sheet*, *christian*, *comment*, *følgeseddel*, *incantation*, *learned*, *letter*, *love*, *magic*, *mnemo-device*, *not interpretable*, *owner's tag*, *period context*,

<sup>8</sup>By this I do not mean that they are the same thing, just that the purpose aligns enough for them to be expressions of the same intent.

*PN*, poetry, prayer, quote, regular, trade.

Compared to the tag list for IH-**idionyms**, seven tags are missing (*carver formula*, *religious*, *teaching*, *writing exercise*, *ambiguous*, *unfinished*, *pub environment*; [Query G.16](#)), while *ambiguous*, *unfinished* cannot be considered as indicating meaningful deviations. Conversely, IH-**idionyms** do not appear in conjunction with *regular*, *learned*, *følgeseddel*, *love*, *mnemo-device*, and the list also appears more balanced in terms of how the tags are spread out across the **idionyms**. The impression is deceiving, though; 18 of 22 IH-**idionyms** connect to *owner's tag*, 16 of 20 NH-**idionyms** do so, too, meaning around 31-35% of each group appear in conjunction with *owner's tag*, using 51 as the basis.

More interestingly, no NH-**idionyms** refer to leisure activities, which appears strange. Then again, inscriptions not containing **idionyms** could have been carved by anyone, although [Query G.17](#) shows that only inscriptions also carrying an **idionym** were tagged.<sup>9</sup>

Despite different tags being used, the activities they indicate mostly correspond between IH and NH. *Teaching*, *writing exercise* can be linked with *mnemo-device*; they are connected to the broader complex of acquiring/mastering/using new skill-sets, whether that is the skill of carving runes or remembering quotes from canonical literature or prayers. *Learned*, *regular* are scholarly judgements on the mastery of a specific skill-set, and do not necessarily mirror a contemporary's opinion. The use of these particular tags is also so sporadic that they cannot influence conclusions.

The tag *religious* is clearly represented in the NH-group considering how many incantations there are; it was just not added to any of the inscriptions in question, because it was not used in the literature. A similar argument applies to *følgeseddel*; there are enough NH-**idionyms** tagged *trade* to render this particular deviation unimportant.

The only real difference between those two groups in terms of tags is therefore the *carver formula* in IH and *love* in NH, but it is hard to find any convincing explanation as to why these two groups should differ there except chance.

#### 6.3.4. Low-status Norwegian idionyms

Only three **idionyms** from NL are tagged, and one could be an NH-**idionym** ([Table G.2](#)). Consequently, there are only four tags: *letter*, *owner's tag*, *PN*, *trade*.

*Ótto* is a foreign **idionym**, most likely of German origin, so the name-bearer could potentially be a foreigner, although the **quartile** indicates that the **idionym** may also have been used amongst the Norwegian population.

All three **idionyms** are connected to inscriptions referencing trade, indicating that men carrying NL-**idionyms** were in *Björgvin* for trading purposes. This is expected, although it is important to remember that this picture may be influenced by the comparatively low number of tagged inscriptions. Interestingly, more inscriptions carrying IL-**idionyms** were tagged. They also show a wider variety of tags, although that is restricted to prayers, incantations and inscriptions with supposedly magical purposes, which might be owing to how **idionyms** with Christian/heathen connotations distribute (there are none in NL, [Figure 5.18](#), page 121).

When comparing NH to NL, a much wider variety of tags is connected to NH. *Balance sheet*, *comment*, *følgeseddel* can be considered as overlapping with the broader activities connected to

---

<sup>9</sup>Yet 93 inscriptions with **idionyms** remain untagged.

trade, but *amulet, christian, incantation, magic, prayer* all hint, again, at some sort of spiritual use of runes that is not, at present, visible in the group of NL-**idionyms**. *Learned, mnemo-device, period context, poetry, quote* and *regular* could be taken as evidence that the supposed social status of these **idionyms** indeed corresponds with their carriers real-life social status. Then their rune-carving activities would mirror their ability to acquire certain skills as well as their application of said skills in daily life and their involvement with politics.

While I would not entirely discount that this is indeed the case, I would like to point out how few NL-**idionyms** were tagged and how haphazard the tagging is at times. The validity of this observation remains to be supported by further investigation of the single inscription as well as of more inscriptions from the same corpus.

### 6.3.5. High-status pan-Scandinavian idionyms

Three feminine PSH-**idionym** are connected to tags (Table G.2): *Ingibjörg/Ingibiörg, Margrét(a), Sigríðr*. *Margrét(a)*, occurring in an inscription tagged *christian, incantation, magic, not interpretable, quote*, is most likely an invocation. However, *Ingibjörg/Ingibiörg* is mentioned in an inscription tagged as *comment, pub environment, smut*, which begs the question of whether the lady really is of high social status. Additionally, she probably did not live in **Björgvin**; the inscription translates “I loved Ingibjörg while I was in Stavanger” (ins438). Yet *Sigríðr* is connected to trade, so she may have been a local.

The list of tags connected to inscriptions also carrying PSH-**idionyms** is fairly long: *amulet, balance sheet, christian, comment, incantation, learned, letter, magic, not interpretable, owner’s tag, period context, PN, prayer, pub environment, quote, regular, sex, smut, trade, unfinished*.

While NH lacks *pub environment, smut, sex, unfinished* when compared to PSH, IH lacks *learned, regular, smut, sex*. The other way around, PSH is not tagged with *følgeseddel, love, mnemo-device, poetry* when compared to NH, and *ambiguous, carver formula, poetry, religious, teaching, writing exercise* when compared to IH.

Looking at Table G.2, those carrying PSH-**idionyms** appear to have been less interested in trade, but this is an impression based on the distribution of tags, not a statistically verified conclusion. The PSH-group still covers the same activities that the other high-status-**idionyms** show: runes are used for the purposes of conducting trade (*balance sheet, owner’s tag, trade*), protection/magic (*amulet, christian, incantation, magic, prayer, quote*), communication in general (*comment, letter*) and for political matters (*period context*), entertainment (*pub environment, sex, smut*). Some of them were potentially fashioned by well- or moderately-educated carvers.

These **idionyms**, by nature of being pan-Scandinavian, cannot be used to (however tenuously) establish geographic origin of rune-carver, and it is no surprise either that the tags overlap with the other two high-status groups and provide further evidence that the use of runes between the three high-status groups was similar.

### 6.3.6. Low-status pan-Scandinavian idionyms

Only four PSL-**idionyms** were tagged with *ambiguous, christian, incantation, owner’s tag, trade*. One of them, provided the identification is right, is feminine: *Þorkatla*. If the identification is



correct, this inscription would count as further evidence that women were engaged in trading activities in Björgvin, much like *Sigríðr* (PSH).

*Lukas* only appears as an invocation in Bergen in connection with an incantation, so it cannot be considered as an expression of a person of lower social status using runes for protective purposes, at least not based on the *idionym*.<sup>10</sup> It appears that much like the NL-name-bearers, PSL-name-bearers used runes for purposes of trading and not much else, which not only deviates strongly from the areas of use the high-status-*idionyms* from all three groups imply, but also from IL, which shows by far the broadest range of tags of all the low-status groups. It thus appears as if the use of runes within the group of IL-*idionyms* is, in fact, closer to how runes were used by those carrying high-status-*idionyms*, although there is, at present, no readily available explanation why.

### 6.3.7. Non-status-associated *idionyms*

While the group of non-status-associated *idionyms* cannot be used for the purpose of determining what people from (potentially) different strata of the social hierarchy used runes for, it would nevertheless be remiss not to list the tags these *idionyms* are associated with, especially as the range is very broad: *ambiguous, amulet, bad, balance sheet, carver formula, christian, comment, følgeseddel, incantation, instruction, learned, letter, list, liturgy, love, magic, mnemo-device, not interpretable, owner's tag, period context, PN, poetry, prayer, pub environment, quote, references, regular, religious, teaching, trade, unfinished, writing exercise*.

Out of 41 tags, non-status-associated *idionyms* are connected to 32. This group counts 114 *idionyms*, though, opposed to the 129 status-associated ones, and it is not broken down into sub-categories. If it were possible to associate them with social status, these *idionyms* could both contradict or support the observations presented so far. The picture that appears to emerge at present looks very much as if those carrying high-status-*idionyms* made much more broad use of runes as a writing medium than those carrying low-status-*idionyms*, with the exception of IL.

Taking into account that some of the non-status-associated *idionyms* may actually be proper representatives of names given to lower-class Scandinavians of whichever origin, there is great potential here for further research.

## 6.4. Tags and names

Regarding how the Bergen inscriptions appear to have changed the view on runes as a script, including by whom and for which purposes it was used (Section 6.1), the main questions are:

1. Are there recognisable patterns in the tags across the six groups of status-associated *idionyms* hinting at activities mainly carried out by actors with a high/low social status, and if so, which?
2. How do status-associated *idionyms* relate to inscriptions containing knowledge supposedly only available to a certain group of people, like continental poetry?

---

<sup>10</sup>The inscription may yet have been carved by someone of lower social status, but the *idionym* cannot be used as evidence for the carver's potential social status.



### 3. Can the merchant community be identified as a driving force behind the use of runes in Björgvin?

Before discussing these questions, some words of caution regarding the conclusions presented here: the current status-association of **idionyms** is by no means as certain as one would wish (Chapter 5); combining it with the text tags was an experiment to determine whether the approach would work for a larger corpus. Also, **idionyms** sorting into different groups appear on one and the same object, often also in the same text, meaning that the **idionyms** will be connected to the same tags. While possible from a technological point of view, analysing the combination of text (as an **entity** represented in **TEXTS**), tags and **idionyms** was not possible considering the sheer number of inscriptions and time restrictions. Such fine-grained re-analysis has to wait for the future, and in addition to a better-developed tagging system, hopefully also a better, more detailed basis concerning **idionym** distribution across time and space in the diplomataria.

Apart from these methodological concerns, another aspect to take into account is the runologist. Since determining the “Sitz im Leben” of an inscription is very often the goal of interpreting a runic inscription, the evaluations entered into **TAKERUN** may already be based on the scholar in question having taken the **idionym** under consideration and thus basing their evaluation of the inscription at least in part on its presumed social status. This presumed social status may contradict the results of the onomastic analysis in this thesis, skewing the picture. This can only be determined on a case-by-case basis by consulting the literature. The survey is also influenced by some inscriptions having drawn more attention than others, or not being covered in the publications included in the experiment.

All that said, how much potential does a survey like this have in terms of gleaning more information about the rune-carving population of a medieval town? Even taking into account difficulties like the smaller numbers of low-status **idionyms** in all three groups, one glance at Table G.2 shows that there are discernible patterns; the question is merely how reliable they are considering the disproportionate representation of low-status **idionyms**. It is plainly obvious that the high-status **idionyms** are connected to more tags indicating a broader range of activities than the low-status **idionyms**, including trade, scholarly activities (teaching, memorising, practising rune-carving skills), political machinations and entertainment of varying kinds. At present, the latter activities are not evidenced in the tags connected to low-status **idionyms**. They do not appear in connection with tags suggesting familiarity with learned literature and/or continental poetry, neither do they appear in connection with Scandinavian poetry.

Theoretically, this could be considered the answer to the first and second questions. However, the **idionyms** from the high-status groups appearing in such inscriptions are generally used as invocation and can therefore not serve as an indicator for the social status of the carver, whose name often does not even appear. Additionally, the presence of the tags in question in the group of non-status-associated **idionyms** implies that the picture might well change once further research into the potential social status of these has been conducted; that people from the lower social scales also engaged in the same activities can therefore neither be ruled out nor confirmed. Without the name of the rune-carver, nothing can be inferred about their social status and, consequently, their access or lack thereof to certain kinds of knowledge. This is important to keep in mind – without potential evidence in the form of the carver’s name, especially typically Scandinavian poetry may well have been carved by a person today’s scholars would not consider learned.

The observable patterns at present also imply that mainly men from the upper social circles amused themselves by carving “unorthodox” inscriptions; but it is difficult to say for sure. Anyone can carve a high-status **idionym**, it need not be their own name. In **TAKERUN**, it is possible to use “interlocutor/invocation” to distinguish between these two groups; yet *Ingibjörg/Ingibiörg*, for example, is marked as an interlocutor. Still, she is (probably) not the carver in this case, but the subject of the inscription, and this illustrates a further need to specify the information at present collected in **TAKERUN** to also account for these circumstances.

One difficulty I continued to encounter was the at times unsystematic way in which information on single inscriptions was presented, even within the same publication (this included no inventory number being provided, or no reference to the original **transrunification/transliteration**). The issue was not much present in the onomastic part of **TAKERUN**, but in the text section, it very much made itself known in various instances. For example, on several occasions the question of who actually carved the inscription does not even come up, with the previously discussed **INS470** being an exception (page 135). But what of, for example, an equally famous inscription, reading “Gyða tells you to go home” (**INS269**, not tagged in the present survey)? Was Gyða carver and sender, and if so, why did she refer to herself by her name? Or was the message carved by someone else doing her a favour? In the latter case, any evaluation of the rune-carver’s skill refers to the actual carver, not the sender of the message.

The problem is not so much that these questions are not discussed, it is that they are discussed in an unsystematic fashion, rendering **data normalisation** for use in an **RDBMS** difficult. For a tagging system to work and return useful results, it is imperative that such metadata is added in a systematic fashion and for every single inscription, otherwise the usefulness is highly restricted. Yet this survey shows that making use of tagging could have immense benefits for runologists, for it enables tracing one activity attested across all seven groups, said activity being trade.

Technically, this is hardly surprising in a port like **Björgvin**. Yet the fact that trade apparently was a major reason to make use of runes across a large part of the social spectrum and both genders implies not only that a fair proportion of **Björgvin**’s population was involved in trading activities, but also that Liestøl (1973, 138) could be right in suspecting that trade and the ability to partake in trade might actually have been a driving factor in acquiring at least basic knowledge of runes.<sup>11</sup> Liestøl (*ibid.*, 137) first mentioned the potential presence of writing schools in **Björgvin**, which certainly appears possible considering the inscriptions potentially related to teaching activities.

If trade were a driving force in making use of runes, what does it then mean that so many potential high-status **idionyms** appear in these inscriptions? Could the Bergen inscriptions be evidence for the emergence of a merchant class in Norwegian society, one that gained enough wealth and influence that their **idionyms** then also appear frequently in the diplomas? The social mobility of merchants and their families, which increasingly allows them to not only gain monetary wealth, but also landed property (for example Loveluck 2013, chapters 12–14; Carocci 2011), results in them also being part of the transactions many of the diplomas attest, which in turn presents a plausible explanation for why their **idionyms** appear in runic inscriptions and diplomas, and appear with high frequencies in the latter.

However, based on the current state of affairs and especially the lack of studies concerning the

---

<sup>11</sup>Johnsen (1987, 725, 736–38) even takes a step further and suggests that runes could have been the usual medium of communication between merchants already since the Elder fupark.

frequency of certain **idionyms** at different points in time in Norway, this must necessarily remain a hypothesis. Much more fine-grained and detailed analyses of the single **idionym**, its spread over time and space and a thorough evaluation of the name-bearers' background based on the diploma evidence would be required to draw any conclusion. The overlap of tags between IL and the high-status groups, as opposed to the NH-/PSH-groups, could perhaps be considered evidence for a gain in social prestige, and thus, a focus on a broader range of activities on the part of the potentially low-status Icelandic name-bearers. But again, it would be of crucial importance for this group in particular to consider each **idionym** and its bearers by itself, since the grouping may already be based on skewed evidence (Chapter 5).

Still, the possibility that the high-status groups already include formerly low-status **idionyms** which, owing to the gain in social and political power of merchants, are in this study considered high-status **idionyms**, should not be overlooked. Conversely, it should not be forgotten that the aristocracy started taking an interest in business ventures as well during the time **Björgvin** was developing into a town (Loveluck 2013, chapter 13; Johnsen 1987, 726). At the present stage, and without an in-depth analysis of every inscription and **idionym**, it would therefore be premature to conclude with certainty that runes were used *mainly* by merchants in **Björgvin**, and assume that high-status-association of several **idionyms** indicates that their bearers had attained a fairly high social status based on their trade. It is more apt to state that there is a probability that certain **idionyms** attested in the Bergen runic inscriptions appear frequently in the diplomataria on account of the merchant families using them having gained enough wealth and power to use diplomas. Unfortunately, owing to the lack of diachronic studies of **idionyms** in the diplomas, there is no way to pinpoint to which **idionyms** this could apply, and in the end, more research is required to tackle this question.

The experiment with including “Sitz im Leben” can nevertheless be considered a success, because patterns become visible by using this combined onomastic-qualitative approach, which previously would not have been readily apparent. The potential to gain more knowledge on a broader scale is thus definitely there. Still, the experiment also shows that using this particular approach for comparative studies has inherent difficulties, not least owing to the switch from physical to abstract **entities**. The point of incorporating a tagging system into a runic **DB** is rooted in the possibility of accessing the corpus from a completely different angle that does not require the scholar already knowing which specific words or phrases they are looking for.<sup>12</sup> Instead, it offers the opportunity to search for inscriptions by type, topic or even level of runic literacy if so desired.

One main problem remains; establishing a tagging system which properly mirrors and encompasses the different conclusions scholars can reach while still remaining clear enough to not confuse the user. If this or a similar system were to be applied to a larger corpus than the Bergen inscriptions, it would require intense study of the different classification systems other scholars have used regarding their corpora of runic inscriptions.

The other main problem already mentioned is the availability of tags for each inscription. That more than half of the corpus is untagged due to lack of scholarly attention, is an annoyance; unrewarding as the tag “not interpretable” may be, it would still be preferable to be able to attach it. Perhaps the incentive of being able to use what would be a fairly convenient system of finding

<sup>12</sup>Which, considering the differing customs of transrunifying, transliterating and normalising runic inscriptions, is almost certainly bound to result in incomplete record sets being returned anyway.

and grouping runic inscriptions for corpus analyses can help to rekindle interest in the unpublished and uninterpreted inscriptions from Bergen.

## 7. Archaeological analysis

While runic inscriptions can provide onomastic and literary evidence, archaeology also plays an important role in their interpretation. The Bergen inscriptions were discovered during excavations in the old medieval/Hanseatic quarter of the town, and are as such also archaeological evidence for the development of the town landscape. Its shape was influenced by people from different levels of society. Historians and archaeologists more or less agree these days that while there may have been some kind of pre-town settlement in the area around the bay Vågen, it was most likely at the initiative of a king that the area was parcelled up into plots in the 11<sup>th</sup> century, although the identity of said king is disputed (see about the history of the debate Hansen 2005, 15-16; the identity of the king Hansen 2005, 230-231, 2015a, 186-188).

These plots were then likely given to his followers with the expectation that they would settle there and develop their plots; yet activity traces on the plots remain sporadic until at least 1120, and it takes until approximately 1170 for most of the plots being in regular use (for example Hansen 2015a, 194). Only the areas closest to the waterfront appear to have been built up from the start, meaning that the royal initiator(s) were apparently not particularly successful in enticing people to develop the town until the first half of the 13th century, when there is also major building activity of churches in Bjørgvin, perhaps connected to the Civil Wars (ibid., 188, 191, 194). This stage also sees the first appearances of international trading contacts and finds indicating the presence of artisans and service trades in town (ibid., 192, 194-195).

Bjørgvin was built as a result of interplay between bottom-up and top-down initiatives taking place (Hansen 2005), with various actors being involved in different ways, including women and children (Hansen 2006, 2010; Myglund 2007, 2015b), craftspeople, fishermen, traders and more (Hansen 2015b,c, 2016; Øye 1988; Larsen 1992). They and their needs and requirements resulted in a town landscape both stable and mutable (Herteig 1985, 1990, 1991).

### 7.1. Town development in spatial terms

The earliest traces of settlement recorded from Bergen all come from the northern shore of Vågen (literally “the bay”), one part of the fjord around which the town clusters. It is protected from harsh weather and storms out at sea by a chain of islands called Øygården. That and the original sloping banks made the inner area of the fjord an ideal natural harbour in prehistoric times.

Once the settlement started to grow, the natural shoreline confined building space. Excavations showed that it was pushed further into the harbour basin by building caissons (bolverksskar) at the waterline and further out into the deeper bay areas. This waterfront expansion seems to have been of great importance to those living on/owning plots in Bjørgvin throughout the whole medieval period, and appears to have been a continuous process helped along by debris from fires and other waste being used to fill the substructures upon which the new houses rested. At the same time,

it follows the already existing structure of plots (Herteig 1985, 1990, 1991).

The BRM 0-site is located on the northern Vågen shore, in the northernmost part of the town-area called “Bryggen” today. This area was divided into oblong plots during the initial stages of town development, running perpendicular to the shoreline and still observed today in building patterns (Hansen 2005). A back, middle and waterfront area can be identified along horizontal lines; since the waterfront is pushed further out into the bay over time, areas that are waterfront in one **period** can be part of the middle in a later one. The structures on the plots were mainly identified as buildings and/or storage rooms (if not support structures), and they can form small groups making up one household, although it is very difficult to determine which buildings may have belonged to the same household. Their layout on the plots follows a strict pattern; two rows of houses are built along a passage leading down to the harbour, with their backs touching the backs of the houses in the neighbouring house row. House rows as well as passages are named, and several of the names are known from historical sources, although it is not always quite certain where the passage in question was located (for an extensive discussion, consult Helle 1982, 183-246, 274-304).

This characteristic double-house row pattern is the physical reality that townspeople experienced on a daily basis, and appears to have been fairly consistent along Vågen’s northern shore. The bulk of finds as well as most of the observations on structures originate from the BRM 0-site, the northernmost part of the town area not counting the half-island Holmen with the king’s residence. The four house rows making up the area are called Bugården, Engelgården, Søstergården and Gullskoen, with Gullskoen taking up about as much space as the other three rows together due to its curious layout (Herteig 1985, 11). The other three rows show the double-house row pattern, meaning that a passage is bracketed by two rows of houses/storage rooms, with the waterfront areas probably serving as the quay and belonging to the same people who also owned the houses (Norwegian “gård”, referring to a household unit rather than a single building). Determining the exact ownership of a single house/gård, though, is impossible even with the help of historical sources, although it is known from the times of the Hanse that the properties on one plot could belong to several different people. Presumably that was also the case in the earlier stages of town development (Helle 1982, 274-303).

Although BRM 0 can theoretically be divided up into smaller areas (plots or houses), the difficulties in determining plot boundaries and also houses would have warranted more in-depth examination than was possible in this thesis. The site is therefore considered as a whole, with the only distinction being made based on how close objects were to the waterfront area.

## 7.2. The legacy of the Bryggen excavations: normalising old data

Another complicating factor is the sheer volume of material BRM 0 produced (over 100,000 finds); various parts and aspects of the excavation are therefore still being published. The most important tool for these analyses is a **DB** maintained by Universitetsmuseet Bergen, which was recently included in the nation-wide MUSIT-**DB**. It is possibly one of the oldest Norwegian archaeological **DB** in existence, although it underwent several software changes and revisions since its conception (Herteig 1985, 33-46; Hansen, Hope and Mygland 2017). As per February 2017, the **DB** consisted of two tables called **Altbases** and **Kontekstbase**. The first **entity type** contains



every single find discovered in the course of BRM 0 and subsequent excavations; the second **entity type**, linked to the first by the *Linjenummer*, the context **PK**, lists all individual contexts (Hansen, Hope and Mygland 2017). **Kontekstbase** must be considered as representing an archaeological context in the broadest sense possible, including information about layer type as well as nearby structures, coordinates etc., while **Altbase** focuses on the objects themselves, but also contains information one would not necessarily expect in this **entity type**, such as **transliterations**.<sup>1</sup>

With only two **entity types**, columns were added as new information needed to be stored, resulting in tables of more than 60 columns. Additionally, several of these columns represent revisions of already existing data, so without intimate knowledge of the **DB**, it is difficult to extract relevant, up-to-date information. Using the data nowadays is therefore somewhat of a challenge, and for this thesis, re-modelling the legacy data became necessary to enable better compatibility with **TAKERUN**'s **entity model**.

### 7.2.1. Excavation methodology

Restructuring the data from the existing **DB** into new **entity types** necessitated a closer look at the excavation methodology, since this informed which kind of data was gathered and how it was connected. For example, in 1955 it was decided to use the stratigraphic method in the planned excavations rather than today's single-context-based approach (Herteig 1985, 16). Where BRM 0 is concerned, a "context", called "linje" in the original documentation, therefore describes a bag of finds excavated in roughly the same area and given a unique number, "linjenummer". Said area could consist of less than 1m<sup>2</sup> or of anything up to a 8x8m-square covering both the inside and outside of a building, the result of a local grid being set up using 8x8m-squares as basic excavation units. A local point 0 served as a reference, based on the observation that an 8x8m square covered approximately the width of one house.<sup>2</sup> Determining whether the objects contained in a bag actually originate from the same "context" in a strict sense, or from as many different contexts as there are objects, is therefore difficult.

Roman letters designate the x- and Arabic numerals the y-axis of those excavation units, which were also not dug equally; several were dug to a certain level using mechanical diggers, resulting in many potential finds being lost and a generally skewed distribution of finds in different areas of the excavation. Since these units form their own physical reality and serve as references for where a context was excavated, they are an **entity type**, designated **EXCAVUNIT** (Figure 7.1, Figure H.6); coordinates in the BRM 0-documentation, while available for some "linjenummer" and finds, are the exception rather than the rule. The **PK** consists of the grid reference (Roman letter/Arabic number), and the table stores the coordinates (measured in metres from local point 0) of all four corners of the excavation unit in question. The following observations help to locate the context/linjenummer in the excavation area and provide more information about its surroundings:

1. excavation unit

---

<sup>1</sup>See Chapter 4 for why this is an issue.

<sup>2</sup>Meaning that what a modern archaeologist might consider one context – the inside of a house – can, in the **UMB DB**, be spread across any number of contexts.

Column Name	Data Type	Length	PK?	Not Null?
unitid	varchar	5	true	true
northx	int	5	false	true
northy	int	5	false	true
eastx	int	5	false	true
easty	int	5	false	true
southx	int	5	false	true
southy	int	5	false	true
westx	int	5	false	true
westy	int	5	false	true

Figure 7.1. Table structure **EXCAVUNIT**.

2. buildings in its immediate vicinity (distance, relation, type of building)
3. layer (type, colour, relation and distance to layer)
4. fire layer (see Section 7.3)
5. coordinates

This level of detail would provide a solid basis for analyses if the respective cells were not empty for the majority of entries.<sup>3</sup> Consequently, the excavation unit is therefore the only point of reference for several contexts.

Houses and other human-made structures often expand across several of the 8x8m-units, and must be considered their own **entity type**, stored in **STRUCTURES** (Figure 7.2, Figure H.6). The contents rely largely on a list of all structures published in Herteig (1990, 1991) compiled by Egill Reimers, kindly made available to me by Gitte Hansen. It provides information on the kind of structure, the identifying number, the excavation units it spans, the dating of the structure and literature alongside other references pertaining to the original documentation. Structure type was turned into *structype* while the literature references are stored in *strucsource* and *strucsourcepg*. The identifier was added as well, *strucno*.

Difficulties originating from the legacy data begin showing themselves in this relation. Since not all of the structures were published, not all appear in the list. The remaining structures connected to the inscriptions were added by means of running a query on the relevant columns in the original UMB **DB**, which results in a **PK**-issue: in Reimers' list, some structures seem to appear twice, and the situation is compounded by adding the structures from the **DB**. Reimers' list also only offers six different structure types: AV (latrine), BR (well), BY (building), GR (ditch/trench), IL (hearth), KA (substructure), whereas a **DISTINCT**-query in the original UMB **DB** returns 62. Deciding whether a structure from the Reimers list corresponds to a structure

<sup>3</sup>Fortunately runic inscriptions were considered very important finds. Information on the layer is available for 197, associated structures are noted for 448 contexts. 562 have information on the fire layer and 573 out of 577 contexts in total have an associated excavation unit (some have two). However, there are only 143 contexts which have information about all of those (Query H.9, H.8, H.10).

Column Name	Data Type	Length	PK?	Not Null?
strucno	varchar	5	false	false
structype	varchar	5	false	false
strucid	varchar	10	false	false
strucsource	varchar	30	false	false
strucsourcepg	varchar	10	false	false

Figure 7.2. Table structure **STRUCTURES**.

Column Name	Data Type	Length	PK?	Not Null?
strucid	varchar	10	true	true
unitid	varchar	5	true	true

Figure 7.3. Table structure **STRUCUNIT**.

from the **DB** is therefore very difficult and requires in-depth study of the original documentation. Where possible – i.e., where the combination of *strucno* and *structype* was unique – this was used as the **PK** for the respective building. That still leaves 170 entries in **STRUCTURES** without a **PK** and therefore, un-connectable to other entries.

Structures themselves are connected to contexts via **CONSTRUC** (Figure 7.4, Figure H.6). Other than **STRUCTURES**, **CONSTRUC** relies on data from 24 columns in **Kontekstbase** storing the horizontal and vertical structures in the immediate vicinity of a context, see Figure H.2, the boxes labelled “Horisontal” and “Vertikal”. Of the originally five slots available, only the first horizontal slot seems to have been used for the large majority of finds, followed by the vertical relation. The other three slots are rarely used. These columns are important for context evaluation (Section 7.2.2).

Continued revisions resulted in more columns being added with the same purpose, preserving the original entries in case they were needed at a later point in time. Instead of retaining this structure, which results in a lot of empty cells, **CONSTRUC** uses *structype*, *typsource*, where type of structure and the original column designation are stored; *strucno*, *nosource* for the structure identifier; *distance*, *disource* for the distance of the find/context from the structure; and lastly, *relation*, *relsource* and *reltype* for information about the nature of the connection between find/context and structure (the last column being my addition, marking whether the connection is horizontal or vertical, although that can be inferred by the values in the *source*-columns). The *musitid*-column links back to **CONTEXTS**, while *strucid* should contain the **PK** for each structure; for the reasons mentioned above, there is none for many of them at present.

Potential revisions of the cell content are dealt with by transferring both the data from the original and the revision columns, including the column designation in *source*. Like this, queries can be run excluding entries from a particular source (either the older version or the newer one), although that this only applies to eight entries to begin with and it is difficult to ascertain whether the additional entries are meant to replace the data in the original column or were added as additional information. My own examination of the original documentation produced 26 new

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
structype	varchar	20	false	false
strucid	varchar	10	false	false
typsource	varchar	10	false	false
strucno	varchar	6	false	false
nosource	varchar	15	false	false
distance	varchar	15	false	false
disource	varchar	10	false	false
relation	varchar	20	false	false
relsource	varchar	10	false	false
reltype	varchar	15	false	false
bibtexkey	varchar	30	false	false

Figure 7.4. Table structure **CONSTRUC**.

entries for 22 contexts (Query H.3), all of which were considered in addition to the original data since, to the best of my knowledge, it did not contradict the already existing entries.

**CONSTRUC** leads to the **entity type CONTEXTS** (Figure H.6, Figure 7.5). With most of the pertinent data moved to other **entity types**, it only retains 10 columns from the original **Kontekstbase**. The **PK** is *musitid*, the unique number assigned to each context during the migration to the national MUSIT-DB rather than the original *linjenummer*, although for backup reasons, this was also kept. Most other columns remaining in **CONTEXTS** store information about the documentation of the context (*plannr*, *profil*, *bilag*, *nivnr*, *niv*); they are of no interest to the current study, though, other than as “literature references” to sources consulted in context evaluation.

**CONTEXTS** also stores what coordinates are available for the exact location of each context (in the local grid). Unfortunately, since some of the cells contain values like “32-3600”, the coordinate-columns are **varchar** instead of **integer** or **decimal** as they should be. It is also important to note that the coordinates at times contradict the find location suggested by the excavation unit. It frequently turned out to be difficult to determine which piece of information provides the correct location; instead I wrote queries automatically checking whether the x/y-coordinates provided are actually located within the excavation unit in question (Query H.1, H.2). Objects/contexts with a contradiction between coordinates and excavation unit use the coordinates instead of the excavation unit; runic inscriptions were considered so important that their find spots were often measured in and they were even assigned their own context number despite originating from a context yielding more finds (pers. comm. Gitte Hansen). Although they do not always show up in the drawings, and it can therefore be assumed that these measurements are correct.

A bespoke **JOIN** connects **CONTEXTS** to **EXCAVUNIT** because in the original **Kontekstbase**, there are two columns designated to associated excavation units, *Rute* and *R2*. While most entries only have values in the first, on occasion the latter also contains data. A **JOIN** was therefore required, combining the data from said two columns into a compound **PK** made up of *musitid* and *unitid* with *unitsource* providing the designation of the original column. There is also data available

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	true	true
linjenr	varchar	10	true	true
plannr	varchar	10	false	false
profil	varchar	10	false	false
bilag	varchar	10	false	false
nivnr	varchar	10	false	false
x	varchar	20	false	false
y	varchar	20	false	false
z	varchar	20	false	false
niv	varchar	10	false	false

Figure 7.5. Table structure **CONTEXTS**.

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
unitid	varchar	5	false	true
unitsource	varchar	5	false	false
unitpart	varchar	10	false	false
unitpartsource	varchar	10	false	false

Figure 7.6. Table structure **CONUNIT**.

on which part of the excavation unit yielded the context in question, stored in *unitpart*. This additional information in **Kontekstbase** is stored in two columns adjacent to *Rute*, *R2* and was therefore also given a *unitpartsource*-column to properly track its origin.

### 7.2.2. Context evaluation

Contexts/finds from BRM 0 are located first and foremost by means of the excavation unit. Additional information about structures in their vicinity helps establish the broader context of the find circumstances, although the lack of information for many contexts/objects already renders it difficult to decide whether they were found *in situ*. Since the aim of this investigation was to gather more information on the individuals behind the runic inscriptions, the approximate original area of use of a runic inscription would help in determining, for example, in which houses individuals lived (or spent time), not to mention that the many different text types could help in establishing bespoke areas of use within the town landscape. After all, “[i]t is important that we remember that archaeological remains are material traces of *activities* carried out by *people* in the past” (Hansen, Ashby and Baug 2015, 2).

Yet runic inscriptions are often carved into small, easily re-deposited objects (not counting the walrus skull with INS173), and frequently ended up with other debris in layers far from their original area of use; therefore their contexts need to be evaluated carefully. Hansen (2005, 51)

established four categories for the purpose:

1. *In situ* culture layers found in their original and functional context, such as a house floor.
2. Redeposited culture layers, for example objects and rubbish from a plot or property, transported to a close-by area in the process of waste disposal. Although not found in their functional context, they probably still represent activities that took place nearby.
3. Redeposited culture-layers for example used as fill-masses in construction work.
4. Culture-layers/artefacts redeposited by non-human events like waste dumped into a stream.

Only the two first categories of culture layers can provide information on the original area of use/purpose, although it is already difficult with the second category. Based only on the results retrieved via Section 7.2.1, context evaluation is difficult, since the basic approach relies on determining the context's relation to structures nearby. Said location is described in terms of relations to building/layers and, if applicable, using compass terms, and either horizontal or vertical. To decide whether a context was relocated, these notes are helpful to an extent only. Where the information says "in structure x", the type may then suggest whether the context was *in situ* or redeposited, for example when objects were found in supporting structures built into the harbour basin to carry the actual houses above sea level. If an object was found in such a substructure, the context is most likely redeposited – these caissons were filled with rubble and often below sea level.

However, the relation to any given building only reflects what the excavators could most easily recognise in the immediate vicinity, and does in no way imply any actual connection. "In" was not only used when there was a structure present, but also when said structure had ceased to be present in the field, but so far no new structure had appeared. In such cases, the correct term would have been "under", but this was not always observed (pers. comm. Gitte Hansen). Vertical relations may add clarity; "in caisson" combined with "between wooden beams" indicates not only that the object was discovered in the caisson, but that it was actually found between traverse beams of said structure. Nevertheless, caissons (especially those at the waterfront) suggest redeposition by default.

These inherent limitations lead to the conclusion that in terms of relations to structures, reliable and doubtful contexts can be characterised by the following criteria:

- reliable
  1. horizontal *and* vertical relation(s) to a structure noted
  2. horizontal location described as *in, under, - part, inside* structure
  3. vertical relation described as *between, in, above, at lower border of* structure
- doubtful
  1. horizontal *or* vertical relation to a structure noted
  2. horizontal relation described as - *of, in, under, by, around, outside, in front of*
  3. vertical relation to structure described as *at same level with, around*



Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
layerid	varchar	5	false	false
layertype	varchar	50	false	false
layercolour	varchar	20	false	false
layerdistance	varchar	10	false	false
layerrelation	varchar	10	false	false
layersource	varchar	30	false	false

Figure 7.7. Table structure **CONLAYER**.

The term *reliable* in this case only signifies that the relation to the structures answers actual circumstances. The context may still be redeposited, i.e. if the location happens to be in a caisson, there is more certainty about it being redeposited, as opposed to a context only described as located in a house, which might be *in situ* in nature (i.e. the runic object was actually used there), but the description does not allow for it to be identified with certainty as a reliable context.

Unfortunately, in many cases the structure relations are the only information permitting context evaluation, although **Kontekstbase** also stores additional information, beginning with which kind of layer an object was found in. The corresponding **entity type** is **CONLAYER** (Figure 7.7, Figure H.6), built along the same lines as most of the tables in Section 7.2.1, with *musitid* connecting the entries back to **CONTEXTS** and information on the layer and its relation to the context in question provided in *layertype*, *layercolour*, *layerdistance*, *layerrelation*. The layer type most common for runic objects is, unsurprisingly, “generic fill masses”, i.e. (re)depositions of whatever material was used to even out the ground in advance of building, or filling in caissons. Besides generic fill masses, there are fill masses containing twigs, wood shavings and charcoal residue. Contexts found in these layer types, regardless of structure relations, must all be considered redeposited. However, the generally good condition of most runic inscriptions suggests that they were not redeposited with the fillmasses more than once.<sup>4</sup>

While the data contained in **CONUNIT**, **CONSTRUC** and **CONLAYER** may be termed the “context” of an object, the information differs. A layer type provides information about the immediate surroundings of an object, such as whether it was found between floorboards or in fillmasses. Excavation units and structures in the immediate vicinity, by contrast, define the frame, the physical reality that defines “insides” and “outsides”. They form the evidence that defines the context type, i.e. whether it is *in situ* or redeposited. In the very best case, coordinates within the local coordinate system locate the object down to the centimetre in the excavation area, although for most objects, either one or both coordinates will be missing. However, for objects without information about related structures or layers, the coordinates can provide essential information, particularly the z-coordinate, height above/below sea level. A wooden object discovered at -1m sea level cannot have been used in this area; it must have gotten there by being part of fillmasses

<sup>4</sup>Since legacy data presented obstacles for **data normalisation** once more, there is at present no **entity type** “layer type”, although this would have been useful, especially when dealing with special kinds of layer like “fire layer” (Section 7.3).

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	false
evaluation	varchar	15	false	false
conevalsource	varchar	30	false	false

Figure 7.8. Table structure **CONEVAL**.

dumped into the water (see Hagland 1988a; about the controversy Nedkvitne 1989).

As a last resort in deciding whether a context is redeposited, the original excavation drawings in the museum archives can provide additional information, although they almost never include hints as to the objects found within the layer drawn. While using coordinates would be preferable, an approximate localisation within an 8x8m-square is not too bad a basis to judge whether a context is redeposited or possibly *in situ*. During extended stays at the Universitetsmuseet in 2017 and 2018, I was able to check 498 of 578 contexts relating to 599 objects with actual or suspected runic inscriptions, and assign a context evaluation to them (Figure 7.8). The values in **CONEVAL** and the evaluation of a context as primary (in situ) or secondary (redeposited) are based on the information available in the UMB **DB** and the various parts of the archaeological **research database** discussed just now. Although not using modern-day excavation methodology, the amount of thought that went into documenting BRM 0 allows for a good number of conclusions to be drawn from the material, including the possibility to fine-date most inscriptions to the various **periods** of the town.

### 7.3. The fire chronology and the dating process

As explained in Section 7.6.9, **Björgvin** underwent several stages of development, interrupted by fires which destroyed large parts, if not all of the town, even before the 1955-fire. Since king(s) had a vested interest in **Björgvin** and it was an important trade port also for other countries, many of these fires are documented in contemporary sources (see Helle 1998, especially for the extent of fires). The ash layers left behind remained in the ground and nowadays help archaeologists to separate **periods** and establish a relative chronology during every excavation of the older parts of town (Ersland 2015), providing stratigraphic breaks between different phases of town development and ante-quem-dates for contexts/finds. Yet the “fire chronology” is fraught with problems in terms of fine-dating. To sum up the key points from Herteig (1985, 1990) and Hansen (2005):

1. A fire layer found on one site does not necessarily originate from a fire noted down in written sources;
2. The written sources may not be as reliable as surmised;
3. In some parts of the excavations, fire layers were cleared very thoroughly before a new building was erected;
4. Unknown local fires (whereas “local” qualifies as one or more houses but not the whole street/plot) may confuse the chronology.

Fire	Date	Period	Building phase	
0	1955			
			9.2	
I.a Prev. Unknown		9	9.1	9.1.1
I	1702			
			8.3	
I.b Prev. Unknown		8	8.2	
Local fire 1527			8.1	8.1.1
II	1476			
		7	7	
III	1413			
			6.3	
III.b	1339	6		
			6.2	6.2.1
			6.1	6.1.1
IV	1332			
		5	5.2	5.2.1
			5.1	
V	1248			
		4	4.2	
			4.1	
VI	1198			
		3	3.2	3.2.1
			3.1	3.1.1
VII	1170/71			
		2	2.2	
			2.1	
VIII	c. 1120			
		1	1.2	
			1.1	
Oldest documented structures at the Bryggen site (BRM 0): 2nd quarter of 11th century (c. 1020/30)				

Figure 7.9. Bryggen fire interval chronology. Compilation of dates from Herteig 1990, Fig. 3, 1991, Fig. 5 and Hansen 1998, 2005, 58-67 (drawing Gitte Hansen).

Some of these problems pertain more to the identification of the fire layer in question in the field, whereas others concern the chronology as a whole. The current chronology serving as the framework in this study is presented in Figure 7.9.

In **TAKERUN**, the **entity type** storing the relevant data is **FIRE**. It contains only three columns, with *fireid* as the **PK**, while *fireyear* stores the (approximate) year of the fire and *altfireid* the Roman equivalent of the number stored in *fireid*. Since the start of publication, fires were given Roman numerals, whereas the **periods** of town development between the fires get Arabic numbers. The sequences also run opposite – the oldest fire layer is designated VIII, whereas the oldest **period** is labelled 1. Fires VIII and VII therefore bracket **period** 2, while fire I and 0 mark beginning and end of **period** 9, and the same applies to the other **periods**. With the ash layers providing physical evidence of ante-quem and post-quem borders, dating the objects in the layers in between is a comparatively easy task. However, fires were not the only reason for changes in Bjørgvin's physical layout. As Figure 7.9 illustrates, some of the longer (and even the comparatively short) **periods**

Column Name	Data Type	Length	PK?	Not Null?
fireid	varchar	4	true	true
fireyear	varchar	10	false	false
altfireid	varchar	6	false	false

Figure 7.10. Table structure **FIRE**.

Column Name	Data Type	Length	PK?	Not Null?
phaseid	varchar	5	true	true
phasedates	varchar	15	false	false
startfire	varchar	5	false	false
stopfire	varchar	5	false	false

Figure 7.11. Table structure **PHASES**.

can be divided further into what are referred to as “**building phases**” to avoid confusion, often very localised replacements of buildings and structures that for some reason other than a fire were replaced. The phases starting after one fire and ending by destruction via the next, on the other hand, are referred to as **periods**.

While the fires bracket each **period** and therefore date its beginning and end, and the fire layers are also used to date contexts (Figure 7.7), they are at the same time dated, at times fine-dated, by **period** or **building phase** where circumstances allowed for it (Figure H.6). Both methods of dating contexts/objects at the same time yield some complications.

**PHASES** has five columns, the **PK**-column *phaseid* (Arabic number with added letter if required), *phasedates* to store start and end dates that do not correspond to fires, and *startfire*, *stopfire* storing the **FK** indicating the fires bracketing the **periods** (but not the **building phases**). Both **FIRE** and **CONPHASE** connect to **CONTEXTS** via **JOINS**, **CONFIRE** and **CONPHASE** (Figures 7.12 and 7.13), which contain much the same columns that can also be found in **CONLAYER**: *musitid* to connect them to the right context, *firedistance*, *firerelation*, *firesource* concerning information about where a context/object was discovered in relation to a fire layer, and *firecom* for additional information regarding the original documentation and whether the fire layer could be clearly identified. **CONPHASE**, on the other hand, has an added column *uncertain*, which is **BOOLEAN** and set to 1 if, in the original **DB**, a question mark was attached to the **period**.

The two **JOINS** are required on account of past and future revisions of the data. In the **UMB DB**, three columns store revisions of the fire layer the objects relate to, and my own survey of the material added another “revision” (although it was restricted to adding missing information from the original documentation). There are likewise two columns for **period**, and my own additions.

In short, each context can potentially be connected to a fire layer five, to a **period** four times, much in the same way the same character sequence can be normalised into one or more **idionyms** (Section 5.5.4). These revisions were not carried out in a systematic fashion for *all* of the finds; they were re-dated and re-assigned when studies required it. Several runic inscriptions are therefore still dated according to Herteig’s initial survey of the documentation. Theoretically, these

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
fireid	varchar	4	false	false
firedistance	varchar	10	false	false
firerelation	varchar	15	false	false
firecom	varchar	150	false	false
firesource	varchar	20	false	false

Figure 7.12. Table structure of the structure of **CONFIRE**.

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
conphase	varchar	30	false	true
uncertain	tinyint	1	false	false
phasecom	varchar	15	false	false
phasesource	varchar	30	false	true

Figure 7.13. Table structure **CONPHASE**.

“old” datings could have been removed in favour of only keeping the new ones. That, however, seemed unwise considering that further investigations might well require the old data to be accessible, if only as references to find the right documentation; using **JOINS** satisfied both requirements, since, by making use of properly written queries, contexts dated several times can be filtered out and re-evaluated if necessary, or the most recent datings can be retrieved for those objects for which they are available, while the original datings are returned for the other ones. When evaluating a context, two different aspects therefore need to be considered:

Firstly, its status as *in situ* or redeposited.

Secondly, the reliability of the dating.

Objects as small as rune-sticks may have been lost or disposed of at any point within the town landscape, but they were not necessarily likely to stay put. They may have been moved elsewhere quite by coincidence when repairs needed to be carried out within a building, or after a fire swept the town. Given the ease with which the objects could be displaced, it is almost impossible to determine whether their contexts reflect the original area of use or not, but generally it can be assumed that they do not. However, it is also possible that the **period** they are dated to is not the **period** during which they were carved; after a fire, the objects may have been swept up during clearing measures and redeposited with the rest of the material. If they are used as part of fillmasses, they then become part of a layer that post-dates their actual **period** of use. This renders their dating by **period** somewhat questionable.

On the other hand, dating them by fire layer is not necessarily a better option. Fire layers were referenced in the documentation until the next layer of ash appeared in the stratigraphic record. A lot of contexts are recorded as being found “under” a fire layer, when in fact, they were physically closer to the fire layer below them, which had however not yet been recorded (“over”). Figure 7.14 illustrates why this is a problem. While the fire layers separating **periods** provide a very convenient

Phase	Year of preceding fire	Year of succeeding fire	Duration in years	building phases
2.0	ca. 1120	1170/71 <sup>4</sup>	unknown	2
3.0	1170/71	1198	27	2-4
4.0	1198	1248	50	2-4
5.0	1248	1332	84	2-4
6.0	1332	1413	81	3-6
7.0	1413	1476	63	1
8.0	1476	1702	226	2-3

Figure 7.14. Start and end dates and duration in years of each major **period**.

means of fine-dating archaeological finds, the fires did not occur in regular intervals, which no doubt the townspeople were more grateful for than the archaeologists. During the longer **periods**, more objects had the chance to be lost, thrown away and end up in the archaeological record, yet with no fires “cleaning up” what rubbish had accumulated, one would also expect that more concerted efforts were made to dispose of waste which would otherwise start to inconvenience **Björgvin**’s inhabitants.<sup>5</sup>

That **Björgvin** was by no means static in between the fires is also illustrated by the number of **building phases** per **period**. Continuous activity required repairing, replacing, tearing down and/or rebuilding old structures while constructing new ones all the time. These activities are sure to have had an impact on object deposition, whether beneficial (when waste was used as fillmasses underneath/in new constructions) or detrimental (when an old structure was torn down and the area cleared for the new one). Since there is a much greater need for replacement of structures during a longer **period**, object deposition during the longer **period** has likely been impacted more than during shorter ones, although in which way is hard to determine. Whether a context was discovered “over” or “under” a specific ash layer therefore matters, as its exact position would indicate at which stage of the process it was deposited.

Either way of dating the contexts has its own pitfalls, and it is often quite difficult to decide, especially when information (such as distance to fire layer) is lacking.<sup>6</sup> Due to time restrictions, I did not undertake any re-dating of the runic inscriptions during my stays at UMB, instead focusing on the question of *in situ* or redeposited contexts and relying on the datings provided by the UMB **DB** and the data revisions. However, since the datings were used in order to analyse whether the composition of townspeople changed over the course of time, and whether their use of runes did as well, it is important to be aware of the datings’ origin and the uncertainties attached to them.

On the whole, it is likely impossible to determine whether an inscription should be dated one **period** earlier than it was; the fire layers are fairly reliable ante-quem-boundaries, as **Björgvin**’s inhabitants were not much in the habit of removing culture layers much deeper than the ash

<sup>5</sup>The problem of skewed numbers owing to different **period**-duration is something every scholar working with the material notes, for example Mygland 2007, 45.

<sup>6</sup>This is less of a problem with actual structures, connected to **PHASES** via **STRUCPHASE**.



layer after a fire. They cleaned the area as much as possible, sometimes including the ash layer, often not, and then rebuilt on top of the previous culture layers, which renders the stratigraphic situation and thus, the ante-quem-dating, clearer than at other excavations.

## 7.4. Archaeological object classifications

While context evaluation is an important part of the process of reconstructing the original function and use of an object, its archaeological classification is also a significant factor when trying to establish to what end said object was originally used. Object classifications are stored in **Altbase** in the **UMB DB**, but are normalised to a much lesser degree than the description of contexts. On account of the number of objects (over 100,000), only the information pertaining to the runic inscriptions was exported into **TAKERUN** and split up into five **entity types**, **OBJECT** being the first. Much like **CONTEXTS**, **OBJECT** also saw a considerable reduction of columns, and was reduced to an collection of, basically, identifiers: *musitid*, *linjenr* as **FKs** connect it back to **CONTEXTS** (Figures 7.15 and H.6), while *objectid* is the **PK** and the other columns all store identifiers used over the course of these objects' existence as part of a museum collection. *xco*, *yco*, *zco* store coordinates, not to be confused with the coordinates attached to a context – these can be the same, but especially runic inscriptions were sometimes recorded with their individual coordinates, while the context (the “bag”) contained finds from a larger area within the excavation (Section 7.2.1.)

The decision to turn **OBJECTIDENTIFICATION**, **OBJECTCLASSIFICATION**, **OBJECTMATERIAL** and **OBJECTEXTRAS** into their own **entity types** (Figures 7.16 to 7.19) rests partly on these being different ways of describing an object. A “classification” is often based on the typological placement of a particular object within a wider group of objects of the same kind, whereas “object identification” can be understood as a less formal description of what the object *is* – if a typology existed for rune-sticks, an object could for example be identified as “owner’s tag”, classification “type arrowhead”.

No formal classification system for runic inscriptions is used in this study, although such would be desirable, since in the case of the Bergen inscriptions, “classification” seems to depend more on the text content than on the physical characteristics of the object itself. Sticks showing no signs of having had any means of fastening them to goods, like arrowheads or holes, were classed as **owner’s tag** because the runes can be identified as a name, and sometimes a name + *á*.<sup>7</sup> That, however, implies a certain use in daily life, and it does not seem particularly likely that all such inscriptions fulfilled the exact same purpose that **owner’s tags** with bespoke physical features like arrowheads or holes would have. Keeping the data stored in columns labelled “classification” and “identification”, although the cell content is often not too different from what can be found in the respective other, was therefore done with a view to potential future work on this. The decision was also guided by the fact that some of those columns are later revisions (and attempts at **data normalisation**) of the original description.

**OBJECTIDENTIFICATION**, **OBJECTCLASSIFICATION** and **OBJECTMATERIAL** are not **JOINS**, but, for now, stand-alone **entity types** containing the information from different columns in **Altbase**, almost identical to how, for example, **CONFIRE** was built until proper **data normalisation** can be undertaken. All information on single objects, discussed alongside **idionyms** in Sections 7.6.2

---

<sup>7</sup>Clearly observable in NIYR VI.

Column Name	Data Type	Length	PK?	Not Null?
musitid	varchar	10	false	true
objectid	varchar	25	true	true
katalogsignatur	varchar	15	true	false
linjenr	varchar	10	true	false
tilvekstnr	varchar	10	true	false
alttilvekstnr	varchar	10	true	false
undernr	varchar	40	true	false
xco	decimal	10,3	false	false
yco	decimal	10,3	false	false
zco	decimal	10,3	false	false

Figure 7.15. Table structure **OBJECT**.

Column Name	Data Type	Length	PK?	Not Null?
objectid	varchar	25	false	true
oidentification	varchar	150	false	true
oidensource	varchar	25	false	false

Figure 7.16. Table structure **OBJECTIDENTIFICATION**.

to 7.6.7, originates from these tables, although I have summarised the descriptions in Figure H.24, Tables H.9 to H.13.

One **entity type** in this part of **TAKERUN** is not, strictly speaking, part of the archaeological dataset: **OBJECTEXTRAS**. While migrating the data to the **MUSIT-DB**, **transliterations**, **normalisations** and interpretations of the runes on the objects were added in fields that, technically, are meant to store classifications and descriptions of the physical appearance of an object. These were removed from the respective columns (and, consequently, the first versions of **OBJECTCLASSIFICATION**, **OBJECTIDENTIFICATION**) and instead stored in **OBJECTEXTRAS** to await further processing.<sup>8</sup>

The next sections discuss how the data from the archaeological **research database** was used to trace the use of runes by different groups of inhabitants in **Björgvin**.

<sup>8</sup>“Further processing” means moving them to **TRANSLITERATION** or **NORMALISATION** as appropriate and attaching a proper source. This will also require removing entries that are taken from SRDB or notes or publications by Liestøl, since they are already in **TAKERUN**.

Column Name	Data Type	Length	PK?	Not Null?
objectid	varchar	25	false	true
oclassification	varchar	150	false	true
oclassource	varchar	40	false	false

Figure 7.17. Table structure **OBJECTCLASSIFICATION**.

Column Name	Data Type	Length	PK?	Not Null?
objectid	varchar	25	false	true
omaterial	varchar	150	false	true
omatsource	varchar	40	false	false

Figure 7.18. Table structure **OBJECTMATERIAL**.

Column Name	Data Type	Length	PK?	Not Null?
objectid	varchar	25	false	true
oextra	varchar	255	false	false
oexsource	varchar	40	false	false

Figure 7.19. Table structure **OBJECTEXTRAS**.

## 7.5. Runes and objects

[...] there is great potential to access the identities of actors through the study of such phenomena as (i.a.) raw material and product provenance, access to and control of resources, spatial distribution of production debris, and geographical patterning in object form and ornament (Hansen, Ashby and Baug 2015, 2).

Runic inscriptions, by their very nature as texts, allow for different insights than, for example, silk-embroidered shoes. They thus provide the opportunity to complement or contradict the pictures of town life emerging from analyses of other categories of finds. The main focus in this chapter is on combining the potential social/geographical implications of various **idionyms** and the texts they appear in with the archaeological classification/find location of the objects they were carved into to shed some light on the rune-carvers and to examine the use of runes throughout the development of **Björgvin**, following the request made by Hansen, Ashby and Baug (ibid.): “[W]e need to ensure that we do not overlook the people in our search for systems”. Little can be said about the rune-carvers as individuals, yet using their names and the kinds of texts they wrote can reveal something about which groups of people may have lived in/visited **Björgvin**. This is achieved via analysing the horizontal spatial distribution over the excavation area and the vertical distribution of inscriptions in time, while keeping in mind that numerous influences, not least varying levels of excavation in different units of the excavation grid, have impacted on the number of objects retrieved from each unit and therefore, observable patterns. This is mirrored in query formulation as well, when some objects are dated to more than one **period** or **building phase**. Depending on how the query is run, these will then appear twice/multiplied in result sets, which needs to be avoided by either

- using only **periods** as a reference point instead of **building phases** (an inscription dated to 5.1 or 5.2 still dates into **period 5**); this, however, requires adding another column in **CONPHASE**; or

- using a data subset respectively including or excluding all objects dated once/multiple times in any given query.

The first solution does not account for the possibility of an object being dated to, for example, 5.2 or 6.1 (*period* 5 or 6). This entry still is counted twice in queries taking only *periods* into account, which is acceptable, even required when comparing the total numbers of objects/*period* (Section 7.6).

The second option requires employing an *SQL-VIEW*-statement. *VIEWS* are virtual tables consisting of data subsets retrieved from the tables in the *DB*, and can be manipulated using the *SQL*-functions also used for manipulating tables. However, since they contain data subsets, they can be tailored towards a very specific purpose; in this case, I created two *VIEWS*, *datedonce* and *datedtwice* (Query H.4, H.5), to run queries separately for those two subsets. The latter needs manual checking to decide if and how the objects are to be included into any counts of totals, for example in a table such as Figure 7.20. This shows a steady rise in rune-inscribed objects until *period* 5, then a steady decline until 8. In terms of absolute numbers (Figure 7.14), the *period* between 1248 and 1332 yielded the most finds, closely followed by 4 (1198-1248). *Period* 6 (1332-1413), despite being almost as long as 5, yielded even fewer finds than 3 (1170/71-1198), and 7 (1413-1476) and 8 (1476-1702) counted considerably fewer objects.

However, it is risky to directly compare number of finds or even objects/year; the scarcity of rune-inscribed objects starting in *period* 6 is most likely a result of using machine-diggers to get to the lower layers. The scraped-off layers were not examined for small finds, which have consequently been lost. The lack of runic inscriptions should therefore not be taken as an indication for a scarcity of rune-inscribed objects during *period* 6 per se, although the case has been made that the German merchants from the Hanseatic kontor established on Bryggen from around 1350 (Helle 1982, 730-734) would likely not have made use of runes in the same way as Norwegians. The German merchants need not have made use of runes, though. The fishermen providing the Hanseatic merchants with their main commodity, stockfish, were Norwegians from further north; especially in the case of *owner's tags*, they could have stuck to their own tried-and-true system (Section 7.5).

A similar argument could also be made for *period* 7; 6, however, sees the outbreak of the Black Death in 1348/49 which decimated the population and radically changed life in *Björgvin*, in part by facilitating the Hanseatic merchants taking complete control of Bryggen by way of killing the Norwegian competition (ibid., 731). By the time *period* 7 begins after the fire in 1413, Bryggen is definitely under German control, so the scarcity of rune-inscribed objects should probably be ascribed to that. Another contributing factor might have been that the Black Death also killed a significant percentage of those familiar with runes, resulting in an overall smaller number of rune-users. Knowledge as well as usage may then well have disappeared over the course of *period* 7, so that when 8 began after the 1476 fire, they were no longer used.

Any definite conclusion when runes stopped being used by those living on Bryggen is difficult; sometime before and around 1476 appears to be the best estimate considering the Hanseatic merchants in residence (ibid., 730-732). Whether the same applies for other parts of the town, which were to a larger extent populated by Norwegians, and which have not yet been excavated, must also remain open. In any case, with 526 dated inscriptions and an approximation of 44 years as a duration of one *period* (Figure 7.14, calculated leaving out *period* 2 on account of its duration

Period/Building phase	Count of objects dated once	Count of objects dated twice	Total count	Objects / year
2.0	19			
2.1	2			
2.2	4			
Total <b>Period 2</b>	25		25	
3.0	70			
3.1	4			
3.2	18	2		
Total <b>Period 3</b>	92	2	94	3.5
4.0	118	3		
4.1	28			
4.2	11	1		
Total <b>Period 4</b>	157	4	161	3.2
5.0	62	1		
5.1	80	2		
5.2	29	6		
Total <b>Period 5</b>	171	8	179	2.1
6.0	20	1		
6.1	23	9		
6.2	7	4		
6.3	5	1		
Total <b>Period 6</b>	55	11	66	0.8
7.0	8	3		
Total <b>Period 7</b>	8	3	11	0.2
8.0	1	1		
Total <b>Period 8</b>	1	1	2	0.009

Figure 7.20. Number of objects carrying runic inscriptions dating to each **building phase**, based on **Query H.6**. Totals for **periods** are given minus those objects that, for example, are dated to 6.1 or 6.2 (**Query H.7**), which are only counted once. Objects dated to two different **periods** are counted once for each phase. The duration of **period 2** cannot be determined reliably.

being unknown and 8 because of it continuing until 1702; [Query H.11](#)), approximately 1.7 runic inscriptions per year were preserved; how many were actually carved is unknown.

## 7.6. Runes, objects and contexts

Bringing together the results from Chapters 5 and 6 and the archaeological information, it turns out that 12 inscriptions carrying [idionyms](#) date to different [periods](#) and are, consequently, counted once in each, while two are dated to different [building phases](#) and are only counted once for the [period](#) ([Query H.14](#), Table [H.1](#)). A full overview of how many and which [idionyms](#) are dated to which [period](#) can be found in Figure 7.21 and table [H.2](#) in the appendix, but as Figure 7.21 illustrates, [period 5](#) has the highest total count of distinct [idionyms](#), followed by [period 4](#) and 3.

Considering the overall number of objects per phase, that was to be expected, but surprisingly, only ten objects carrying [idionyms](#) date to [period 2](#), which totals 18 distinct [idionyms](#). In part, this is because one character sequence was normalised as three different [idionyms](#) (INS134, Table [H.3](#)), but also because one object carries seven distinct [idionyms](#) (INS14). This is a common occurrence; various lists of names appear in the material, also reflected in the numbers: the count of objects carrying [idionyms](#), even only considering interlocutor-[idionyms](#), already indicates that [idionyms](#) must appear on the same objects, and the count of tokens is even more indicative of this (Figures 7.21 and [H.26](#)). While that count is artificially boosted by considering every [normalisation](#) of a character sequence as a token in its own right, only eight character sequences according to NIYR VI, nine to SRDB and 21 to Markali 1983, carved into a total of 27 objects, were normalised as two or more different [idionyms](#).

Somewhat unexpectedly, less than half of the objects inscribed with runes also carry [idionyms](#), invocation or interlocutor. This raises questions about the purposes runes were used for – the Bergen material is generally known for the large number of [owner's tags](#), rune-sticks used to label (and perhaps keep apart in storage) goods. Yet considering the majority of rune-inscribed objects do not carry [idionyms](#), while others carry not one but several, it would appear that runes served a much greater range of purposes in urban society than marking ownership. While the system developed in Chapter 6 to tag runic inscriptions according to their text type/content is used later

Period	2	3	4	5	6	7
Count of rune-inscribed objects	25	94	161	179	66	11
Count of objects carrying <a href="#">idionyms</a>	10	37	71	66	30	5
Count of distinct <a href="#">idionyms</a>	18	49	87	107	37	7
Count of objects carrying interlocutor- <a href="#">idionyms</a>	10	35	70	58	19	5
Count of objects carrying invocation- <a href="#">idionyms</a>		4	3	12	11	

Figure 7.21. Count of distinct objects and [idionyms](#) by [period](#) ([Query H.16](#)). Note that objects and [idionyms](#) may date to/appear in several [periods](#) and are therefore counted more than once in this table ([Query H.17](#), [H.20](#), Tables [H.1](#) and [H.2](#)).



in this chapter to broaden the picture, the first survey focuses on **PNs** and potential implications for the potential social status of rune-carvers in **Björgvin**.

### 7.6.1. Townspeople

Evaluations/surveys of **Björgvin**'s population and its composition based on the archaeological evidence have been undertaken by a number of people, most prominently Hansen (2006, 2008, 2010, 2015a,b,c, 2016) and Mygland (2015b).<sup>9</sup> The analyses undertaken here work with the **idionyms**' potential significance concerning their bearers' social status and/or geographic origins (Chapter 5). Based on the archaeological data, these were mapped across the excavation space and time, with the relevant maps and tables showing distribution patterns, object classifications and all **idionyms** identified per object (Figures **H.7** to **H.24** and Tables **H.3** to **H.8**).

Another important table for this section is Figure **7.21**, presenting the total counts of distinct objects, **idionyms** and tokens thereof for each **period** by social-status-association. Objects/**idionyms** with broad dates which span two **periods** are included in this presentation in order to retain all possible information; they are marked in **bold**. Each group is referred to by its assumed social status despite these categorisations not being set in stone (Section **5.7**). Potential implications of the object type are also taken under consideration. For ease of reading, the groups are referred to by shorthand like in Chapter **6**: IH (Icelandic high-status), IL (Icelandic low-status), NH (Norwegian high-status), NL (Norwegian low-status), PSH (pan-Scandinavian high-status), PSL (pan-Scandinavian low-status).

Before looking at each **period** and its objects, it needs to be said that spatial comparisons within BRM 0 (regarding distribution into house rows) returned no meaningful results, although the house rows are indicated by different colours in the distribution maps in the appendix. The lack of results is most likely owing to the generally low numbers of objects used in this study, but as explained (Section **7.4**), it was impossible to normalise the data for all finds to the degree that would have allowed taking a larger group of finds into account, and the Gullskoen grid situation further complicated matters. Furthermore, since most of the objects originate from redeposited contexts, spatial comparisons between waterfront and back area are not as informative as hoped either. This survey is therefore mainly one of how the distribution of **idionyms** and types of inscriptions changed over the course of time.

### 7.6.2. Period 2 (ca. 1120-1170)

In **period** 2, 18 distinct interlocutor-**idionyms** possibly denoting 19 individuals appear in 10 inscriptions (Figures **7.21** and **H.7** and table **H.3**), most of which were found in the back parts of the excavation.<sup>10</sup> One or two of them (depending on the **normalisation** chosen) are classed as IH, seven NH and two more PSH, with one each in the low-status groups and seven without determinable social status (Figure **H.26** and table **H.3**, page **329**).

---

<sup>9</sup>Who I thank for providing me with a printed copy and digital versions of their maps.

<sup>10</sup>The number of individuals the **idionyms** belonged to can be calculated by using **Query H.26** on the basis of how many distinct *insnids* are logged. If the same **idionym** appears twice on an object, it will be counted twice, so these numbers are to be taken with a grain of salt.

NH- and PSH-**idionyms** prevail over IH, whereas the picture appears to be fairly even for the low-status **idionyms**. High-status **idionyms** count more tokens than low-status ones, unless the status-less **idionyms** are considered part of the low-status group (which may be the case, Section 5.7.4). More men of potentially high social standing are visible in runic inscriptions during **period** 2, suggesting either the physical presence or some connection of several men of high social standing to **Björgvin**. This ties in neatly with the hypothesis of plots being given to and owned by followers of the king (Hansen 2005), although several of the **idionyms** appear in the form of a list (INS14). The only female **idionym** for which potential social status can be assigned is PSL *Hallbjörg*, INS496. Following Mygland (2015a), this could indicate the presence of a female servant; however, discovery in general fillmasses underneath a passage does not support such a conclusion, and the same applies to *Hallkatla* on INS509, also a feminine **idionym**, which was found in the neighbouring unit N05.

This lack of information is characteristic for most of these inscriptions; coordinates are available for INS134, INS65, INS80, INS88, INS134, INS80, which are found in general fillmasses. Querying for surrounding/related structures, INS65, INS66, INS80, INS88 in addition return information, most of which is unspecific enough to suggest either redeposition or at least make it impossible to decide whether the context might have been primary. None of the **idionym**-carrying objects from **period** 2 can therefore be considered as having been found *in situ*.

In terms of the distribution maps, some explanation is in order to properly read Figures H.7 to H.9. Since so many of the objects lack coordinates, I used the grid squares as reference points. The presence of objects is thus indicated either (in cases where coordinates are available) by a geometric symbol on the map, for example a square or circle, or, for those without coordinates, their presence and count per excavation unit is indicated by the number shown in the unit in question. Overlap was avoided by means of only using one way to reference an object; if three objects are found in the same excavation unit, one of which has coordinates, the number in this unit shows “2” and the geometric symbol for a single find shows up in addition, adding up to three objects found in this excavation unit. A complete list of all objects, including a list of the **idionyms** they carry, can be found in the bespoke table for each **period**, including the excavation unit where they were found for easier cross-referencing (Tables H.3 to H.8).

Since the original aim was to compare patterns across the excavation area (which did not work as hoped), clarity and simplicity were given preference, meaning that the **idionyms** themselves are not displayed in the maps themselves, nor the *insids*; the tables need to be used alongside the maps. This resulted in an unexpected problem: the coordinates do not always place the objects in the same excavation unit as the grid reference does, for example INS543 (Table H.4 and fig. H.10). According to the coordinates, it was found in O03, whereas according to **CONUNIT**, it was found in P02. I gave coordinate placement preference over the unit with the justification that if they are available, coordinates are likely the more reliable source owing to the importance of runic inscriptions as finds. A note is attached where I have noticed this discrepancy in the tables, but I did not check for it specifically.

Where possible, maps show the distribution of several **idionym** groups combined to allow for better comparison of patterns, but owing to different **idionyms** appearing on the same object, this was often not possible. For example, Figure H.7 shows IH and IL combined, but with only three mapped objects, it is difficult to say anything about patterns. The most that can be said is that both IH-objects were found closer to each other roughly in the middle of the excavation

area, while the IL-object was found closer to the harbour area – this is the same object shown in Figures H.8 and H.9 in K11, which only becomes clear when looking at Figure H.7.

N- and PS-**idionyms** do not fare much better; they, too, count so few objects that no patterns become visible. Taken together, though, all interlocutor-carrying objects from this **period** appear roughly in the middle of the excavation area away from the waterfront. It is, however, not clear whether that is representative of the general distribution, or if it is due to excavation methodology; not all excavation units were dug to the same depth, not to mention that runic inscriptions were only recognised as important objects a few years into the excavation, resulting in an uneven spread of finds across the area.

Also, since the objects were redeposited, their location is only indicative of where they ended up after they had been moved from where they were used. The general availability of items required for rune-carving (a stick of wood and a knife) suggests that this activity could be carried out by people regardless of social standing and at very short notice. Yet people apparently cared to a certain extent about what kind of item they used. Many of the finds are small wooden sticks (more or less) carefully cut to offer four sides on which the runes are carved. While the level of skill varies, especially the **owner's tags** tend to be elaborate, either showing hooks or holes, by which means they could be fastened to something. Object type is noted in the tables alongside **idionyms** and house row-association (Table H.9). In order to single out those objects of particular interest, not every object is identified. That is mostly owing to the fact that in **period** 2, as well as the other **periods**, most of the objects are simply classed as “rune-stick”. The tables therefore only list object classifications other than “rune-stick”.

In **period** 2, INS103, INS134, INS65, INS66, INS80, INS88 are considered **owner's tags**, INS103, INS496 **tally sticks** (Table H.3). This could indicate that these objects were used in professional trading, and it is interesting to note that the latter stick carries the aforementioned *Hallbjörg*, raising the question of why a potentially low-status feminine **idionym** would appear on an item connected to professional trade. Several scenarios are conceivable: perhaps *Hallbjörg* was a professional tradeswoman, possibly on a small or local scale. Within the context of a rising trading town, it is however equally plausible that *Hallbjörg* was the recipient of goods, meant for her own or the household she was serving in. Since there is no information available about the kind of goods the tally marks refer to, it is not entirely unthinkable that she could have been a female servant overseeing a larger household. As such, she might have been in charge of the acquisition of goods for household purposes, similar to what has been suggested for *Lunaney* 5 **periods** later (NIYR VI, 111-112).

Reservations are in order, though. To begin with, tally marks and **idionym** need not be connected, or *Hallbjörg* could have been counting something else entirely.<sup>11</sup> There is no indication that the items being counted were trading goods. *Hallbjörg* need not have carved her name into the stick herself, either, or she may have reused a convenient piece of wood for her own purposes. So while the presence of a potentially low-status Pan-Scandinavian feminine **idionym** on a **tally stick** does open up for the possibility that said woman was somehow involved in the trading activities of the town around her, it is important to remember that more evidence is required for such a conclusion.

---

<sup>11</sup>The same also applies to other sticks carrying tally marks. While it is certainly more satisfactory to consider them as evidence of trade, this is not the only area of human activity where keeping count is important.

Since the majority of objects from **period 2** are identified as **owner's tags**, this is an important discussion. These items are generally considered connected to trading activities, but whether the trade was on a large or small scale, local or international must remain an open question. **Tally sticks** could be used for professional or private purposes, on big and small scales, since the activity of keeping count is hardly restricted to traders. Animal herders, for example, could have made use of them for the same purpose.

It is certainly very likely that at least some of the **owner's tags** and **tally sticks** used in Björgvin were connected to trading activities; at the same time, it is probably premature to assume that *all* of them, without exception, originate in that context. Still, the fact that most of the objects are identified as having served this purpose seems to indicate that **PNs** during **period 2** were mainly carved with the purpose of indicating ownership of something. The fact that most objects also carry only one **idionym**, or the same **idionym** twice, further supports this. The need to indicate ownership was apparently also more pronounced amongst those with a potentially high social status, although there are three lower-status **idionyms** in the group, one of them possibly Icelandic. *Glúmr* appears on **INS14** though, which not only carries almost half of all **idionyms** from this **period**, but is also indeterminable as an object. It is not recognisably an **owner's tag**, nor can it be considered a **tally stick**.

This and similar objects have been interpreted as lists of names, perhaps of a ship's crew (Liestøl 1964a, 15-16). If that is the case (and it is by no means beyond possibility) then said crew consisted almost exclusively of men carrying potentially high-status **idionyms**, excepting the aforementioned *Glúmr* and *Arnviðr*, whose potential social status cannot be determined at present. Considering this and the widespread practice of trading in a *félag* – basically a company – perhaps that is actually the best explanation concerning the purpose of this inscription, and this particular company consisted mainly of Norwegians judging by their **idionyms**. Wieske (2011, 88-98, especially 94, 98) however points out that a *félag* consisting of more than two partners is a rare occurrence, and that the laws regulating the partnership mostly apply to situations with two partners, not several, which contradicts this interpretation.

In conclusion, most of the **idionyms**-inscribed objects with runes from **period 2** appear to have been carved with the intention of signalling ownership, of what and to whom is difficult to determine, not least because all of the contexts they were discovered in are secondary.

### 7.6.3. Period 3 (1170-1198)

In **period 3**, a potential total of 48 individuals and their **idionyms** appear on 34 objects (**Query H.26, H.25**). The count of different **idionyms** totals at 44; several character sequences can be normalised in different ways (**Table H.4**). None of the **idionyms** from **period 2** reappear in **period 3**, and no low-status feminine **idionyms** appear. Still, examples for every group are present: *Eindriði*, *Þorgrímr*, *Finnr*, *Hálfðan*, *Ari*, *Rúnolfr*, *Arnbjörn*, *Þorvaldr/Þorvarðr*, *Arni* and *Erlendr* are classed as **IH-idionyms**, with *Ari* appearing two times and possibly denoting two individuals considering that the two inscriptions, **INS12** and **INS507** were found in excavation units **L08** and **M05** respectively. Both contexts are evaluated as secondary, however, with the objects found in general

fillmasses. The Ari referred to might therefore still have been the same individual.<sup>12</sup>

Additionally, INS12 also carries *Ólafr*. It is not clear whether that is a reference to Saint Ólafr (Section 5.5.4). If the Ólafr in question was not the saint, INS12 could be interpreted as representing trade or some kind of connection between a Norwegian and an Icelander, both of possibly high social status. Sadly, the object was not clearly identified, so there is no information to be gleaned from this.

None of the other objects except INS494 carrying *Arni* and INS297 were identified either. Excepting INS12 and INS297, none of them carries more than one **idionym**, though (provided that *Þúfa* on INS146 is a byname), which could imply that once more, the purpose of the inscriptions was to signify ownership of something, although that does not preclude that some of these inscriptions were carved out of boredom and/or a wish to exercise one's rune-carving skills. In the case of INS494, it is likely that Arni was trying to mark his property, since this item is identified as a wooden knife, and in the case of the second Ari on INS507, it was carved into a rowlock pin. These inscriptions do not suggest an accident or something done out of boredom.

INS297 features the exception insofar as the IH-**idionym** appears once more in a list similar to INS14 from **period** 2, where the odd one out is IL *Glúmr*, while the rest points towards several Norwegian men of potentially high social standing, perhaps all part of a *félag*. In INS297, though, there are more exceptions than recognisable rules. Not only does the inscription feature **idionyms** from high-status groups of both countries, but potentially also one feminine NL-**idionym**, *Arnbjörg*, PSH *Heinrekr*, which could indicate a foreigner, *Bubba/Poppe*, which poses a problem to scholars, and two or three, depending on normalisation, **idionyms** with no currently determinable social status. The occurrence of so many **idionyms** potentially denoting high social status of name-bearer and a feminine **idionym** in the middle of a list of masculine **idionyms** (regardless of **normalisation**, *Agnbjörg/Arnbjörg* are both feminine) makes one wonder what this group of people could have had in common for their names to be inscribed in the same shard of, interestingly, ceramic.<sup>13</sup> In other words, it is harder to interpret this particular inscription as a group of men making up a ship's crew/*félag*,<sup>14</sup> further confounded by this "list" being carved into a ceramic shard. A ship crew appears unlikely; an alternative solution could maybe be a customer list? Or, perhaps a bit beyond what we imagine to be possible, a list of attendants at a certain event, where one attendant for some reason decided to note down the names of all those present? The inscription is difficult to place in a trading context. Excavation documentation reveals nothing more than that the shard was found north of a caisson at the same level as an undefined layer of beams in a drip, most likely a redeposition, and not providing any additional information to help solve the mystery.

None of the other contexts can be considered a primary context either, mostly because they were discovered somewhere close to a caisson or foundations, without there being enough evidence to definitely tie them to this particular structure (Section 7.2.2.) Objects carrying IH-**idionyms** were found almost all over the excavation area (Figure H.10), perhaps indicating both presence of Icelanders and interactions with the local Norwegian population. The distribution is not due

---

<sup>12</sup>Inscriptions carved by different hands, but carrying the same **idionym**, are often considered as referring to two individuals of the same name. In actual fact, they could as well refer to the same individual and carved by two different people.

<sup>13</sup>The object identification from B\_Gjenstand identifies it as "kar", vessel.

<sup>14</sup>Even if there was no restriction in terms of geographic origin of the partners (Wieske 2011, 97-98).



to **period 3** not having been excavated to the relevant depth in the back of the excavation area, either. Perhaps some storage rooms for goods and wares were further removed from the harbour than others, for excepting *INS494*, the wooden knife, the other objects found so far back appear to be **owner's tags**. This is also the case for the only inscription carrying an **IL-*idionym***, *INS83* with the already discussed *Eldjarn/Eldiárn* (Section 5.7.1). It was found in redeposited fillmasses under building 35, and whether its original owner was a local carrying an ***idionym*** that simply never made it into the diplomas in Norway, or – considering the potential social status – an Icelandic sailor visiting *Björgvin*, or even a local of mixed background, must remain open. There is no indication that this inscription and *IH-Erlendr*, potentially also discovered in *O03*, were connected.

Sixteen tokens of **NH-*idionyms*** date to **period 3**, four of which are *Ása* (f). Why so many and only *Ásas* appear in this, comparatively short **period** (27 years) is a mystery. The ***idionym*** only appears on five inscriptions in total, and the last one dates to **period 5**.<sup>15</sup> This distribution brings to mind a certain fashion amongst the inhabitants, or an otherwise unprecedented influx of *Ásas* into town. Since the ***idionym***, despite being feminine, sorts into **quartile 3** in DN, the name-bearers in this case could have been women of fairly high social status rather than servants, although their distribution in neighbouring or nearby excavation units (*M08*, *K09*, *L08*, *L05*) might also indicate that *Ása* was the same woman. The find locations in secondary contexts in the waterfront area suggests that the objects were redeposited in the process of waste disposal. *INS609* carries a declaration of love presumably meant for *Ása*, unless someone was quoting, whereas most of the other inscriptions were not interpreted beyond identification of the ***idionym***. Ultimately, it is impossible to decide whether **period 3** provides evidence for four different *Ásas* who, apparently, all knew how to carve runes, or at least had admirers who could, or one or two *Ásas*, who may or may not have been neighbours.

The masculine **NH-*idionyms*** are *Þorkell*, *Eysteinn*, *Ólafr*, *Sigurðr*, *Þorsteinn*, *Gyrðr*, *Qnundr*, *Þórir*. Reservations are attached to one instance of *Þorkell*, *INS413*, where the character sequence in question could also be normalised to *Þorkatla*, a feminine **PSL-*idionym***. Considering the difficulty of deciding on an interpretation when the name-bearer in question might either be a Norwegian man of possibly high social status or a Scandinavian woman of (potentially) low status, nothing definite can be said.<sup>16</sup> That this particular inscription is written down on a piece of bast or tree bark could indicate that it was carved as a result of boredom, which, however, does not help narrow down the gender of the name-bearer. With the context being redeposited fillmasses at almost 3m below sea level, nothing can be deduced from its location either.

*INS424* provides insight into the political machinations of the time and mentions an *Ólafr*, presumably a contender for the Norwegian throne, which fits nicely with his ***idionym*** indicating high status.

The next-most-often used **NH-*idionym*** in this group is *Sigurðr*, appearing three times and once in connection with another **NH-*idionym***, *Þorsteinn*, on *INS152*. This object, while not identified as such, appears to be an **owner's tag**, making one wonder why two names were carved into it; a “twin” inscription, most likely also carved by the same person (*NIYR VI*, 212), dates into **period 4** (*INS153*). The other two *Sigurðs*, judging by hand-carving, are not the same man;

<sup>15</sup>The sixth occurrence is marked invocation.

<sup>16</sup>Other than for *INS156*, where both possible normalisations are classed *IH*.



then again, considering the popularity of the **idionym**, that is hardly surprising.

While more NH-**idionyms** appear on objects with other **idionyms** than in the prior group, there is still a marked tendency for them to appear by themselves. Apparently signalling ownership was still an important factor in why runes were employed. That NH counts the most tokens (and inscriptions) is hardly surprising, but in combination with IH-**idionyms**, it appears that once more those of potentially high social status have left more of a mark in runic writing than those from the lower social scales (disregarding, for now, those **idionyms** for which no social status could be determined). Like IL, NL only features one token/inscription, the already mentioned Arnþjórg in INS297.

Opposed to this is the group of six PSH-**idionyms**, adding yet more tokens to the high-status group. Three of them are feminine, *Sigríðr*, *Ingibjörg/Ingibiörg* and *Margrét(a)*, only the last of which appears together with one of two PSL-**idionyms** on INS539, *Halli* (the other PSL-**idionym** is the potential *Þorkatla* on INS413). The other two, like the Ásas, appear by themselves. Women carrying **idionyms** with high-status connotations, based on these inscriptions, may well have been active rune-carvers/-users in Björgvin, although they, too, might have used them mainly to signal ownership considering that Sigríðr's object was potentially a needle.

Of the three masculine PSH-**idionyms**, two appear in the already discussed INS297, while *Björn/Björn* gets an inscription by himself. It has no information except a z-coordinate attached, which puts depth of discovery at 1.45m. Theoretically, this could therefore be an *in situ*-context, but with all relevant information lacking, it is impossible to decide. None of the other objects can be considered as originating from a primary context either.

Much like the IH-**idionyms**, objects carrying NH-**idionyms** distribute across most of the excavation area (Table H.4), resembling the distribution patterns of IH and PSH, although NH- and PSH-**idionyms** can be found further back than IH. Very little can be said concerning differences in distribution between periods 2 and 3; in period 3, the **idionym**-carrying objects are more evenly spread across the whole area, but it is difficult to decide what that may be owing to.

In period 3, high-status **idionyms** regardless of country allocation make up the largest group, although the not inconsiderable number of **idionyms** currently without country/status-allocation should not be forgotten. Tokens of NH- and IH are almost at the same level. Surprisingly, the number of feminine **idionyms** rises considerably from period 2 to 3, with period 2 having two feminine tokens in total and period 3 counting potentially 9 feminine **idionyms** where social status can be assigned and a further 5 where it cannot (Tables H.3 and H.4). The feminine **idionyms** are also almost exclusively high-status **idionyms** in DN, raising the question of who these women might have been and why they suddenly become visible in runic inscriptions.

#### 7.6.4. Period 4 (1198-1248)

69 objects date to period 4. They carry 128 tokens of 86 different **idionyms** belonging to potentially 114 individuals (Query H.25, H.26, Table H.5 and figs. H.14 to H.16). 24 tokens on 18 inscriptions are classed IH-**idionyms**, of which three are feminine. As visible in Figure H.14, most of them were retrieved in the front parts of the excavation, mostly in connection with caissons in the harbour area, although INS69, carrying *Brandr/Vébrandr*, found north of a common passage, may be from a primary context. However, the primary context being a common passage, the object may have been lost/thrown away just as likely as used there.

A few **idionyms** appear several times, for example *Arni*, counting six tokens on five inscriptions (INS58, INS62, INS472, INS512, INS350). Whether they refer to the same person must remain open, although considering the length of **period** 4 (50 years), they probably refer to different men, possibly Icelandic long-distance traders (page 119), although the second character sequence on INS62 likely reads *Arni* as well and references the same person. This, and the tokens on INS472, INS512, are not identified with certainty, so perhaps the count of tokens is actually lower than suggested here.

The choice of one **normalisation** over the other results in a shift in interpretation, since the alternatives are not only different **idionyms**, but also change the gender of the name-bearer from male to female. Particularly in the case of INS472, the feminine **idionym** is a likely alternative since the inscription also sports two other feminine **idionyms** and *Sigurðr*. Again, that raises the question of why these **idionyms** would appear on the same object; was it a customer list, a list of debtors, an overview of someone's tenants or perhaps even the beginnings of a guest list for some social event? Similar considerations concern INS304, which in addition to the feminine IH *Þorbjörg* carries four masculine **idionyms**, one or two of which are NH. Again, a feminine **idionym** appears in conjunction with masculine **idionyms**, a phenomenon already observed in **period** 3. It recurs on INS382, INS384, INS110, INS412 in **period** 4 (on condition that the feminine **normalisation** is correct).

Numerous occasions in daily life can require writing down a list of names including both genders, and guessing at the background behind these particular ones is likely a futile endeavour. Heðinn from INS304 may only have been looking to practise his skills by carving the names of people he knew. However, it is interesting that the IH-**idionyms** now occur so frequently in combination with **idionyms** from the other categories, although there are still several objects on which they are the only ones. Are Icelanders becoming more involved in the goings-on in **Björgvin**? Are they immigrating back to Norway? INS101, carrying another example of what could be the result of an Icelandic-Norwegian marriage, could point in the same direction (page 118). All things considered, though, there is too much uncertainty regarding especially the geographical aspect of Category-1a-**idionyms** to assume anything the like.

The last *Arni*-token from this **period** appears on INS350 in a list of masculine **idionyms** spanning almost the whole range of categories except IL and NL. This list does not include a feminine **idionym**, but more tokens of IH-**idionyms**, *Erlendr*, *Finnr*, *Kolbeinn*. Again, it was interpreted as a counting up of the whole crew of a ship (Liestøl 1964a), and if correct, it strikes one that almost all of the **idionyms** can be considered high-status in their respective groups. Or should this rather be considered as a sign that these **idionyms** were also popular amongst all social levels? Or does this have anything to do with the rise in status of rich merchant families and the aristocracy taking an interest in trade (Section 7.6.8)?

If this inscription refers to a joint business venture or the crew of a ship, not only was it “bi-national”, but the members of it were potentially of fairly high social standing, even considering the two low-status and the one non-status-associated **idionym**. Considering that a *félag* generally only includes two partners (Wieske 2011, 98), other interpretations than a crew list could also be taken into consideration; a list of supporters for one of the political factions of the time? A list of trust-worthy allies living/trading in **Björgvin**? Historical sources state that the townspeople had their own opinions concerning the various contenders for the Norwegian throne, and could and would support their favourite candidate even if the opposing faction was currently holding

the town (Helle 1982, 156-157). Presumably, the powers that be would therefore have a keen interest in knowing just who they might turn to when in need of support, or who to stay away from.

This is far from even being a hypothesis and can by no means be proven, regardless of what the social status of the *idionyms* or INS424 may seem to imply. It should merely be understood as a thought experiment, a suggestion for why a person might feel the need to note down so many names of men who may have wielded power of some sort; *period* 4 certainly encompasses a turbulent time in Norwegian history.

Despite so many of the IH-*idionyms* appearing in inscriptions listing more than one *idionym*, 10-12 objects only carry one IH-*idionym* (depending on whether two tokens of the same *idionym* refer to the same person), indicating that while runes during *period* 4 were apparently increasingly used to compose lists of names for whichever purposes, signalling ownership remained a reason for making use of runes amongst those carrying IH-*idionyms*. In terms of distribution across space, the *period* 4 IH-*idionyms* cluster in the front part of the excavation, mostly the waterfront (Figure H.14), whereas in *periods* 2 and 3, they spread relatively evenly across the map. The purpose of inscriptions carrying IL-*idionyms* appears much clearer based on the fact that three use the verb *á*, “owns”. INS119 even clarifies that Ragnarr’s ownership concerns certain threads, whereas the others have (sadly) not felt the need to elaborate. Þorbergr, however, informs readers that it was him who carved these runes.

Compared to the two prior *periods* with only one IL-*idionym* each, the count has risen, and the objects were found mostly in the middle and towards the waterfront. With only one example from *periods* 2 and 3 and five from 4, statements about changing distribution patterns cannot be made. None of the objects were identified as anything but a rune-stick either, so presumably these inscriptions were meant to serve as *owner’s tags* or a writing exercise.

The group of NH-*idionyms* counts 40 tokens on 23 objects. Only one of them, *Guðrún* on the already mentioned INS384, is feminine, and appears with *Eiríkr* (also NH) and a feminine PSH-*idionym*, *Sigríðr*. Since name lists were discussed above, it should suffice to note that once more, all *idionyms* appearing in the inscription in question sort into the high-status groups. Provided the masculine *normalisation* of the *idionym* is the correct solution, INS382 offers another instance of IH-*idionyms* appearing together with NH-*idionyms*, although the purpose of this inscription is unclear; the same goes for INS304, although in this case, the IH-*idionym* is feminine.

The twin of INS152, carrying another token of *Sigurðr* and *Þorsteinn*, is dated to *period* 4, raising the question of whether one of these objects was dated to the wrong *period* or the two men in question just happened to be active in *Björgvin* before and after the fire. As far as the inhabitants were concerned, the fires were short-term events meaning a nasty disruption of their daily lives and routines, not a cut-off point. People survived these fires, rebuilt and commenced their usual activities at the earliest possible opportunity. With no evidence that the two objects – which also look very much alike – are dated to the beginning of *period* 3 and the end of 4 respectively, which would separate them by at least 70 years, there is therefore more reason to assume that these two men represent the (presumably large) group of inhabitants whose lives and usual activities were interrupted by the fire and who returned to rebuild. Since both *idionyms* are NH, they might have been locals rather than traders who only occasionally visited, although the objects being *owner’s tags* could mark them as traders living in other areas of Norway.

Once more, ownership and business correspondence appear predominant topics in this group.

OWN á frequently occurs, and 14 objects carry only one **idionym**, although not all of them necessarily indicate ownership. INS49, for example, bears witness that one Þorkell sent someone pepper. Once more, the majority are only classed as rune-sticks, so presumably did not serve any purpose beyond being an inscription carrier.

INS478 is the (in)famous order for weapons or ships by the crown prince (page 136), while INS492 was carved into what might have been part of a hammer; all the more mysterious because two NH-**idionyms** appear on it, *Auðun* and *Þórðr*, rendering ownership marking questionable.

Two contexts could potentially be primary, INS77 and INS81, although both were found in a thoroughfare, so even if the context is indeed primary, they could have been lost there. Interestingly, they both carry the **idionym** *Eiríkr* and if both inscriptions refer to the same man, he could have lived along the passage in question; one object was found in K12 and the other in L05, though, a fair bit apart. Most likely, the inscriptions have nothing to do with each other.

Much like the IH-**idionyms**, the objects carrying NH-**idionyms** are found mostly close to or at the waterfront. It also appears that the NH-carrying objects have shifted from the left to the right side of the excavation area. There are not enough data points for NL-**idionyms**, of which there is only one in **period** 4, just like in the preceding **periods**, especially since the **normalisation** is uncertain (INS304).

Eight objects carry inscriptions with nine PSH-**idionyms**, two of them feminine: *Sigríðr* in the already mentioned INS384 and another in INS126, where the **idionym** appears by itself. It is the only object to be found in a lavatory, into which it may have been thrown after it had fulfilled its purpose as an **owner's tag**. Of the group, four **idionyms** appear alone, the others always group with NH-**idionyms**. In comparison to **periods** 2 and 3, PSH-**idionyms** distribute more evenly, although given the larger number of inscriptions dating to this phase and its longer duration, this does not have to mean anything. What apparently remains the same is that about half of them are found along the waterfront, while the other half was discovered in excavation units at the rear end of the house rows. The same cannot be observed for NH- or IH-**idionym**, and neither does it hold true for PSL, which only has four objects carrying five PSL-**idionyms**, provided *Vébrandr* is the right **normalisation** for INS69. Three of the other four are *Einarr*, although their appearance on three different objects renders it unlikely that they refer to the same man. The last one is *Styrkárr*, appearing on INS350 together with one token of *Einarr*. There is no preference for the rear, middle or waterfront parts, but the nature of their contexts still suggests redeposition.

Like in **periods** 2 and 3, high-status-**idionyms** have more individual tokens than the low-status-groups, with a substantial count of **idionyms** with no social-status-association. Interestingly, **idionyms** now appear to group according to social status; one look at Table H.5 shows that quite a few of the undefined tokens stand by themselves, while especially the high-status-**idionyms** frequently appear side-by-side in lists, in which case **idionyms** of both genders are often combined as well. It is difficult to draw any conclusions regarding the purpose of those lists other than that **idionyms** associated with high social status dominate the material.

#### 7.6.5. Period 5 (1248-1332)

In **period** 5, 82 **idionyms** counting 105 tokens appear on 56 objects, possibly referring to 94 individuals (Query H.25, H.26, Table H.6 and fig. H.17). Most of them are simply classed as “rune-stick”. 18 are IH, one of which is feminine, *Þorbjörg*. It appears with three masculine

**idionyms** on INS304; other than in **period 4**, most of the IH-**idionyms** now stand by themselves in inscriptions. Not counting INS304, they appear with other **idionyms** in only three instances, INS40 (possibly an invocation), INS53 and INS549. Theoretically, INS304 also belongs to this group, but dating being uncertain, it was already discussed (page 184).

INS53 and INS549 are lists, with INS53 almost certainly counting up debts. Apart from the **idionym** of the potential signatory Vígi, all listed **idionyms** belong to high-status groups, and so do most of the **idionyms** on INS549.<sup>17</sup> This follows the trend already observed in **period 4**. INS566 only shows two **idionyms**, so is hardly a list, but also here, an IH-**idionym** appears with an NH-one. Again the group includes several objects carrying *á*, thereby recognisable as **owner's tags**. Three objects breaking the pattern of either being classed as rune-stick or **owner's tag** are INS40, a cross possibly used for private worship (NIYR VI), INS566, which mainly differs in material (stone), and INS231, identified as a toy boat and carrying *Illugi*, which sorts into IH. Since the object is a toy, it is much harder to accept that Illugi was merely paying Björgvin a visit; a very tentative conclusion could be that Illugi may have been the result of an Icelandic-Norwegian marriage. The majority of the objects are now found in the eastern/right half of the excavation area and closer to the waterfront (Figure H.17).

Only four **idionyms** dated to **period 5** are IL, and in the case of INS71, INS141, INS56, they may be normalised as other **idionyms** (Table H.6). While for INS71, INS56, the alternatives are **idionyms** without status association, the alternatives for INS141 indicate a Norwegian of either high or low social status; a decision cannot be made, nor can the object serve to support an argument. The only inscription without doubts about the **idionym** is INS328, and this particular instance possibly does not refer to an actual person. Considering these complications, and while the distribution is mapped in Figure H.17, there is little point in attempting to read anything into the distribution pattern.

Again, most tokens in **period 5** are NH, counting 36 tokens on 30 objects, two of which are feminine, INS216 *Ása* and INS239 *Jórunn/Iórunn*. Either appears in a list, *Ása* with a masculine and a feminine PSH-**idionym**, while *Jórunn/Iórunn* is grouped with three more feminine **idionyms**, one PSH and the other two non-status-associated. Considering there was no lack of *Ásas* in **period 3**, it is surprising that the **idionym** appears to skip **period 4** completely and then only appears once in 5. There is too little evidence to draw conclusions along the lines of the **idionym** falling out of favour; it is much more likely that either fewer women were active on Bryggen in **period 5** or that the evidence was destroyed.

**Period 5**, however, yields an important find regarding the question of women on Bryggen: the only list composed of only feminine **idionyms**, INS239. In addition to NH-*Jórunn/Iórunn*, PSH-*Ingibjörg/Ingibiörg* and non-status-associated *Bótbíldr*, *Hallkatla* appear. A customer list is once more an option, but the inscription was interpreted in full; it is therefore difficult to say anything more about it. A writing exercise is another explanation; perhaps one should also consider the notion that these lists could be an overview of servants connected to a certain household, or the names of tenants? Mygland (2015b) lists various evidence for single women living in and renting rooms in houses on Bryggen, so this could be an explanation.

Many of the masculine NH-**idionyms** in Table H.6 appear to be **owner's tags**, although they frequently appear in conjunction with other potential high-status-**idionyms**. Except for one list,

<sup>17</sup>Although in one case the right **normalisation** might be either undetermined or NL.



INS549, recording the patronymics of the men alongside their names, there is nothing in particular that catches attention. The combination of patronymics and given names, however, allows for speculation: Erlendr Birgissonr, Sigurðr Helgasonr and Þorfinnr/Þorgarðr/Þorviðr Narfasonr do not only carry given names potentially indicating high social status, but their fathers do as well. The trouble is that in the case of Erlendr, his given name currently sorts into IH, while the patronymic is NH. Depending on which **normalisation** is correct, Þorfinnr/Þorgarðr/Þorviðr Narfasonr presents a similar problem (page 118). Only Sigurðr Helgasonr shows no such contradiction.

There is no conclusive answer to the question of where exactly these men hailed from, although it might have played an important role when the inscription was carved. **Period 5** starts after the 1248-fire, seven years after Snorri Sturluson was killed due to his quarrel with Hákon IV, who brought Iceland under Norwegian rule against Icelandic protests. Icelanders could not avoid **Björgvin** regardless of the political situation owing to its importance as a port. Perhaps two of the three men from INS549 were Icelanders with a Norwegian or Norwegians with an Icelandic background, and had reason to be in **Björgvin** on account of politics. Why their names were noted down together is anyone's guess, although the location in Q02, almost at the very rear end of Gullskoen close to St. Lawrence's under building 52, may imply that this inscription was lost there rather than redeposited.

The overall distribution of NH-carrying objects both resembles and contradicts the IH-distribution, since NH-objects cover a larger area (Figure H.18). They particularly appear to cluster in I-K 04-05 and H-G11. A single object was found in what can be considered a primary context, INS228 carrying *Lafranz* in building 368, again close to the Church of St. Lawrence. The other contexts are all redeposited, and often from below sea level, where they likely ended up as redeposited fillmasses. The empty excavation units at the back are a familiar phenomenon and the pattern for the most part corresponds with the observations in **period 4**, although the units in question have shifted.

NL-**idionyms** appear on four objects, INS447, INS304, INS141, INS549 (Figure H.19). Like the IL-**idionyms**, their **normalisations** are not certain; they could also be N/IH-, IL or non-status-associated **idionyms**. If their **normalisation** as NL-**idionyms** is correct, two appear by themselves and the other two in lists. Again, the numbers are too low to be talking about patterns.

PSH-**idionyms** are, once again, the third-largest group by count of token with 11 on as many objects (Figure H.26). Three of them are feminine; INS216 and INS239 were already discussed in relation to their associated **idionyms**. *Margrét(a)* appears on INS40, the same cross as *Benedikt*; it may be an invocation. Of the seven masculine PSH-**idionyms**, only INS93 *Guðmundr* and INS173 *Ió(h)an/Jó(h)an* appear by themselves, while INS158, *Heinrekr* keeps company with *Qlrekr* and possibly indicates a foreigner (Table H.6). INS470 carries three PSH-tokens, *Guðþormr* and two times *Jón*. This is interesting, as the high-status-**idionyms** generally mix in lists, and this inscription is tagged with “sex” (Section 6.3.5). Similar to IH-**idionyms**, the objects carrying PSH-**idionyms** cluster close to the waterfront. One object in particular needs to be mentioned: INS173 *Ió(h)an/Jó(h)an* was carved into a walrus skull. Most likely this, too, is an expression of ownership, although what the purpose of keeping the skull was, must remain an open question.

PSL has only one token, *Þorkatla* on INS149, and again the **normalisation** is doubtful.

The distribution of **idionyms** dating to **period 5** shows, once more, a dominance of potentially high-status-**idionyms**, with NH leading, IH coming in second and PSH third in terms of tokens.



This has not changed in comparison to the preceding **periods**, but the spatial distribution has, with IH and PSH moving more towards the right side and clustering closer to the waterfront, and NH generally distributing more evenly on the east-west axis. The empty units at the rear of the excavation prevail with only a few exceptions. With most of the contexts redeposited, this is likely due to more fillmasses ending up in the caissons due to increased building activity, and the longer duration of **period 5**.

#### 7.6.6. Period 6 (1332-1413)

24 **idionyms** counting 28 tokens appear on 19 objects in **period 6**, three of which are feminine (Table H.7, Figures H.21 to H.23). They potentially denote 28 individuals. Five tokens are IH; *Kolbeinn* appears twice in INS258 and may refer to the same man. *Erlendr* and *Yngvildr* appear by themselves on INS460 and INS214 while *Hákon* shares INS404 with the non-status-associated *Gunnar* and PSH-*Jón*, which likely refer to historical Norwegians (Liestøl 1964a, 11, 1968, 25). That leaves *Kolbeinn*, *Erlendr* and *Yngvildr* as potentially Icelandic rune-carvers in **period 6**; INS460 was found in a possible primary context underneath a passage covering, furthest back in the excavation area (Figure H.21 and table H.7). The inscription, perhaps an **owner's tag**, may have been lost there, possibly as goods *Erlendr* owned were transported to or from storage, or it could have been thrown away.

The other inscriptions are much closer to the waterfront, although four inscriptions do not a pattern make. **Period 6** is also one of the phases where mechanical diggers were employed in many units, so many finds were lost; any observable patterns are even less reliable than those in other **periods**.

Only INS463 *Vémundr* from IL dates to **period 6**, in connection with *á*, indicating an **owner's tag**. It was found in M06 (Figure H.21) underneath a passage, the same kind of potentially primary context as before, suggesting it may have been lost during transport or thrown away after use.

Eleven NH-tokens on eight objects date to **period 6**; INS200 carries two tokens, alternatives for the same character sequence in yet another list. The same applies to INS51, where *Gunnarr* and *Qgmundr* appear with *Helga/Helgi*. Either is categorised NH, so it is merely a question of gender. Considering that the other two **idionyms** are masculine, *Helgi* seems more likely, but other objects show masculine and feminine **idionyms** in the same list. There is therefore no reason to prefer the masculine over the feminine **normalisation**.

INS440, *Sigurðr* is carved into a handle, possibly also meant as a sign of ownership. Conversely, INS220 was carved into a wooden splinter, indicating perhaps boredom as the primary carving motivation.

Trends apparently continue: **idionyms** appear either by themselves, probably as ownership markers, or in combination with other potential high-status-**idionyms** in lists. Yet no inscription in **period 6** combines IH and NH, only the combinations NH/PSH or IH/PSH appear. Considering the much smaller number of inscriptions retrieved, that might not mean anything, and the same applies to the pattern observable in Figure H.22, which shows objects carrying NH-**idionyms** exclusively at the front of the excavation area with one cluster in Bugården.

No NL-**idionym** is dated to **period 6** (Figure H.26), although both IL and PSL are present, even if their numbers are low.

Yet five PSH-**idionyms** appear on five objects, one of which is feminine *Ingibjörg/Ingibiörg* (by itself) on INS531.<sup>18</sup> All of the contexts are redeposited. Figure H.23 shows that the objects are found in vastly different areas, with any patterns likely strongly influenced by mechanical diggers and the overall smaller number of finds from this **period**.

As mentioned, INS200 carries a list of masculine **idionyms**, one of which is categorised NH. INS404, also mentioned, is a prime example for the identification of the actual name-bearers indicating Norwegians regardless of country allocation, although their high social status, in this case, is beyond doubt. INS173, the walrus skull, was discussed already, and the last token, *Jón*, appears by itself on INS5. Three of the five objects carrying PSH-**idionyms** were therefore some sort of ownership marker, one a list and the last an unfinished letter.

Only three PSL-tokens are dated to **period** 6, two times *Einar* on INS324 and *Halli* on INS223 (both masculine), found close to the waterfront in L06 and 09. The *Einar*-tokens presumably refer to the same man, especially since the byname corresponds. Conversely, Halli is carved into part of a wooden vessel, presumably also as an ownership declaration.

With the removal of many parts of the layer by mechanical digger, what evidence there might have been was lost, and the remaining objects indicate no substantial changes compared to prior **periods**. Most objects were discovered close to or directly at the waterfront, only one object towards the rear in P04.

#### 7.6.7. Period 7 (1413–1476)

Only five objects carrying seven **idionyms** potentially indicating seven individuals appear in **period** 7. One of them is feminine, the (perhaps foreign or of mixed background) *Lunaney*, whose name appears in connection with another foreign **idionym**, *Ótto*. While the **idionym** is most likely German in origin (Johnsen 1987, 723), it was apparently used frequently enough in Norway to appear in NL. Two objects, INS256, INS223 could also be dated to **period** 6, where they were discussed.

INS155 is the only (more or less) certain NH-**idionym**, in combination with the already mentioned *Lunaney*, *Ótto* and the non-status-associated *Gunnarr*. If INS256 dates to 7 rather than 6, then two NH-**idionyms**, one NL- and one PSL-**idionym** appear. There are so few inscriptions from this **period** though that it is hard to say anything more but that the majority is masculine, more **idionyms** appear by themselves and inscriptions mentioning more than one individual date to it as well. Judging by the content of the inscription, Lunaney was perhaps a wife or landlady on Bryggen capable of conducting business on behalf of her husband/tenant (NIYR VI, 111–112). The inscription is interesting since it puts a woman in a trading/business context, although whether Lunaney was asked to do so on a regular basis or only infrequently is not clear.

With only five objects, and one of them carrying a non-status-associated **idionym**, looking for distribution patterns is pointless, although Figure H.24 shows the distribution.

---

<sup>18</sup>INS173 was discussed in **period** 5.

### 7.6.8. Merchant rune-carvers?

The preceding survey may result in the impression that using runes in Björgvin was to a great extent tied to being part of a group holding comparatively high social status. This shall be discussed briefly before moving on to the last part of the analysis. As mentioned elsewhere (for example Sections 5.2, 5.3 and 6.4), the corpora used for the comparison are diplomas written in Latin/OWN for and by a certain part of medieval society. Since it is rather difficult to properly pinpoint who would have belonged to that part of society and which social status they would have held in the eyes of their contemporaries, “social status” in this thesis is also fairly vaguely defined – a problem impossible to avoid on account of the lack of studies analysing the potential social status of those mentioned in the diplomas. It is generally accepted that from the 10<sup>th</sup>/11<sup>th</sup> century onwards merchants gained not only in wealth, but also in political influence and social status to the point where they were regarded as a distinct social group (for example Loveluck 2013; Hirschmann 2016; Carocci 2011), and it is tempting to consider the runic inscriptions as evidence of this, or more precisely: as indicators for the upwards social mobility of merchants.

There are, however, two problems with using the runic inscriptions as evidence for both merchants and upwards social mobility of this group. One is the current state of research into upwards social mobility of specifically Norwegian/Icelandic traders/merchants. While not the primary focus of his work, social background and (potential) social mobility of merchants are discussed in Wieske (2011, specifically 55-88).<sup>19</sup> Johnsen (1987), too, discusses the social background of the merchants, but it is never quite clear who she considers part of the “merchant” group; once she mentions that we lack testimonies by the traders themselves (ibid., 734), but conversely also writes that those levels of society in need of some sort of script used runes, and also quotes INS478 while arguing that the crown prince was not part of the mercantile group on Bryggen (ibid., 717, 726). Other authors as well touch upon the social status of merchants in OWN society, frequently reaching the conclusion that, while those from the lower levels of society could participate in trade, in Norway, Iceland and possibly Sweden and Denmark it was from the start dominated by comparatively rich landowners (Ebel 1987, 272; Wieske 2011, 56-59, 60, 69) – precisely the group of people we also find in the diplomataria (Section 5.2.2).

These statements in themselves are confusing at best, contradictory at worst, especially against the backdrop of written sources in the form of diplomas and sagas attesting that the king and his men as well as clerical personnel took part in trade and, in some instances, even accompanied their goods on the journey (Wieske 2011, 60, 66-69; Ebel 1987, 272, 275-277). It is possible that what Johnsen (1987, 726) *actually* means is that the crown prince, despite clear evidence that he, by extension his father King Sverrir, are partaking in trade, is not part of the group of *professional* merchants on Bryggen. However, again one encounters the problem that written sources, in particular sagas, indicate that men close to the king are undertaking extensive mercantile journeys, which in turn means that the definition of “professional” merchant is more than vague; this is not made easier by sources mentioning several types of traders/merchants (Wieske 2011, 61, 70-74).

There appears to have been a distinction between men of high social status undertaking mercantile journeys for a variety of reasons and professional merchants based on the fact that in some of the sources, merchants are mentioned specifically as a group, sometimes also as being in the

---

<sup>19</sup>This is only one aspect; the Magisterarbeit primarily focuses on determining whether the commercial revolution can also be attested for Norway and Iceland.

service of the king (Wieske 2011, 55, 62, 67-68, 87-88). However, to my knowledge there is no study on the gradations of “merchant” in 11<sup>th</sup>-14<sup>th</sup> century Norway, much less a study looking into the similarities and differences between the general developments on the continent and Norway regarding the emergence of a merchant *Stand*. The available sources indicate that social betterment was possible via trade, and it appears that there was even a necessity to stop people from the lower social scales from participating in trade during certain times of the year, lest the fields be neglected (ibid., 55-56, 60). Still, it is by no means advisable to simply ascribe the runic inscriptions to a certain social group and be done with it, like Johnsen (1987, 725, 736) does, who firmly ascribes the use of runes to merchants, following Liestøl (1973, 138). I am sceptical of this conclusion. The results of the onomastic analyses seem to indicate that this is indeed the case, just like they *appear* to attest the presence of Icelanders in Bergen, which Johnsen (1987, 733, 735-36) also seems to consider a certainty. In my opinion, and as I stated elsewhere (Section 5.7), there are only two **idionyms** in the material that I would with some confidence consider markers of Icelandic origin, simply based on the problematic approach of equating ethnicity with name use (Section 5.1.2).

At present, what can at most be taken away from the diploma comparison is that the “merchants” of Bergen could have had vastly different backgrounds in terms of social status, and that while trade was a vehicle of social mobility for some, runic inscriptions are probably not the right kind of evidence to be tracking these kinds of processes. Similarities between the name material from Bergen and the diplomataria may not just be owed to certain **idionyms** being popular across the population (although that possibility should never be discounted entirely), but it may in actual fact mirror the reality that men of high social status were using Bergen as a trade port – which would be precisely what the founder likely intended (Hansen 2008). But while there is evidence for other countries that there was an increasing number of merchants who, having acquired enough wealth, began to invest their fortune into land, something the *Konungskuggsjá* explicitly recommends (Wieske 2011, 130-31, see also 57, 83 for an actual saga example), I am less than certain this conclusion should be applied to Norwegian/Icelandic traders by default of it happening elsewhere in Europe. Since this study could not consider the diachronic spread of **idionyms**, it is entirely possible that the samples also include merchants; one example coming to mind is *Áslákr*, which holds place 3 in the total ranking of Category-1b-**idionyms**, but does not make the ranking list in *Sverris saga* (page 122). It would be interesting to examine the documents in question with an eye to the social status of the name-bearers, especially since *Sverris saga* describes the Norwegian court under Hákon’s grandfather.

Chapter 5 details in various places the dangers of assuming the absence of evidence for certain **idionyms** translates to evidence of absence, and the Bergen corpus is actually the perfect example to illustrate why extreme caution must be exercised when drawing such conclusions: consulting Figure H.26, it is blatantly obvious that the group of non-status-associated **idionyms** frequently makes up the largest group. Admittedly part of that is owed to the fact that several **idionyms** were disqualified by sorting into different **quartiles** in DN; DI; nevertheless there are still 47 **idionyms** not even mentioned in NID; NID-S. What should also not be forgotten is that the current status association, not to mention the conclusions regarding potential geographic origin, are based on a sample of only 242 **idionyms** as opposed to the at least 1,500 in NID; NID-S; and while 209 inscriptions were tagged, that means 469 were not. Since the inscriptions concerning trade have traditionally garnered the most attention from scholars looking at the material, it is

no surprise that the current results, based exclusively on prior scholarship, seem to point towards runes in Bergen having potentially been used by merchants of comparatively high social status. To counterbalance this impression, I therefore also tried to include more inscriptions into the analysis.

### 7.6.9. Town landscape and development

For this purpose, the text tags from Chapter 6 are employed in addition to the archaeological classification and the **idionyms** marked as *invocations* to gather as much data and present the fullest picture possible of the purposes runes were used for in **Björgvin**. Since most objects are classed as “rune-stick”, the main weight of determining an object’s purpose rests on the text classification. Analysing the material from this angle is rendered more difficult by the dataset being smaller than it actually is on account of not all inscriptions having been assigned tags (Chapter 6). Therefore inscriptions carrying *invocation*-marked **idionyms** are added as an additional set of data (Tables H.8 to H.13).

It is striking that the **period** with most archaeologically classified objects in relation to the total count of objects is **period 2**, where most objects are classed as **owner’s tag** and two as **tally stick** (Table H.9). That is particularly surprising since the *Text tag*-column reveals that a number of objects in other **periods** was identified as **owner’s tag** based on their text. In some cases, the verb *á* was recognised on the object in question, but that cannot be the whole explanation for the mismatch; it would therefore be interesting to re-evaluate the definition of **owner’s tag** from an archaeological and a runological standpoint (see the preceding section on potential scholarly bias).

Comparing classifications and text tags by **period** while considering relative frequencies, a pattern suggesting a change in the use of runes emerges, although numbers of objects retrieved for each period or the lack of text tags for the other inscriptions may at present be skewing the picture. Still, it seems that the use of runes shifts from mostly practical purposes (**owner’s tags**, trade-related correspondence) to more spiritual purposes. Even between **periods 2** and **3**, objects either carrying text thought to relate to magical purposes, or carrying invocation-**idionyms** become more common (Tables H.9 and H.10). The same applies when comparing **3** to **4**, where the main function and use of runes appears to be related to trade or, at the very least, ownership (Tables H.10 and H.11). While **period 5** yielded most rune-inscribed objects in total, one cannot deny that there is another increase, if not in numbers of objects, then at the very least count of tokens marked as *invocations*, often on the same object. **Period 6**, however, marks the most obvious change. Despite a comparatively low count of objects and being one of those **periods** where large areas were removed by mechanical digger, it yielded six *María*-inscriptions, eight when also counting those where *María* appears with other **idionyms**.

**Period 6** spans the decades right before and after the Plague arrived in **Björgvin** (1349), and for all that the material evidence is sparse and not necessarily representative, it seems that the shift in focus is mirrored in the runic inscriptions: there is a conspicuously small number of identified **owner’s tags** dated to this **period** compared to the others (considering relative frequencies, not raw numbers, Figure 7.22). Conversely, there is not even one object identified (on the basis of **idionyms**, text tags or object classifications) as having served anything but a mundane purpose in **period 7**, starting in 1413, although five objects can hardly be considered “representative” by



	3	4	5	6
Interlocutor	37.23%	43.49%	32.4%	28.79%
Invocation	4.26%	1.86%	6.7%	16.67%

Figure 7.22. The relative frequencies of interlocutor- and invocation-marked **idionyms** on rune-inscribed objects by **period**. Raw numbers found in Figure 7.21.

any stretch of the imagination. However, if they were representative of the inscriptions from the whole phase, then it would seem that things had returned to normal, with trade going on as usual.

The increase in inscriptions showing *invocation*-marked **idionyms** necessitates a closer look at the **idionyms** in question, since *invocation* is used more in opposition to *interlocutor* than as a proper identification for **idionyms** referring to supernatural entities in **TAKERUN**.

For **idionyms** marked *invocation*, **periods** 2 and 7 return no results.<sup>20</sup> The only invocation-**idionym** appearing consistently in **periods** 3 to 6 is *María*, unsurprising considering both the count of tokens (19) and the prominent position of Maria in the Christian faith. Yet **period** 4 only returns two more tokens in addition, amounting to only three invocations dating to the whole **period**, whereas 3 returns four plus one without an **idionym**, 5 twelve and 6 eleven in total (Figure 7.21, page 176, **Query H.20**; the considerably higher number of distinct **idionyms** is owed to the fact that several appear in the same inscription).

Again, even just looking at the ratios of interlocutor-to-invocation-carrying objects in Figures 7.21 and 7.22, **period** 6 stands out as the exception, with invocation-carrying objects making up 16.67% of the rune-inscribed objects, when during other **periods**, if there are any to begin with, the percentage never rises above 10. Figure 7.22 also shows that starting from **period** 5, percentages drop regarding how often interlocutor-**idionyms** appear on rune-inscribed objects; the precise reasons for this are unknown.

Returning to the distinction between invocation-marked and invocation-used **idionyms**, of the five dated to **period** 3, two are heathen (*Óðinn*, *Þórr*) and used in a poetic context, so they cannot be considered proper invocations. The other three are *Andreas/Andrés*, *María* and *Ólaf* and Christian(ity-associated) (Table H.10). Whether the last should be considered an invocation given that the **idionym** could also be **PN** in this particular inscription remains open for discussion; **INS17** was tagged as an amulet, although it could also have been a writing exercise according to Liestøl and Johnsen (NIYR VI, 36, 41).

**Period** 4 yields three Christian **idionyms**, *Johannes*, *María* and *Samson* (Table H.11). All are well-known characters from Christian mythology, although none of the three inscriptions was tagged, and considering that *María* appears on the foot of a wooden vessel, it could theoretically also be a sign of ownership. This is not very likely considering the apparent taboo-nature of the **idionym**, but still has to be taken under consideration (page 74). Surprisingly, these three invocation-**idionyms** comprise the whole evidence for spiritual use of runes for this **period**, which is both inexplicable and interesting, although there is probably a case to be made that **INS278**, a part of a cross, should be considered as evidence of spiritual use as well.

<sup>20</sup>Query modification **WHERE** phaseid LIKE "2.\_"/"7.\_" AND invocation=1, see **Query H.18**.



**Period 5**, in contrast, displays a broad range of references from different mythologies: on the Christian side, *Andreas/Andrés, Benedikt, Christus, Constantinus, Dionysius, Gabriel, Jesus, Johannes, Klémetr, Lafranz, Malchus, Margrét(a), María, Maximianus, Michael/Mikiáll, Nikulás/Nikolás, Pétr, Raphael, Serapion, Thomás, Vilhelmus/Vilhiálmr* and *Ólafr* put in an appearance, a veritable collection of saints, although several of these appear in lists counting up “allir Guðs helgir menn” – all God’s holy men (perhaps not quite all, but counting 9 different saints/archangels, an effort was definitely made). Greek mythology is represented by *Amor*<sup>21</sup> and *Philomena, Tereus* in two inscriptions. These can hardly be understood in the traditional sense of “invocation”, they are references to historical-mythological figures. A similar case must be made for several references to Norse mythology, like *Grímnir, Ran, Yggjar/Yggr, Ása*, two of which are alternative names for Óðinn, and were potentially used for poetic purposes. Conversely, *Ími* is tagged as “bad, incantation, magic, poetry”, indicating the range of possible interpretations, which point towards this having been an actual invocation, albeit with ill-intent.

**Period 6** features several references to Christian mythology, but only one to Norse: *Abed-Nego, Christus, Elisabet(h), Jesus, Johannes, Lukas, Markús, María, Mat(t)heus, Mesak, Sadrak* and *Tobias* on the one side, *Óðinn* on the other. *INS31*, carrying four of the Christian **idionyms**, is most likely a charm meant to heal some kind of eye ailment (NIYR VI, 64).

In terms of distribution across the excavation area, Figure **H.25** maps all inscriptions carrying at least one invocation-**idionym** and those tagged as *prayer/incantation/christian/amulet*. It illustrates that once more, the majority of objects is found close to the waterfront in redeposited contexts, and this is the case for all **periods**. Since no **period** but 5 has sufficient objects to talk about patterns, there is more of an overall statement to be made here, that in terms of distribution patterns, invocation-inscribed objects also appear along or close to the waterfront in redeposited contexts. Areas of spiritual activity can therefore not be identified by looking at the distribution patterns, especially since most of the inscriptions were found far away from St. Lawrence’s behind Bryggen. Their distribution across the different **periods**, however, permits at least preliminary conclusions about changes in the use of runes as a writing medium over the course of town development, and the composition of rune-carvers. The final conclusions as well as a final evaluation of the use of **RDBMS** for this kind of investigation are discussed in the last chapter.

<sup>21</sup>Lacking coordinates and an associated excavation unit, this object is not listed in Table **H.12**.

## 8. Conclusions

The aim of this thesis has been twofold:

One, to determine whether more information about Björgvin's population could be gleaned by analysing the runic inscriptions as a corpus and applying a macro-perspective to the material.

Two, examining whether the tool chosen for this purpose, a relational DB, provided the required flexible data infrastructure to conduct these macro-analyses, taking into account the many different angles from which runic inscriptions can be studied.

Both topics need to be given proper space and attention, but it is the gain in knowledge about Björgvin that shall first be discussed. Due to the interdisciplinary nature of this undertaking, already interpreted inscriptions were also the focus of this project, and the aim was to see if, when considered as a corpus, more information could be wrangled from them. This was done by tentatively assigning a social status to the *idionyms* appearing in many of these inscriptions and using previous scholars' conclusions about the content, purpose and situational context of each inscription to get a handle on the activities these inscriptions evidence. In the last step, archaeological datings and distribution patterns were used to determine whether distribution of *idionyms* and evidence for different activities differed between stages of town development.

As Section 7.6.9 illustrates, there are some indications that mapping the inscriptions across time provides glimpses at a shift in the use of runes; during the *period* that also sees Björgvin's population decimated by the Plague, the percentage of inscriptions mirroring spiritual activities and illness rises. It is difficult to say at present to say how reliable this observation is, owing to lacking tags and interpretations for the unpublished inscriptions. Granted, they may not add anything new to our knowledge, not least because several of them are probably meaningless scribbles. If that were the conclusion, it would still provide another group of inscriptions for comparisons, not to mention that it would hopefully add to a more balanced view of who the Bergen rune-carvers were and which reasons they had for carving by taking the focus off the trade-related inscriptions (Section 7.6.8). The proper conclusion to draw at this stage is therefore that more inscriptions need to be treated to the same kind of scrutiny and systematic registration process a RDBMS enforces.

As far as the rune-carvers are concerned, this part of the analysis rests on the extensive and therefore probably fairly reliable study of PNs by Markali (1983), further broadened by the material from NIYR VI; SRDB. In spatial terms, little can be said about what the distribution of interlocutor-*idionym*-carrying objects on the BRM 0-site might mean, since the patterns were most likely the result of waste disposal. However, the analysis shows that potentially high-status-*idionyms* apparently have a tendency to group when inscriptions carry more than one *idionym*, and that non-status-associated and low-status-*idionyms* appear more often by themselves, although especially the latter group consists of 47 *idionyms*. These name lists present an interesting problem for interpretation; while there is a chance that they might indicate a *félag* or list a ship's crew (page 180), there are also arguments against interpreting them as such. In *period*

2, the list might indicate a mostly Norwegian and possibly high-status *félag*, but already in **period 3** and **period 4**, the lists include feminine **idionyms** and different social-status-groups (pages 181 and 184), which makes a *félag* less likely, even if women could also be part of one (Johnsen 1987, 722). However, one of the difficulties here is that a *félag* seems to have restricted the number of partners to two (Wieske 2011, 98), which number is far exceeded by the tokens/inscription. It therefore does not seem a likely interpretation, either.

In **period 4**, one can also observe that high-status-**idionyms** seem to group more than before on inscriptions with more than one (page 186), and similar observations apply to **period 5**, which also has the only name list made up of only feminine **idionyms** (page 187), and **period 6**, although with its greatly reduced number of objects, it is very difficult to make any conclusive statements. The reasons for this sudden accumulation of potentially high-status-**idionyms** are unknown. With regard to Wieske (2011), Ebel (1987) and Johnsen (1987), an argument could perhaps be made that the potentially high-status-**idionym** lists mirror merchants from the higher social scales, whereas the non-status-associated, single **idionyms** represent the lower tiers of society, who had an interest in, but could probably not take part in trade to the same extent wealthy merchants or landowners could. Without dismissing this notion out of hand, with no clear definition of what “merchant” actually means in an **OWN** context, should we even be attempting to look for merchants, not to mention consider them as a driving force of runic literacy in **Björgvin**? I am less than convinced that the various name lists are actually crew lists; I am equally doubtful that runic inscriptions are the right tools to ascertain social mobility of people. These inscriptions are more often than not restricted to one single word; hardly anything can be inferred about the person mentioned, not even necessarily that they also were the carver.

Another problem with this particular analysis is that the status assignation rests on a sample more likely to mirror Norwegian than Icelandic naming customs (Section 5.7.1), so the results are very preliminary. If further studies should confirm this observation, though, this opens up an interesting avenue of investigation; why do we see so many high-status **idionyms** clustering together in runic name lists? Is this confirmation that, after all, runic writing was for the most part restricted to the group of individuals with a fairly high social status? Or are the status assignations wrong, and these **idionyms** were just widely used amongst the population? What would that, in turn, mean for our perception of medieval naming customs in Norway and Iceland, in particular **name transfer**? Although the Bergen inscriptions carry many **idionyms** only occurring once, 49 appear in at least two **periods**, and *Sigurðr* (2-6; NH) and *Gunnarr* (3-7; non-status-associated, Table F.2) appear in five out of six. *Sigurðr* is no surprise (page 120), and considering the **quartile**-placement of *Gunnarr*, its frequency is also unsurprising. Yet other **idionyms** from the upper **quartiles** do not appear frequently, which one might expect if rune-carvers were predominantly from the upper social scales. For the time being, such investigations will have to be postponed until further information and studies are available.

Another angle one could take is a comparison of the percentages in Figure H.26; it appears that the composition of rune-users varied between different **periods**. The percentages of non-status-associated **idionyms** mostly remain constant until 6, where the numbers drop, and 7, where the increase is sharp and steep, although that **period** has so few tokens little weight should be put on this observation. Comparing the relative frequencies of tokens and **idionyms** from the three high-status groups, NH always shows the highest percentage for tokens and objects, but surprisingly,

IH surpasses it in terms of distinct **idionyms** in **period** 3 (25% to 20.45%).<sup>1</sup> IH also shows a sharp increase in tokens and **idionyms** from **period** 2 to 3, then drops slightly and remains approximately at the same level until none appear in 7. Conversely, PSH decreases steadily from 2 to 4 and only increases again in 5 and 6, with no evidence in 7. Whether these observations indicate statistically significant differences is hard to say. Running  $\chi^2$ -tests is an option for the future, but I refrained from using them on this occasion because of the difficulties with the **idionyms**' status association; it does not seem advisable to test groups, the composition of which is based on an already prejudiced sample, against each other to then make conclusive statements. Besides, even if the differences are statistically significant, there are caveats. The observable differences may be due to preservation conditions or the duration of **periods** much more than to which group was actually using runes for their purposes, and the BRM 0-site in turn may not provide the best representation of who used runes in **Björgvin** to begin with, it being to an extent a bespoke merchant quarter. Clearly NH-tokens prevail during all **periods**, but NL-tokens, for example, dip below IL-tokens in **period** 4, 5 and 6, only recovering in 7, where there are no Icelandic tokens at all.

Based on the observation presented in Sections 7.6.2 to 7.6.7, the material also appears to mirror developments concerning the gender distribution of the rune-carvers on Bryggen, with a steady increase in feminine **idionyms** as time progresses. The archaeological analyses of town development have shown that **Björgvin** developed from a little-used space to an important trading port over the course of just two hundred years, and that the inhabitants became progressively more diverse (for example Hansen 2005; Mygland 2015b). Even accepting that we at present cannot properly define “merchant”, the presence of – relatively – more feminine **idionyms** in the runic inscriptions (page 83) indicates that women might have played a bigger role in town development than previously assumed so far, but that their contributions are less visible on account of the gender bias of written sources. Comparisons with other trading towns and their runic inscriptions from Scandinavia might be able to shed more light on this as well.

All things considered, the results are interesting and promising, and yet the basis upon which they were calculated is, in my opinion, not reliable enough to proceed with even tentative assumptions about how the rune-carving/-using population in **Björgvin** may have changed in composition over the course of time. I am well aware that this is not the most desirable outcome of such a study; most scholars would prefer to be able to say something about their material at the end of such a project. At the very least, a study of runic inscriptions should present new interpretations. Yet providing new interpretations was not the aim of my thesis. I concerned myself with questions pertaining to the storage and technological infrastructure of already existing scholarship in a way that would enable and support future studies, then using said infrastructure to illustrate how it can be utilised for scholarly work. That the results are less-than-satisfactory is to a great deal due to the fact that important groundwork is lacking, for example statistical studies of the distribution of **OWN-PNs** across time and space in Iceland and Norway.

This study has still yielded an important outcome: the relational **DB** model developed for the purposes of analysing the Bergen corpus. MySQL, the **RDBMS** chosen to build **TAKERUN**, is not only capable of mirroring real-life circumstances, but also provides the required flexibility to allow for research into a corpus of runic inscriptions from different angles, whether the approach

---

<sup>1</sup>Percentages are calculated based on total of **idionyms**/tokens/objects per **period**.

be onomastic, text-based or archaeological. As the main outcome of this project, the **entity model** developed for **TAKERUN** can therefore be considered a success. It works both as a stepping stone to start looking more closely at particular aspects of runic inscriptions, and as a highly specified tool to collect evidence to test a hypothesis. Most importantly, this model can be easily modified to not only store the Bergen inscriptions, but other runic inscriptions as well. The underlying structures of the **core database** are not modelled specifically to answer the requirements of the Bergen inscriptions, but instead on the workflow processes of runologists, and are therefore capable of also storing other runic inscriptions. By extending the rune encoding standard from Chapter 3 to include runic rows beyond the medieval Futhark, adding non-medieval runic inscriptions is no problem. The model also allows for further additions to the **research database**; semantic analyses, for example, become possible by branching the data infrastructure required to do so off from **PATTERNING**. Even more detailed studies into the onomastic material are possible by slightly modifying **IDIONYM** and creating a bespoke **DB** model answering to the needs of onomasticians, which in turn connects to **TAKERUN** via **IDIONYM**. Both its flexibility and explicit goal of storing every prior interpretation of an inscription set this model apart from already existing **DB** models for runic inscriptions (Section 2.2), which were either written with specific research questions in mind (**KDB**, **RFB**) or are instead aiming to only provide the most up-to-date and generally accepted interpretations (**SRDB**, **Runor**). Its structure also allows connecting **TAKERUN** to all of the other **DBs** available, either via archaeological or runological identifiers; that their structures cannot be mapped onto each other one-to-one is a result of the different approaches to data/**entity modelling**. That however does in no way impede the possibility of linking the different **DBs** to each other, thus retrieving as much information as possible.

Given its flexibility and the possibilities this approach presents for runology, the model can indeed be considered the most important outcome of this thesis. Yet it also reinforces the statements from Chapter 2 in that the whole modelling process shows that there is no such thing as a “simple **DB**” when the aim is to support and further research. Digital Humanities approaches using tools like **RDBMS** present just one more way of doing research, and it has become clear that if the crucial steps building the tool are not undertaken with the required care, the product, whether that be a **DB** or an XML-based text archive like **MENOTA**, runs the risk of being largely unusable or unable to accommodate certain user requests. Even worse, the qualitative data analysed by these means may mistakenly be taken to represent set-in-stone facts if one is not careful enough.

**Entity modelling** decisions thus need to be firmly rooted in how the actual research is conducted to ensure that the resulting digital product/tool answers to expectations, and does not represent data in a misleading fashion. By default of analysing how pieces of information relate to each other, this process is very close to the humanities mindset already, where the point of research is to gain insight into human interactions with, alternatively, abstract concepts, experiences and items. It is therefore worth spending time on these considerations and potentially building test tools with small sets of data to see how they respond and if they conform to expectations, even more so when working with legacy data like the **UMB DB**. The process of taking apart an old dataset may in itself provide insights into how different assumptions have shaped the data and interpretation thereof.

For in the end, it is not computers who interpret data. Researchers do, and researchers, whether conscious of it or not, also model the data they use in certain fashions. It is therefore their duty

to treat the digital tools they are using with the same caution as they treat theories, and be clear on how these influence their research output.

It is my hope that this study has thoroughly illustrated the step-by-step process of building a relational **DB** solidly based on the work of runologists, and that the outcomes, even if at present somewhat meagre, have demonstrated how efficient a digital tool like a bespoke relational **DB** can be when analysing runic corpora from a macro-perspective. It is equally my hope that the model presented here can serve as a blueprint for further research and projects, especially where traditional publication of whole corpora of archaeological, onomastic or textual materials is impossible and alternative methods have to be considered.



# Bibliography

- Aldrin, Emilia (2016). "Names and Identity". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 382–394.
- Andersson, Thorsten (2003). "Personennamen". In: *Östgötalag - Pfalz und Pfälzen*. Ed. by Heinrich Beck, Dieter Geuenich and Heiko Steuer. 2nd ed. Reallexikon der germanischen Altertumskunde 22. Walter de Gruyter, 589–614.
- Antonsen, Elmer H. (1975). *A concise grammar of the older runic inscriptions*. Sprachstrukturen. Reihe A, Historische Sprachstrukturen 3. M. Niemeyer Verlag.
- ASCII Codes CP 865 (Nordic languages) (Oct. 2018). URL: <https://www.ascii-codes.com/cp865.html> (visited on 05/10/2018).
- Barnes, Michael P. (2012). *Runes: a handbook*. Woodbridge.
- (2013). "What Is Runology, and Where Does It Stand Today?" In: *Futhark: International Journal of Runic Studies* 4, 1–6.
- Beck, Heinrich (2002). "Skandinavische Beiträge zur Personennamenforschung". In: *Person und Name. Methodische Probleme bei der Erstellung eines Personennamenbuches des Frühmittelalters*. Ed. by Dieter Geuenich, Wolfgang Haubrichs and Jörg Jarnut. Ergänzungsbände zum Reallexikon der Germanischen Altertumskunde 32. Walter de Gruyter, 127–147.
- Beech, George T., Monique Bourin and Pascal Chareille, eds. (2002). *Personal names studies of medieval Europe: social identity and familial structures*. Medieval Institute Publications, Western Michigan University.
- Bianchi, Marco (2017). *Projektet Evighetsrunor*. URL: <https://www.raa.se/kulturarv/runor-och-runstenar/projekt-om-runor/projektet-evighetsrunor/> (visited on 25/05/2021).
- (2020). *Runor är här!* URL: <http://www.runforum.nordiska.uu.se/runor-ar-har/> (visited on 25/05/2021).
- Bourin, Monique (2002). "How Changes in Naming Reflect the Evolution of Familial Structures in Southern Europe, 950–1250". In: *Personal names studies of medieval Europe: social identity and familial structures*. Ed. by George T. Beech, Monique Bourin and Pascal Chareille. Medieval Institute Publications, Western Michigan University, 3–13.
- Bramwell, Ellen S. (2016). "Personal Names and Anthropology". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 263–278.
- Brylla, Eva (2016). "Bynames and Nicknames". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 237–250.

- Burkhardt, Armin, ed. (1995). *Namenforschung: ein internationales Handbuch zur Onomastik*. Handbücher zur Sprach- und Kommunikationswissenschaft = Handbooks of linguistics and communication science 11.1. Walter de Gruyter.
- Busa, Roberto A. (2004). "Foreword: Perspectives on the Digital Humanities". In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, xvi–xxi.
- Buttinger, Sabine (1st Feb. 2012). *Das Mittelalter*. wbg Theiss.
- Carocci, Sandro (Dec. 2011). "Social mobility and the Middle Ages". In: *Continuity and Change* 26.3, 367–404.
- Chareille, Pascal (2002). "Methodological Problems in a Quantitative Approach to Changes in Naming". In: *Personal names studies of medieval Europe: social identity and familial structures*. Ed. by George T. Beech, Monique Bourin and Pascal Chareille. Medieval Institute Publications, Western Michigan University, 15–27.
- Christensen, Arne Emil (1985). "Boat finds from Bryggen". In: *The Bryggen Papers. Main Series* 1. Universitetsforlaget, 47–278.
- Deegan, Marilyn and Simon Tanner (2004). "Conversion of Primary Sources". In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, 488–504.
- Düwel, Klaus (2008). *Runenkunde*. 4th ed. Metzler.
- Düwel, Klaus, Robert Nedoma and Sigmund Oehrl (2020). *Die südgermanischen Runeninschriften*. Ergänzung zum Reallexikon der Germanischen Altertumskunde 119. Walter de Gruyter.
- Dyvik, Helge (1985). "Runer fra Bryggen". In: *Middelalderbyen: Onsdagskvelder i Bryggens Museum*, 133–148.
- (1996). "Terje Spurkland: En fonografematisk analyse av runematerialet fra Bryggen i Bergen. Doktordisputas ved Universitetet i Oslo 20. mars 1993". In: *Maal og Minne* 1, 3–29.
- Ebel, Else (1987). "Der Fernhandel von der Wikingerzeit bis in das 12. Jahrhundert in Nordeuropa nach altnordischen Quellen". In: *Untersuchungen zu Handel und Verkehr der vor- und frühgeschichtlichen Zeit in Mittel- und Nordeuropa. Teil IV. Der Handel der Karolinger- und Wikingerzeit*. Ed. by Klaus Düwel, Herbert Jankuhn, Harald Siems and Dieter Timpe. Abhandlungen der Akademie der Wissenschaften in Göttingen. Philologisch-historische Klasse. Dritte Folge 156. Vandenhoeck & Ruprecht, 266–312.
- Elmasri, Ramez and Shamkant Navathe (2017). *Fundamentals of database systems*. 7th ed. Harlow: Pearson Education.
- Ersland, Geir Atle (2015). "How Archaeology saved Bryggen". In: *Nordic Middle Ages – Artefacts, Landscapes and Society. Essays in Honour of Ingvild Øye on her 70th Birthday*. University of Bergen, 145–157.
- Evans, Mel (2016). "Curating the Language of Letters: Historical Linguistic Methods in the Museum". In: *Research methods for creating and curating data in the digital humanities*. Ed. by Matt Hayler and Gabriele Griffin. Research methods for the arts and humanities. Edinburgh University Press, 44–61.
- Findell, Martin (2014). *Runes*. British Museum Press.
- Fuhrmann, Bernd (1st May 2014). *Hinter festen Mauern*. wbg Theiss.

- Geary, Patrick (2002). "Foreword". In: *Personal names studies of medieval Europe: social identity and familial structures*. Ed. by George T. Beech, Monique Bourin and Pascal Chareille. Medieval Institute Publications, Western Michigan University, vii–viii.
- Gunnes, Erik (1983). "Utenlandsk navneskikk i norsk middelalder". In: *Maal og Minne* 3-4, 150–169.
- Haavaldsen, Anne and Espen S. Ore (1995-2003). *Runes in Bergen. Preliminary report from the project "Computerising the runic inscriptions at the Historical museum in Bergen". 1. English edition*. URL: <https://www.nb.no/baser/runer/ribwww/english/runeindex.html#Heading3>.
- Hagland, Jan Ragnar (1988a). "Nokre onomastiske sider ved runematerialet frå bygrunnen i Trondheim og Bryggen i Bergen". In: *Studia Anthroponymica Scandinavica* 6, 13–25.
- (1988b). "Runematerialet frå gravingane i Trondheim og Bergen som kjelder til islandshandelens historie i mellomalderen". In: *Historisk Tidsskrift* 67, 145–156.
- (1989). "Islands eldste runetradisjon i lys av nye funn frå Trondheim og Bergen". In: *Arkiv för Nordisk Filologi* 104, 89–102.
- Halvorsen, Eyvind Fjeld (1975). "Person- og slektsnavntradisjoner i Norge". In: *Norske stedsnavn/stadnamn*. Grøndahl & Søn Forlag A/S, 157–171.
- (1981). "Personnavn. Island og Norge". In: *Kulturbistorisk leksikon for nordisk middelalder*. Kulturbistorisk leksikon for nordisk middelalder 13. Rosenkilde og Bagger, 199–206.
- (1984). "Innlån av fremmede personnavn i Norge i tidlig gammelnorsk tid". In: *Festskrift til Ludvig Holm-Olsen på hans 70-årsdag den 9. jun 1984*. Ed. by Bjarne Fidjestøl. Alvheim & Eide, 114–123.
- Hansen, Gitte (1998). "The Bryggen chronology. New light upon the dating of fire layer sequence before V". In: *Medieval Fires in Bergen – Revisited*. Ed. by Ingvild Øye. The Bryggen Papers. Supplementary Series 6. Fagbokforlaget, 81–127.
- (2005). *Bergen c 800–c1170. The emergence of a town*. The Bryggen Papers. Main Series 6. Fagbokforlaget.
- (2006). "Kvinner, barn og pøsepinner - Demografiske drypp fra det eldste Bergen". In: *Samfunn, symboler og identitet – Festskrift til Gro Mandt på 70-årsdagen*. Ed. by Randi Barndon, Sonja M. Innselset, Kari Klæboe Kristoffersen and Trond K. Lødøen. UBAS – Universitetet i Bergen Arkeologiske Skrifter 3. Universitetet i Bergen, 305–319.
- (2008). "Konger og byfolk i det eldste Bergen – byoppkomst i et aktørperspektiv". In: *De første 200 årene – nytt blikk på 27 skandinaviske middelalderbyer*. Ed. by H Andersson, Gitte Hansen and Ingvild Øye. Institutt for arkeologi, historie, kulturvitenskap og religion, Universitetet i Bergen, 15–39.
- (2010). "New pathways for Women in Twelfth-century Bergen, Norway?" In: *Situating Gender in European Archaeologies*. Ed. by Liv Helga Dommasnes, Tove Hjørungdal, Sandra Montón-Subías, Margarite Sánchez Romero and Nancy L. Wicker. *Archaeolingua* Alapítvány, 245–260.
- (2015a). "Bergen AD 1020/30-1170: Between Plans and Reality". In: *Maritime Societies of the Viking and Medieval World*. Ed. by James H. Barrett and Sarah Jane Gibbon. Society for Medieval Archaeology Monograph 27. Maney Publishing, 182–197.
- (2015b). "Itinerant craftspeople in 12th century Bergen, Norway – aspects of their social identities". In: *Everyday Products in the Middle Ages. Crafts, Consumption and the Individual in*

- Northern Europe c. AD 800–1600*. Ed. by Gitte Hansen, Steven P. Ashby and Irene Baug. Oxbow Books, 28–50.
- Hansen, Gitte (2015c). “Sko, kammer og klær. En nedenfra-studie av bergensernes økonomiske evne på 1100-tallet”. In: *Inn i fortida – ut i verden – i museet!* Ed. by Jon Anders Risvaag, Ragnhild Berge and Terje Brattli. Vitark. Acta Archaeologica Nidarosiensia 9. Museumsforlaget.
- (2016). “Luxury for everyone? Embroideries on Leather Shoes and the Consumption of Silk Yarn in 11th–13th Century Northern Europe”. In: *Textiles and the Medieval Economy. Production, Trade and Consumption of Textiles 8th–16th Centuries*. Ed. by Angela Ling Huang and Carsten Jahnke. Ancient Textiles Series 16. Oxbow Books, 87–103.
- Hansen, Gitte, Steven P. Ashby and Irene Baug (2015). “Everyday products in the Middle Ages. Crafts, consumption and the individual in Northern Europe c. AD 800-1600: an introduction. Crafts, consumption and the individual in northern Europe, c. AD 800-1600”. In: *Everyday products in the Middle Ages*. Ed. by Gitte Hansen, Steven P. Ashby and Irene Baug. Oxbow Books, 1–10.
- Hansen, Gitte, Brita Hope and Sigrid Samset Mygland (2017). “Migreringsprosjektet 2015-2017. Rapport om migrering av Middelaldersamlingens digitale BRM-funnkataloger til de norske Universitetsmuseenes felles databaseløsning, MUSITbasen for arkeologi”.
- Harrington, Jan L. (2009). *Relational database design and implementation: clearly explained*. 3rd ed. Elsevier.
- Haugen, Odd Einar (2000). *Alfabetisk oversyn over Gullskoen runefont, versjon 2.1*. URL: <https://folk.uib.no/hnooh/runefont/PDF-filar/AlfabetGullskoen.pdf>.
- (2013). “Tekstkritikk og tekstfilologi”. In: *Handbok i norrøn filologi*. Ed. by Odd Einar Haugen. 2nd ed. Fagbokforlaget, 76–126.
- Hayler, Matt and Gabriele Griffin (2016a). “Introduction”. In: *Research methods for creating and curating data in the digital humanities*. Ed. by Matt Hayler and Gabriele Griffin. Research methods for the arts and humanities. Edinburgh University Press, 1–13.
- eds. (2016b). *Research methods for reading digital data in the digital humanities [electronic resource]*. Research methods for the arts and humanities. Edinburgh University Press.
- Helle, Knut (1982). *Bergen bys historie. Kongssete og kjøpstad. Fra opphavet til 1536*. Universitetsforlaget.
- (1998). “Medieval fires in Bergen according to written sources”. In: *Medieval Fires in Bergen – Revisited*. Ed. by Ingvild Øye. The Bryggen Papers. Supplementary Series 6. Fagbokforlaget, 15–80.
- Herteig, Asbjørn E. (1985). “The Archaeological Excavations at Bryggen, “The German Wharf”, in Bergen, 1955–68”. In: The Bryggen Papers. Main Series 1. Universitetsforlaget, 9–46.
- (1990). *The buildings at Bryggen. Their topographical and chronological development*. Vol. 1. The Bryggen Papers. Main Series 3. Norwegian University Press.
- (1991). *The buildings at Bryggen. Their topographical and chronological development*. Vol. 2. The Bryggen Papers. Main Series 3. Norwegian University Press.
- Hirschmann, Frank G. (2016). *Die Stadt im Mittelalter*. 2., aktualisierte und erweiterte Auflage. De Gruyter Oldenbourg.
- Hockey, Susan (2004). “The History of Humanities Computing”. In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, 3–19.

- Hough, Carole (2016). "Introduction". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 1–38.
- Hough, Carole and Daria Izdebska, eds. (2016). *The Oxford Handbook of Names and Naming*. Oxford handbooks in linguistics. Oxford University Press.
- Janzén, Asser (1947a). "De fornvästnordiska personnamnen". In: *Personnavne*. Ed. by Asser Janzén. Nordisk kultur VII. Albert Bonnier, 22–186.
- (1947b). "Inledning". In: *Personnavne*. Ed. by Asser Janzén. Nordisk kultur VII. Albert Bonnier, 1–4.
- Johannessen, Ole-Jørgen (2002). "Kristne personnavn i norsk middelalder". In: *I: Kristendommens indflydelse på nordisk navngivning. Rapport fra NORNA's 28. symposium i Skålbolt 25.–28. maj 2000*. Ed. by Svavar Sigmundsson. NORNA-rapporter 74. NORNA-förlaget, 29–57.
- Johnsen, Ingrid Sanness (1981). "Personal Names in Inscriptions from Towns of Medieval Norway". In: *Proceedings of the First International Symposium on Runes and Runic Inscriptions*. Ed. by Claiborne W. Thompson. Michigan Germanic Studies VII, 119–128.
- (1987). "Die Runeninschriften über Handel und Verkehr aus Bergen (Norwegen)". In: *Untersuchungen zu Handel und Verkehr der vor- und frühgeschichtlichen Zeit in Mittel- und Nordeuropa. Teil IV. Der Handel der Karolinger- und Wikingerzeit*. Ed. by Klaus Düwel, Herbert Jankuhn, Harald Siems and Dieter Timpe. Abhandlungen der Akademie der Wissenschaften in Göttingen. Philologisch-historische Klasse. Dritte Folge 156. Vandenhoeck & Ruprecht, 716–744.
- Knirk, James E. (1997). "Kunne en gotlending finne romantikk i middelalderens Bergen? Kjærlighetsdikt med runer fra Bryggen i Bergen". In: *Archiv und Geschichte im Ostseeraum. Festschrift für Sten Körner*. Ed. by Robert Bohn, Hain Rebas and Tryggve Siltberg. Peter Lang, 25–37.
- Kruken, Kristoffer (2013). *Norsk personnamnleksikon*. 3. utg. ved Kristoffer Kruken. Samlaget.
- Laliena, Carlos (2002). "Personal Names, Immigration, and Cultural Change: Francos and Muslims in the Medieval Crown of Aragon". In: *Personal names studies of medieval Europe: social identity and familial structures*. Ed. by George T. Beech, Monique Bourin and Pascal Chareille. Medieval Institute Publications, Western Michigan University, 121–130.
- Larsen, Arne J. (1992). *Footwear from the Gullskoen area of Bryggen*. The Bryggen Papers. Main Series 4. Scandinavian University Press.
- Laue, Andrea (2004). "How the Computer Works". In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, 145–160.
- Le Jan, Régine (2002). "Personal Names and the Transmission of Kinship in Early Medieval Society (Sixth to Tenth Centuries)". In: *Personal names studies of medieval Europe: social identity and familial structures*. Ed. by George T. Beech, Monique Bourin and Pascal Chareille. Medieval Institute Publications, Western Michigan University, 31–50.
- Leibring, Katharina (2016). "Given Names in European Naming Systems". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 199–213.
- Lerche Nielsen, Michael (1997). "Runologien mellem sprogvidenskaben og arkæologien — med et sideblik på de forskellige tolkninger af Glavendrupindskriften". In: *Beretning fra sekstende tværfaglige vikingesymposium*. Ed. by Hans Bekker-Nielsen and Hans Frede Nielsen. Hikuin, 37–51.

- Liestøl, Aslak (1964a). "Runer frå Bryggen". In: *Viking* XXVII, 5–53.
- (1964b). *Runer frå Bryggen (med etterskrift)*.
  - (1968). "Correspondence in Runes". In: *Medieval Scandinavia* 1.
  - (1970). "En uartig historisk runeinnskrift". In: *KUML* 20.
  - (1973). "Runeninschriften von der Bryggen in Bergen (Norwegen)". In: *ZAM Zeitschrift für Archäologie des Mittelalters* 1, 129–139.
  - (1974). "Runic Voices from Towns of Ancient Norway". In: *Scandinavica* 13.1, 19–33.
- Loveluck, Christopher (2013). *Northwest Europe in the early Middle Ages, c. AD 600–1150 : a comparative archaeology*. New York : Cambridge University Press.
- Magin, Elisabeth Maria (2017). *Additions and corrections of database entries pertaining to the fields concerning Lag, Brann, Diverse kommentar, Bygningsrelasjoner, Coordinates, Phases*.
- (2018). *Additions and corrections of database entries pertaining to the fields concerning Lag, Brann, Diverse kommentar, Bygningsrelasjoner, Coordinates, Phases*.
- Markali, Kjersti (1983). "Personnavnsmaterialet i runeinnskriftene fra Bryggen i Bergen". MA thesis. Universitetet i Oslo.
- Marold, Edith (2000). "Bergen als literarischer Umschlagplatz". In: *Arbeiten zur Skandinavistik. 13. Arbeitstagung der deutschsprachigen Skandinavistik, 29.7.–3.8.1997 in Lysebu (Oslo)*. Ed. by Fritz Paul, Joachim Grage and Wilhelm Heizmann. Peter Lang, 189–201.
- Meldgaard, Eva Villarsen (1994). "De kristne personnavne kommer". In: *Vikingetidens sted- og personnavne: rapport från NORNA:s 22. symposium i København 14. - 16- januar 1993*. Ed. by Gillian Fellows-Jensen and Bente Holmberg. NORNA-rapporter / Nordiska Samarbetskommittén för Namnforskning 54. NORNA-förlaget, 201–217.
- Menota Handbook 3.0. Guidelines for the electronic encoding of Medieval Nordic primary sources* (2019). URL: [https://www.menota.org/HB3\\_index.xml](https://www.menota.org/HB3_index.xml).
- Molaug, Sonja (1998). "Smykker og draktutstyr fra middelalderens Bergen: en arkeologisk analyse i tid og rom". MA thesis. Universitetet i Bergen.
- Mygland, Sigrid Samset (2007). *Children in medieval Bergen. An archaeological analysis of child-related articles*. The Bryggen Papers. Main Series 7. Fagbokforlaget.
- (2015a). "'Female' Activities, 'Female' Artefacts? A Theoretical Approach to Women and Gender in Medieval Bergen". In: *Nordic Middle Ages – Artefacts, Landscapes and Society. Essays in Honour of Ingvild Øye on her 70th Birthday*, 241–250.
  - (2015b). "Gender and Material Culture. Women in Medieval Bergen. A Contextual Analysis of Gender-Related Artefacts from Bryggen in Bergen 1170–1476". PhD thesis. Universitetet i Bergen.
- Nedkvitne, Arnved (1989). "Runepinner og handelshistorie". In: *Historisk tidsskrift* 68, 348–350.
- Nordanskog, Gunnar (2006). *Föreställd bedendom: tidigmedeltida skandinaviska kyrkportar i forskning och historia*. Vägar till Midgård 9. Nordic Academic Press.
- Nordby, Jonas K. (2018). "Kryptografi i runeinnskrifter fra vikingtid og middelalder". PhD thesis. Institutt for lingvistiske og nordiske studier. Det humanistiske fakultet. Universitetet i Oslo.
- Nowak, Sean (2003). "Schrift auf den Goldbrakteaten der Völkerwanderungszeit : Untersuchungen zu den Formen der Schriftzeichen und zu formalen und inhaltlichen Aspekten der Inschriften = Writing on the Migration-Period Gold Bracteates". PhD thesis. Philosophische Fakultät der Georg-August-Universität zu Göttingen. URL: <http://resolver.sub.uni-goettingen.de/purl/?webdoc-512>.



- Nygren, Thomas, Zephyr Frank, Nicholas Bauch and Erik Steiner (2016). “Connecting with the Past: Opportunities and Challenges in Digital History”. In: *Research methods for creating and curating data in the digital humanities*. Ed. by Matt Hayler and Gabriele Griffin. Research methods for the arts and humanities. Edinburgh University Press, 62–86.
- Nyström, Staffan (2016). “Names and Meaning”. In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 39–51.
- Olsen (2004). “Medieval fishing tackle from Bergen”. In: *Medieval fishing tackle from Bergen and Borgund*. Ed. by Ingvild Øye. The Bryggen Papers. Main Series 5. Fagbokforlaget, 7–106.
- Ore, Espen S. (Oct. 2002). *Runetype - faglig arbeid*. URL: <https://www.nb.no/baser/runer/Arbeidsrapport.html> (visited on 08/10/2018).
- Ore, Espen S., Fiona J. Tweedie and Craig Dougan (2018). *Computers, statistics, and the grouping of rune forms*. URL: <https://www.nb.no/baser/runer/drh98.html> (visited on 08/10/2018).
- Owe, Jan (2014). *Samnordisk Runtexdatabas. Rundata for Windows 3.1*. Tech. rep. Uppsala Universitet.
- Øye, Ingvild (1988). *Textile equipment and its working environment, Bryggen in Bergen c 1150 - 1500*. The Bryggen Papers. Main Series 2. Norwegian University Press.
- Palumbo, Alessandro (2018). “Skriftsystem i förändring. En grafematisk och paleografisk studie av de svenska medeltida runeinskrifterna”. PhD thesis. Institutionen för nordiska språk. Uppsala Universitet.
- Parsons, David N. (2002). “Anna, Dot, Thorir ... counting Domesday personal names”. In: *Nomina: A Journal of Name Studies Relating to Great Britain and Ireland* 25, 29–49.
- Paysan, Moritz and Klaus Düwel (2020). “Runeninschriften und deren mögliche Veränderung durch Freilegungstechniken und Konservierungsüberzüge”. In: *Die südgermanischen Runeninschriften*. Ed. by Klaus Düwel, Robert Nedoma and Sigmund Oehrl. Ergänzung zum Reallexikon der Germanischen Altertumskunde 119. De Gruyter, CLXXVIII–CLXXXIV.
- Peterson, Lena (2004). *Lexikon över urnordiska personnamn*. Institutet för språk och folkminnen.
- (2007). *Nordiskt runnamnslexikon*. 5th rev. utg. Institutet för språk och folkminnen.
- Projekt RuneS (Oct. 2018). URL: <http://www.runesdb.de/home> (visited on 16/12/2020).
- Ramsay, Stephen (2004). “Databases”. In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, 177–197.
- Runenprojekt Kiel (2016b). *Die Literaturliste*. URL: <http://www.runenprojekt.uni-kiel.de/beschreibung/6/default.htm> (visited on 08/10/2018).
- (2016c). *The Kiel Rune Project (Kieler Runenprojekt)*. URL: [http://www.runenprojekt.uni-kiel.de/beschreibung/1/default\\_eng.htm](http://www.runenprojekt.uni-kiel.de/beschreibung/1/default_eng.htm) (visited on 08/10/2018).
- (Oct. 2016d). *The table Find*. URL: [http://www.runenprojekt.uni-kiel.de/beschreibung/3/default\\_eng.htm](http://www.runenprojekt.uni-kiel.de/beschreibung/3/default_eng.htm) (visited on 08/10/2018).
- (2016e). *The table Interpretations*. URL: [http://www.runenprojekt.uni-kiel.de/beschreibung/4/default\\_eng.htm](http://www.runenprojekt.uni-kiel.de/beschreibung/4/default_eng.htm) (visited on 08/10/2018).
- RuneType. *The Rune Typology Project* (Oct. 2002). URL: <https://www.nb.no/baser/runer/RB.html> (visited on 08/10/2018).
- Runic inscriptions from Bryggen in Bergen (2002). URL: <https://www.nb.no/baser/runer/eindex.html> (visited on 15/10/2018).

- Runor (n.d.). URL: <https://app.raa.se/open/runor/search>.
- Schmidt, Tom (2002). "Fornavn i Norge gjennom 1000 år". In: *Å kallast med sitt rette namn*. Ed. by Knut Sprauten. Norsk lokalhistorisk institutt, 88–114.
- Schreibman, Susan, Raymond George Siemens and John Unsworth (2004). "The Digital Humanities and Humanities Computing: An Introduction". In: *A companion to digital humanities*. Ed. by John Unsworth, Raymond George Siemens and Susan Schreibman. Blackwell companions to literature and culture 26. Blackwell Pub, xxii–xxvii.
- Seim, Karin Fjellhammer (1982). "Grafematisk analyse av en del runeinnskifter fra Bryggen i Bergen". MA thesis. Universitetet i Bergen.
- (1988a). "A Review of the Runic Material". In: ed. by Asbjørn E. Herteig. The Bryggen Papers. Supplementary Series 2. Norwegian University Press, 10–23.
  - (1988b). "Runic Inscriptions in Latin. A summary of Aslak Liestøl's Fascicle (Vol. VI, 1) of Norges Innskrifter med de yngre Runer". In: *The Bryggen Papers. Supplementary Series No 2*. Ed. by Asbjørn E. Herteig. The Bryggen Papers. Supplementary Series 2. Norwegian University Press, 24–65.
  - (1989). "Runeinnskifter fra Trondheim og Bergen som kilder til Islandshandelens historie? Et innfløkt proveniens-spørsmål". In: *Historisk Tidsskrift* 68, 333–347.
  - (1998). "De vestnordiske futhark-innskriftene fra vikingtid og middelalder – form og funksjon". PhD thesis. NTNU Trondheim. Det historisk-filosofiske fakultet. Institutt for nordistikk og litteraturvitenskap.
  - (2013). "Runologi". In: *Handbok i norrøn filologi*. Ed. by Odd Einar Haugen. 2nd ed. Fagbokforlaget, 128–193.
- Shaw, Philip A. (2011). "The Role of Gender in Some Viking-Age Innovations in Personal Naming". In: *Viking and Medieval Scandinavia* 7.7, 151–170.
- Simek, Rudolf and Hermann Pálsson (2007). *Lexikon der altnordischen Literatur*. Alfred Kröner Verlag.
- Sirkin, R. Mark (2006). *Statistics for the social sciences*. 3rd ed. Sage.
- Sørli, Mikjel (1950). *Norske språkminner i engelske tollregnskaper fra 1300-årene*. Universitetet i Bergen Årbok 1948: Historisk-antikvarisk rekke 3. Universitetet i Bergen.
- Spurkland, Terje (1991). "En fonografematisk analyse av runematerialet fra Bryggen i Bergen". PhD thesis. Institutt for nordistikk og litteraturvitenskap, Institutt for arkeologi, kunsthistorie og numismatikk, Universitetet i Oslo.
- (2005). *Norwegian runes and runic inscriptions*. Trans. by Betsy van der Hoek. Boydell & Brewer.
- Stefani, Elwys de (2016). "Names and Discourse". In: *The Oxford Handbook of Names and Naming*. Ed. by Carole Hough and Daria Izdebska. Oxford handbooks in linguistics. Oxford University Press, 52–66.
- Stemshaug, Ola (1982a). "Førreformatriske namn". In: *Norsk personnamnleksikon*. Ed. by Ola Stemshaug. 1st ed. Det norske Samlaget, 32–43.
- (1982b). "Namngjeving og namnebruk. Namngjevingsmåtar". In: *Norsk personnamnleksikon*. Ed. by Ola Stemshaug. 1st ed. Det norske Samlaget, 25–31.
- Tanner, Simon, Laura Gibson, Rebecca Kahn and Geoff Laycock (2016). "Choices in Digitisation for the Digital Humanities". In: *Research methods for creating and curating data in the digital humanities*. Ed. by Matt Hayler and Gabriele Griffin. Research methods for the arts and humanities. Edinburgh University Press, 14–43.

- TEI: P5 Guidelines (2020). URL: <https://tei-c.org/guidelines/p5/>.
- Thompson, Claiborne W. (1981). "On transcribing runic inscriptions". In: *Proceedings of the First International Symposium on Runes and Runic Inscriptions*. Ed. by Claiborne W. Thompson. Michigan Germanic Studies VII, 89–97.
- Unsworth, John, Raymond George Siemens and Susan Schreibman, eds. (2004). *A companion to digital humanities*. Blackwell companions to literature and culture 26. Blackwell Pub.
- Uppsala runforum (2018). *Samnordisk runtextdatabas*. URL: <http://www.runforum.nordiska.uu.se/srd/> (visited on 05/10/2018).
- velcrow (2018). *Simple way to calculate median with MySQL*. URL: <https://stackoverflow.com/a/7263925> (visited on 13/08/2018).
- w3schools (2020). *SQL Quick Reference*. URL: [https://www.w3schools.com/sql/sql\\_quickref.asp](https://www.w3schools.com/sql/sql_quickref.asp) (visited on 14/12/2020).
- Waldispühl, Michelle (2013). *Schreibpraktiken und Schriftwissen in südgermanischen Runeninschriften*. Medienwandel - Medienwechsel - Medienwissen 26. Chronos.
- West, Andrew (n.d.[b]). *BabelStone Shapes*. URL: <http://www.babelstone.co.uk/Fonts/Shapes.html>.
- Whaley (1993). "Nicknames and Narratives in the Sagas". In: *Arkiv för Nordisk Filologi* 108, 122–146.
- Wieske, Nicolas (2011). *Kommerzielle Revolution in Norwegen und Island? intraregionaler Handel im Spiegel altwestnordischer Quellen*. Utz.
- Zilmer, Kristel (2020). "Runic sticks and other inscribed objects from medieval Bergen: Challenges and possibilities". In: *Maal og Minne* 1, 65–101.

# Appendices

## A. Notes on using the appendices

Every chapter of this thesis has its own bespoke appendix with additional figures and tables. For chapters involving **DB** operations, the code referred to in the chapters is documented using the LaTeX listings package. This code does not copy paste well into **GUI**; the raw code can be obtained by contacting the author via [elisabeth.magin@gmx.de](mailto:elisabeth.magin@gmx.de).

## B. Inventory numbers

Table B.1. Complete list of inventory numbers. “Bergen” indicates the numbers assigned by Liestøl during his first examination.

<b>TAKERUN</b>	Museum	NIYR VI	Bergen	SRDB
ins1	0000/031265/001	603	330	N 603 M
ins10	0000/029751/001	612	285	N 612 M
ins100	0000/034459/001	703	376	N 703 M
ins101	0000/025336/001	704	222	N 704 M
ins102	0000/041940/001	705	446	N 705 M
ins103	0000/043439/001	706	468	N 706 M
ins104	0000/040456/001	707	433	N 707 M
ins105	0000/009181/001	708	23	N 708 M
ins106	0000/017526/001	709	117	N 709 M
ins107	0000/011762/001	710	47	N 710 M
ins108	0000/036994/001	711	397	N 711 M
ins109	0000/020668/001	712	176	N 712 M
ins11	0000/019326/001	613	159	N 613 M
ins110	0000/020882/001	713	182	N 713 M
ins111	0000/009113/001	714	21	N 714 M
ins112	0000/023007/001	715	204	N 715 M
ins113	0000/028729/001	716	256	N 716 M
ins114	0000/019117/001	717	155	N 717 M
ins115	0000/031994/001	718	353	N 718 M
ins116	0000/019531/001	719	164	N 719 M
ins117	0000/014840/001	720	80	N 720 M
ins118	0000/012692/001	721	67	N 721 M
ins119	0000/030412/001	722	297	N 722 M
ins12	0000/035508/001	614	389	N 641 M
ins120	0000/031771/001	723	344	N 723 M
ins121	0000/018710/001	724	148	N 724 M
ins122	0000/019041/001	725	151	N 725 M
ins123	0000/029690/001	726	283	N 726 M
ins124	0000/030580/001	727	302	N 727 M
ins125	0076/006196/001	728	595	N 728 M
ins126	0000/061658/001	729	527	N 729 M



TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins127	0000/023971/001	730	209	N 730 M
ins128	0000/063648/001	731	537	N 731 M
ins129	0000/040108/001	732	428	N 732 M
ins13	0000/033747/001	615	375	N 615 M
ins130	0000/017680/001	733	121	N 733 M
ins131	0000/031171/001	734	321	N 734 M
ins132	0000/030690/001	735	309	N 735 M
ins133	0000/030941/001	736	316	N 736 M
ins134	0000/052994/001	737	506	N 737 M
ins135	0000/044562/001	738	481	N 738 M
ins136	0000/019278/001	739	210	N 739 M
ins137	0000/031187/001	740	326	N 740 M
ins138	0000/029281/001	741	269	N 741 M
ins139	0000/019116/001	742	154	N 742 M
ins14	0000/011214/001	616	42	N 616 M
ins140	0000/077156/001	743	553	N 743 M
ins141	0000/044372/001	744	478	N 744 M
ins142	0000/019718/001	745	167	N 745 M
ins143	0000/028821/001	746	261	N 746 M
ins144	0000/032077/001	747	360	N 747 M
ins145	0000/037807/001	748	419	N 748 M
ins146	0000/054388/001	749	513	N 749 M
ins147	0000/018628/001	750	146	N 750 M
ins148	0000/032060/001	751	357	N 751 M
ins149	0000/031444/001	752	340	N 752 M
ins15	0000/068064/001	617	543	N 617 M
ins150	0000/016903/001	753	105	N 753 M
ins151	0000/024349/001	754	216	N 754 M
ins152	0000/034460/001	755	377	N 755 M
ins153	0000/022079/001	756	198	N 756 M
ins154	0000/037382/001	757	408	N 757 M
ins155	0000/013093/001	758	72	N 758 M
ins156	0000/042518/001	759	456	N 759 M
ins157	0000/011478/001	760	43	N 760 M
ins158	0000/016411/001	761	98	N 761 M
ins159	0000/022296/001	762	199	N 762 M
ins16	0000/018094/001	618	130	N 618 M
ins160	0000/032075/001	763	358	N 763 M
ins161	0000/061923/001	764	531	N 764 M
ins162	0000/060383/001	765	522	N 765 M
ins163	0000/008953/001	766	16	N 766 M
ins164	0000/040669/001	767	435	N 767 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins165	0000/040277/001	768	430	N 768 M
ins166	0000/022736/001	769	202	N 769 M
ins167	0000/033746/001	770	374	N 770 M
ins168	0000/045966/001	771	487	N 771 M
ins169	0000/026328/001	722	236	N 772 M
ins17	0000/032891/001	619	370	N 619 M
ins170	0000/008950/001	773	14	N 773 M
ins171	0048/000000/001		1	N B1 M
ins172	0000/001102/001		3	N B3 M
ins173	0000/003028/001		4	N B4 M
ins174	0000/004450/001		8	N B8 M
ins175	0000/008445/001		9	N B9 M
ins176	0000/006522/001		10	N B10 M
ins177	0000/008561/001		11	N B11 M
ins178	0000/008602/001		12	N B12 M
ins179	0000/008760/001		13	N B13 M
ins18	0000/026041/001	620	233	N 620 M
ins180	0000/008951/001		15	N B15 M
ins181	0000/009059/001		17	N B17 M
ins182	0000/009060/001		18	N B18 M
ins183	0000/009060/002		19	N B19 M
ins184	0000/009098/001		20	N B20 M
ins185	0000/009180/001		22	N B22 M
ins186	0000/009291/001		24	N B24 M
ins187	0000/009610/001		25	N B25 M
ins188	0000/010006/001		26	N B26 M
ins189	0000/010398/001		27	N B27 M
ins19	0000/015301/001	621	85	N 621 M
ins190	0000/011855/001		28	N B28 M
ins191	0000/011889/001		29	N B29 M
ins192	0000/012318/001		30	N B30 M
ins193	0000/012838/001		32	N B32 M
ins194	0000/003520/001		34	N B34 M
ins195	0000/010554/001		35	N B35 M
ins196	0000/010668/001		38	N B38 M
ins197	0000/010667/001		39	N B39 M
ins198	0000/010664/001		40	N B40 M
ins199	0000/010552/001		41	N B41 M
ins2	0000/084381/001	606	563	N 606 M
ins20	0000/009242/001	622	7	N 622 M
ins200	0000/011476/001		44	N B44 M
ins201	0000/011477/001		45	N B45 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins202	0000/011479/001		46	N B46 M
ins203	0000/011835/001		48	N B48 M
ins204	0000/011952/001		49	N B49 M
ins205	0000/012186/001		51	N B51 M
ins206	0000/012275/001		53	N B53 M
ins207	0000/012274/001		55	N B55 M
ins208	0000/012319/001		56	N B56 M
ins209	0000/012486/001		57	N B57 M
ins21	0000/023851/001	623	577	N 623 M
ins210	0000/012033/001		58	N B58 M
ins211	0000/012502/001		59	N B59 M
ins212	0000/012334/001		60	N B60 M
ins213	0000/012498/001		62	N B62 M
ins214	0000/012591/001		64	N B64 M
ins215	0000/012691/001		65	N B65 M
ins216	0000/012777/001		66	N B66 M
ins217	0000/012865/001		68	N B68 M
ins218	0000/013775/001		74	N B74 M
ins219	0000/013946/001		76	N B76 M
ins22	0000/013796/001	624	75	N 624 M
ins220	0000/014308/001		77	N B77 M
ins221	0000/014307/001		78	N B78 M
ins222	0000/014169/001		79	N B79 M
ins223	0000/014642/001		81	N B81 M
ins224	0000/015049/001		82	N B82 M
ins225	0000/015284/001		86	N B86 M
ins226	0000/015660/001		87	N B87 M
ins227	0000/015845/001		88	N B88 M
ins228	0000/015955/001		89	N B89 M
ins229	0000/015912/001		90	N B90 M
ins23	0000/012883/001	625	33	N 625 M
ins230	0000/016058/001		91	N B91 M
ins231	0000/016059/001		92	N B92 M
ins232	0000/016037/001		93	N B93 M
ins233	0000/016181/001		94	N B94 M
ins234	0000/016413/001		99	N B99 M
ins235	0000/016413/002		100	N B100 M
ins236	0000/016645/001		101	N B101 M
ins237	0000/016706/001		102	N B102 M
ins238	0000/016777/001		103	N B103 M
ins239	0000/016858/001		104	N B104 M
ins24	0000/001244/001	626	573	N 626 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins240	0000/016911/001		107	N B107 M
ins241	0000/006945/001		108	N B108 M
ins242	0000/016982/001		109	N B109 M
ins243	0000/006989/001		110	N B110 M
ins244	0000/017060/001		111	N B111 M
ins245	0000/017223/001		112	N B112 M
ins246	0000/017252/001		113	N B113 M
ins247	0000/017427/001		115	N B115 M
ins248	0000/017428/001		116	N B116 M
ins249	0000/017540/001		118	N B118 M
ins25	0000/030711/001	627	310	N 627 M
ins250	0000/017595/001		119	N B119 M
ins251	0000/017701/001		122	N B122 M
ins252	0000/017702/001		123	N B123 M
ins253	0000/017704/001		124	N B124 M
ins254	0000/018010/001		126	N B126 M
ins255	0000/018211/001		127	N B127 M
ins256	0000/018052/001		128	N B128 M
ins257	0000/018093/001		129	N B129 M
ins258	0000/018110/001		132	N B132 M
ins259	0000/017379/001		133	N B133 M
ins26	0000/043754/001	628	471	N 628 M
ins260	0000/018173/001		134	N B134 M
ins261	0000/018253/001		135	N B135 M
ins262	0000/018254/001		136	N B136 M
ins263	0000/018271/001		138	N B138 M
ins264	0000/018441/001		140	N B140 M
ins265	0000/018540/001		142	N B142 M
ins266	0000/018595/001		143	N B143 M
ins267	0000/018910/001		145	N B145 M
ins268	0000/018679/001		147	N B147 M
ins269	0000/018959/001		149	N B149 M
ins27	0000/031525/001	629	341	N 629 M
ins270	0000/018990/001		150	N B150 M
ins271	0000/019090/001		153	N B153 M
ins272	0000/019161/001		156	N B156 M
ins273	0000/019181/001		158	N B158 M
ins274	0000/019385/001		160	N B160 M
ins275	0000/019386/001		161	N B161 M
ins276	0000/019529/001		163	N B163 M
ins277	0000/019563/001		165	N B165 M
ins278	0000/019734/001		168	N B168 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins279	0000/020001/001		170	N B170 M
ins28	0000/009241/001	630	5	N 630 M
ins280	0000/020015/001		171	N B171 M
ins281	0000/020315/001		172	N B172 M
ins282	0000/020482/001		174	N B174 M
ins283	0000/020669/001		177	N B177 M
ins284	0000/020695/001		178	N B178 M
ins285	0000/020834/001		180	N B180 M
ins286	0000/020881/001		181	N B181 M
ins287	0000/020893/001		183	N B183 M
ins288	0000/020969/001		184	N B184 M
ins289	0000/021265/001		185	N B185 M
ins29	0000/013894/001	631	73	N 631 M
ins290	0000/021364/001		187	N B187 M
ins291	0000/021365/001		188	N B188 M
ins292	0000/021424/001		189	N B189 M
ins293	0000/021425/001		190	N B190 M
ins294	0000/021430/001		191	N B191 M
ins295	0000/021432/001		192	N B192 M
ins296	0000/021514/001		193	N B193 M
ins297	0000/022300/001		200	N B200 M
ins298	0000/023006/001		203	N B203 M
ins299	0000/023493/001		205	N B205 M
ins3	0000/010568/001	607	36	N 607 M
ins30	0000/027316/001	632	248	N 632 M
ins300	0000/023503/001		206	N B206 M
ins301	0000/022600/001		208	N B208 M
ins302	0000/020885/001		211	N B211 M
ins303	0000/024255/001		214	N B214 M
ins304	0000/024348/001		215	N B215 M
ins305	0000/024410/001		217	N B217 M
ins306	0000/024793/001		218	N B218 M
ins307	0000/024842/001		219	N B219 M
ins308	0000/025329/001		221	N B221 M
ins309	0000/025410/001		223	N B223 M
ins31	0000/028202/001	633	251	N 633 M
ins310	0000/025461/001		225	N B225 M
ins311	0000/025476/001		226	N B226 M
ins312	0000/025535/001		227	N B227 M
ins313	0000/025604/001		228	N B228 M
ins314	0000/025670/001		229	N B229 M
ins315	0000/025671/001		230	N B230 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins316	0000/026268/001		235	N B235 \$M
ins317	0000/026349/001		237	N B237 M
ins318	0000/026384/001		239	N B239 M
ins319	0000/026415/001		240	N B240 M
ins32	0000/016904/001	634	106	N 634 M
ins320	0000/026421/001		241	N B241 M
ins321	0000/026652/001		242	N B242 M
ins322	0000/026900/001		243	N B243 M
ins323	0000/026955/001		244	N B244 M
ins324	0000/027173/001		245	N B245 M
ins325	0000/027206/001		246	N B246 M
ins326	0000/027487/001		249	N B249 M
ins327	0000/028197/001		250	N B250 M
ins328	0000/028465/001		252	N B252 M
ins329	0000/028524/001		253	N B253 M
ins33	0000/068384/001	635	544	N 635 M
ins330	0000/028541/001		254	N B254 M
ins331	0000/028553/001		255	N B255 M
ins332	0000/028770/001		257	N B257 M
ins333	0000/028796/001		259	N B259 M
ins334	0000/028800/001		260	N B260 M
ins335	0000/028975/001		262	N B262 M
ins336	0000/029106/001		263	N B263 M
ins337	0000/029162/001		264	N B264 M
ins338	0000/029180/001		265	N B265 M
ins339	0000/029217/001		266	N B266 M
ins34	0000/037293/001	636	407	N 636 M
ins340	0000/029258/001		267	N B267 M
ins341	0000/029259/001		268	N B268 M
ins342	0000/029306/001		271	N B271 M
ins343	0000/029460/001		273	N B273 M
ins344	0000/029461/001		274	N B274 M
ins345	0076/006194/001		593	N B593 M
ins346	0076/006195/001		594	N B594 M
ins347	0076/007660/001		596	N B596 M
ins348	0076/008805/001		597	N B597 M
ins349	0000/087771/001		598	N B598 M
ins35	0000/031413/001	637	337	N 637 M
ins350	0000/087909/001		599	N B599 M
ins351	0000/088536/001		600	N B600 M
ins352	0000/088788/001		601	N B601 M
ins353	0000/095055/001		603	N B603 M



TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins354	0000/095056/001		604	N B604 M
ins355	0000/052927/001		605	N B605 M
ins356	0001/078137/001		606	N B606 M
ins357	0094/001248/001		607	N B607 M
ins358	0076/009221/001		608	N B608 M
ins359	0076/006651/001		609	N B609 M
ins36	0000/065550/001	638	541	N 638 M
ins360	0076/006898/001		610	N B610 M
ins361	0076/006197/001		611	N B611 M
ins362	0000/006815/001		612	N B612 M
ins363	0076/011744/001		613	N B613 M
ins364	0076/006200/001		614	N B614 M
ins365	0000/029466/001		275	N B275 M
ins366	0000/029526/001		276	N B276 M
ins367	0000/029585/001		277	N B277 M
ins368	0000/029637/001		280	N B280 M
ins369	0000/029669/001		281	N B281 M
ins37	0000/061702/001	639	528	N 639 M
ins370	0000/029676/001		282	N B282 M
ins371	0000/029804/001		286	N B286 M
ins372	0000/029888/001		287	N B287 M
ins373	0000/029909/001		288	N B288 M
ins374	0000/029958/001		289	N B289 M
ins375	0000/029977/001		290	N B290 M
ins376	0000/029991/001		291	N B291 M
ins377	0000/030053/001		292	N B292 M
ins378	0000/030085/001		293	N B293 M
ins379	0000/030096/001		294	N B294 M
ins38	0000/036584/001	640	394	N 640 M
ins380	0000/030198/001		295	N B295 M
ins381	0000/030427/001		298	N B298 M
ins382	0000/030429/001		300	N B300 M
ins383	0000/030551/001		301	N B301 M
ins384	0000/030581/001		303	N B303 M
ins385	0000/030631/001		304	N B304 M
ins386	0000/030649/001		305	N B305 M
ins387	0000/030666/001		306	N B306 M
ins388	0000/030689/001		307	N B307 M
ins389	0000/030760/001		308	N B308 M
ins39	0000/023504/001	641	207	N 641 M
ins390	0000/030746/001		311	N B311 M
ins391	0000/030759/001		313	N B313 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins392	0000/030812/001		314	N B314 M
ins393	0000/030913/001		315	N B315 M
ins394	0000/030948/001		317	N B317 M
ins395	0000/031085/001		319	N B319 M
ins396	0000/031170/001		320	N B320 M
ins397	0000/031173/001		323	N B323 M
ins398	0000/031182/001		325	N B325 M
ins399	0000/031188/001		327	N B327 M
ins4	0000/030315/001	604	296	N 604 M
ins40	0000/007529/001	642	6	N 642 M
ins400	0000/031228/001		328	N B328 M
ins401	0000/031229/001		329	N B329 M
ins402	0000/031354/001		331	N B331 M
ins403	0000/031355/001		332	N B332 M
ins404	0000/031390/001		333	N B333 M
ins405	0000/031410/001		334	N B334 M
ins406	0000/031411/001		335	N B335 M
ins407	0000/031412/001		336	N B336 M
ins408	0000/031414/001		338	N B338 M
ins409	0000/031623/001		342	N B342 M
ins41	0000/022368/001	643	201	N 643 M
ins410	0000/031710/001		343	N B343 M
ins411	0000/031804/001		346	N B346 M
ins412	0000/031868/001		347	N B347 M
ins413	0000/031900/001		348	N B348 M
ins414	0000/031903/001		351	N B351 M
ins415	0000/031904/001		352	N B352 M
ins416	0000/032033/001		354	N B354 M
ins417	0000/032034/001		355	N B355 M
ins418	0000/032120/001		361	N B361 M
ins419	0000/032303/001		362	N B362 M
ins42	0000/012090/001	644	50	N 644 M
ins420	0000/032746/001		364	N B364 M
ins421	0000/032747/001		365	N B365 M
ins422	0000/032853/001		366	N B366 M
ins423	0000/032854/001		367	N B367 M
ins424	0000/032875/001		368	N B368 M
ins425	0000/032890/001		369	N B369 M
ins426	0000/032923/001		371	N B371 M
ins427	0000/033738/001		373	N B373 M
ins428	0000/034551/001		378	N B378 M
ins429	0000/034556/001		379	N B379 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins43	0000/041612/001	645	444	N 645 M
ins430	0000/034880/001		380	N B380 M
ins431	0000/035038/001		381	N B381 M
ins432	0000/035066/001		382	N B382 M
ins433	0000/035067/001		383	N B383 M
ins434	0000/035229/001		384	N B384 M
ins435	0000/035283/001		385	N B385 M
ins436	0000/035363/001		386	N B386 M
ins437	0000/035460/001		387	N B387 M
ins438	0000/035509/001		390	N B390 M
ins439	0000/035944/001		391	N B391 M
ins44	0000/028771/001	646	258	N 646 M
ins440	0000/036360/001		392	N B392 M
ins441	0000/036917/001		395	N B395 M
ins442	0000/036929/001		396	N B396 M
ins443	0000/036995/001		398	N B398 M
ins444	0000/037017/001		399	N B399 M
ins445	0000/037046/001		400	N B400 M
ins446	0000/037092/001		401	N B401 M
ins447	0000/037196/001		402	N B402 M
ins448	0000/037208/001		403	N B403 M
ins449	0000/037261/001		404	N B404 M
ins45	0000/029706/001	647	284	N 647 M
ins450	0000/037277/001		405	N B405 M
ins451	0000/037283/001		406	N B406 M
ins452	0000/037383/001		409	N B409 M
ins453	0000/037384/001		410	N B410 M
ins454	0000/037385/001		411	N B411 M
ins455	0000/037565/001		413	N B413 M
ins456	0000/037596/001		414	N B414 M
ins457	0000/037648/001		415	N B415 M
ins458	0000/037672/001		416	N B416 M
ins459	0000/037732/001		417	N B417 M
ins46	0000/021919/001	648	195	N 648 M
ins460	0000/037844/001		420	N B420 M
ins461	0000/037885/001		421	N B421 M
ins462	0000/037957/001		422	N B422 M
ins463	0000/038244/001		423	N B423 M
ins464	0000/039522/001		424	N B424 M
ins465	0000/039917/001		425	N B425 M
ins466	0000/039977/001		426	N B426 M
ins467	0000/040000/001		427	N B427 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins468	0000/040127/001		429	N B429 M
ins469	0000/040324/001		431	N B431 M
ins47	0000/026374/001	649	238	N 649 M
ins470	0000/040576/001		434	N B434 M
ins471	0000/040763/001		436	N B436 M
ins472	0000/041056/001		439	N B439 M
ins473	0000/041170/001		441	N B441 M
ins474	0000/041353/001		442	N B442 M
ins475	0000/041393/001		443	N B443 M
ins476	0000/041939/001		445	N B445 M
ins477	0000/042000/001		447	N B447 M
ins478	0000/042011/001		448	N B448 M
ins479	0000/042050/001		449	N B449 M
ins48	0000/040325/001	650	432	N 650 M
ins480	0000/042090/001		450	N B450 M
ins481	0000/042269/001		451	N B451 M
ins482	0000/042270/001		452	N B452 M
ins483	0000/042375/001		453	N B453 M
ins484	0000/042433/001		454	N B454 M
ins485	0000/042491/001		455	N B455 M
ins486	0000/042536/001		457	N B457 M
ins487	0000/042606/001		458	N B458 M
ins488	0000/042653/001		459	N B459 M
ins489	0000/042707/001		460	N B460 M
ins49	0000/029622/001	651	279	N 651 M
ins490	0000/042807/001		461	N B461 M
ins491	0000/043025/001		462	N B462 M
ins492	0000/043072/001		463	N B463 M
ins493	0000/043110/001		465	N B465 M
ins494	0000/043163/001		466	N B466 M
ins495	0000/043256/001		467	N B467 M
ins496	0000/043661/001		469	N B469 M
ins497	0000/043704/001		470	N B470 M
ins498	0000/043757/001		474	N B474 M
ins499	0000/043903/001		475	N B475 M
ins5	0000/015203/001	608	84	N 608 M
ins50	0000/037789/001	652	418	N 652 M
ins500	0000/043965/001		476	N B476 M
ins502	0000/044410/001		479	N B479 M
ins503	0000/044477/001		480	N B480 M
ins504	0000/044851/001		483	N B483 M
ins505	0000/045930/001		485	N B485 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins506	0000/046336/001		488	N B488 M
ins507	0000/046571/001		489	N B489 M
ins508	0000/046440/001		490	N B490 M
ins509	0000/046717/001		491	N B491 M
ins51	0000/037564/001	653	412	N 653 M
ins510	0000/050605/001		492	N B492 M
ins511	0000/051140/001		493	N B493 M
ins512	0000/051203/001		494	N B494 M
ins513	0000/051219/001		495	N B495 M
ins514	0000/051385/001		496	N B496 M
ins515	0000/052098/001		497	N B497 M
ins516	0000/052299/001		499	N B499 M
ins517	0000/052402/001		500	N B500 M
ins518	0000/052511/001		501	N B501 M
ins519	0000/052560/001		502	N B502 M
ins52	0000/088800/001	654	602	N 654 M
ins520	0000/052722/001		503	N B503 M
ins521	0000/052790/001		504	N B504 M
ins522	0000/052920/001		505	N B505 M
ins523	0000/053257/001		508	N B508 M
ins524	0000/053472/001		509	N B509 M
ins525	0000/053473/001		510	N B510 M
ins526	0000/053705/001		511	N B511 M
ins527	0000/054086/001		512	N B512 M
ins528	0000/055618/001		515	N B515 M
ins529	0000/057281/001		516	N B516 M
ins53	0000/016154/001	655	95	N 655 M
ins530	0000/058642/001		518	N B518 M
ins531	0000/059523/001		520	N B520 M
ins532	0000/060182/001		521	N B521 M
ins533	0000/061088/001		524	N B524 M
ins534	0000/061300/001		525	N B525 M
ins535	0000/061423/001		526	N B526 M
ins536	0000/061802/001		529	N B529 M
ins537	0000/061817/001		530	N B530 M
ins538	0000/062071/001		532	N B532 M
ins539	0000/062382/001		533	N B533 M
ins54	0000/031181/001	656	324	N 656 M
ins540	0000/063013/001		534	N B534 M
ins541	0000/063019/001		535	N B535 M
ins542	0000/063186/001		536	N B536 M
ins543	0000/064049/001		539	N B539 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins544	0000/064079/001		540	N B540 M
ins545	0000/065770/001		542	N B542 M
ins546	0000/070535/001		546	N B546 M
ins547	0000/071477/001		547	N B547 M
ins548	0000/071491/001		548	N B548 M
ins549	0000/071692/001		549	N B549 M
ins55	0000/017399/001	657	114	N 657 M
ins550	0000/071782/001		550	N B550 M
ins551	0000/071951/001		551	N B551 M
ins552	0000/073214/001		552	N B552 M
ins553	0001/078670/001		554	N B554 M
ins554	0001/079839/001		556	N B556 M
ins555	0001/081381/001		557	N B557 M
ins556	0001/083199/001		559	N B559 M
ins557	0001/083200/001		560	N B560 M
ins558	0001/083991/001		561	N B561 M
ins559	0001/084101/001		562	N B562 M
ins56	0000/041038/001	658	438	N 658 M
ins560	0000/084763/001		565	N B565 M
ins561	0003/085226/001		566	N B566 M
ins562	0001/085705/001		568	N B568 M
ins563	0000/086167/001		569	N B569 M
ins564	0000/086362/001		570	N B570 M
ins565	0001/086928/001		571	N B571 M
ins566	0000/083953/001		572	N B572 M
ins567	0001/004115/001		574	N B574 M
ins568	0004/006037/001		576	N B576 M
ins569	0000/024928/001		578	N B578 M
ins57	0000/033737/001	659	372	N 659 M
ins570	0000/095076/001		579	N B579 M
ins571	0083/004234/001		581	N B581 M
ins572	0083/004464/001		582	N B582 M
ins573	0083/004490/001		583	N B583 M
ins574	0083/004811/001		584	N B584 M
ins575	0083/004876/001		585	N B585 M
ins576	0083/004989/001		586	N B586 M
ins577	0083/005180/001		587	N B587 M
ins578	0083/005668/001		588	N B588 M
ins579	0083/006013/001		589	N B589 M
ins58	0000/029418/001	660	272	N 660 M
ins580	0083/006118/001		590	N B590 M
ins581	0076/006192/001		591	N B591 M




TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins582	0076/006193/001		592	N B592 M
ins583	0104/001753/001		615	N B615 M
ins584	0076/021250/001		616	N B616 M
ins585	0104/001752/001		617	N B617 M
ins586	0110/000373/001		619	N B619 M
ins587	0110/000721/001		620	N B620 M
ins588	0110/001230/001		621	N B621 M
ins589	0110/001544/001		622	N B622 M
ins59	0000/027205/001	661	247	N 661 M
ins590	0110/001641/001		623	N B623 M
ins591	0110/001701/001		624	N B624 M
ins592	0110/001711/001		625	N B625 M
ins593	0110/003244/001		626	N B626 M
ins594	0110/003415/001		627	N B627 M
ins595	0110/003490/001		628	N B628 M
ins596	0110/005500/001		629	N B629 M
ins597	0110/005935/001		630	N B630 M
ins598	0000/006802/001		632	N B632 M
ins599	0000/016796/001		633	N B633 M
ins6	0000/013033/001	605	71	N 605 M
ins60	0000/012588/001	662	63	N 662 M
ins600	0000/017042/001		634	N B634 M
ins601	0000/022759/001		635	N B635 M
ins602	0000/054158/001		637	N B637 M
ins603	0000/071730/001		638	N B638 M
ins604	0000/076765/001		639	N B639 M
ins605	0000/076845/001		640	N B640 M
ins606	0000/077161/001		641	N B641 M
ins607	0000/079576/001		642	N B642 M
ins608	0000/079975/001		643	N B643 M
ins609	0000/081002/001		644	N B644 M
ins61	0000/012401/001	663	61	N 663 M
ins610	0000/089786/001		645	N B645 M
ins611	0076/012886/001		646	N B646 M
ins612	0076/022393/001		647	N B647 M
ins613	0076/022756/001		648	N B648 M
ins614	0083/005639/001		649	N B649 M
ins615	0083/006210/001		650	N B650 M
ins616	0090/001131/001		652	N B652 M
ins617	0115/000003/001		653	N B653 M
ins618	0000/021542/001		654	N B654 M
ins619	0000/074605/001		656	N B656 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins62	0000/032056/001	664	356	N 664 M
ins620	0000/087107/001		657	N B657 M
ins621	0237/001518/001		658	N B658 M
ins622	0237/012219/001		660	N B660 M
ins623	0342/000081/001		661	N B661 M
ins624	0000/016253/001		662	N B662 M
ins625	0000/077726/001		663	N B663 M
ins626	0076/004706/001		664	N B664 \$M
ins627	0346/001917/001		666	N B666 M
ins628	0346/002665/001		667	N B667 M
ins629	0346/003548/001		668	N B668 M
ins63	0000/021967/001	665	196	N 665 M
ins630	0246/004181/001		669	N B669 M
ins631	0000/073291/001		671	N B671 M
ins632	0000/045745/001		672	N B672 M
ins633	0000/073460/001		31	
ins634	0000/012289/001		54	
ins635	0000/015178/001		83	
ins636	0000/016219/001		96	
ins637	0000/016310/001		97	
ins638	0000/017611/001		120	
ins639	0000/017890/001		125	
ins64	0000/055524/001	666	514	N 666 M
ins640	0000/018255/001		137	
ins641	0000/018456/001		141	
ins642	0000/018242/001		144	
ins643	0000/019607/001		166	
ins644	0000/021266/001		186	
ins645	0000/022338/001		212	
ins646	0000/025430/001		224	
ins647	0000/025681/001		231	
ins648	0000/025903/001		232	
ins649	0000/026110/001		234	
ins65	0000/043756/001	667	473	N 667 M
ins650	0000/029586/001		278	
ins651	0000/030428/001		299	
ins652	0000/030751/001		312	
ins653	0000/032076/001		359	
ins654	0000/032641/001		363	
ins655	0000/044995/001		484	
ins656	0000/045931/001		486	
ins657	0000/052260/001		498	

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins658	0000/053066/001		507	
ins659	0000/058575/001		517	
ins66	0000/044013/001	668	477	N 668 M
ins660	0000/058657/001		519	
ins661	0003/000809/001		545	
ins662	0001/082204/001		558	
ins663	0000/005691/001		575	
ins664	0083/004135/001		580	
ins665	0076/008102/001		618	
ins666	0110/005953/001		631	
ins667	0000/045047/001		636	
ins668	0086/000426/001		651	
ins669	0000/057189/001		655	
ins67	0000/012923/001	669	70	N 669 M
ins670	0237/012218/001		659	
ins671	0346/000186/001		665	
ins672	0346/004200/001		670	
ins673	0000/093321/001			
ins674	0000/003097/001			
ins675	0000/027301/001			
ins676	B/007097/0b/01			
ins677	0000/064155/001			
ins678	0000/			
ins68	0000/019052/001	670	152	N 670 M
ins69	0000/043109/001	671	464	N 671 M
ins7	0000/041163/001	609	440	N 609 M
ins70	0000/020438/001	672	173	N 672 M
ins71	0000/019517/001	673	162	N 673 M
ins72	0000/019809/001	674	169	N 674 M
ins73	0000/079607/001	675	555	N 675 M
ins74	0000/010567/001	676	37	N 676 M
ins75	0000/031902/001	677	350	N 677 M
ins76	0000/084690/001	678	564	N 678 M
ins77	0000/018095/001	679	131	N 679 M
ins78	0000/019180/001	680	157	N 680 M
ins79	0000/018333/001	681	139	N 681 M
ins8	0000/012886/001	610	69	N 610 M
ins80	0000/044817/001	682	482	N 682 M
ins81	0000/031036/001	683	318	N 683 M
ins82	0000/060622/001	684	523	N 684 M
ins83	0000/063657/001	685	538	N 685 M
ins84	0000/031172/001	686	322	N 686 M

TAKERUN	Museum	NIYR VI	Bergen	SRDB
ins85	0000/085675/001	687	567	N 687 M
ins86	0000/012187/001	688	52	N 688 M
ins87	0000/025282/001	689	220	N 689 M
ins88	0000/043755/001	690	472	N 690 M
ins89	0000/031803/001	691	345	N 691 M
ins9	0000/029305/001	611	270	N 611 M
ins90	0000/040969/001	692	437	N 692 M
ins91	0000/031901/001	693-694	349	N 693 M, N 694 M
ins92	0000/020780/001	695	179	N 695 M
ins93	0000/031443/001	696	339	N 696 M
ins94	0000/020653/001	697	175	N 697 M
ins95	0000/021996/001	698	197	N 698 M
ins96	0000/035462/001	699	388	N 699 M
ins97	0000/021515/001	700	194	N 700 M
ins98	0000/036385/001	701	393	N 701 M
ins99	0000/024158/001	702	213	N 702 M





Zur Übersicht  
der Abfragen

[Projektbeschreibung](#)
[Abfragen](#)
[Kontakt](#)
[Links](#)
[English version](#)

### Datenbankabfragen

#### Abfragen zu Inschriften

- 1 - Steckbrief: wichtigste Daten zu einer Inschrift
- 2 - Literatur zu einer Inschrift
- 3 - Typen von Inschriften
- 4 - Zeitliche Einordnung der Inschriften nach archäologischen Kriterien
- 5 - Fälschungsverdächtige Inschriften
- 6 - Inschriften aus einem Land
- 7 - Inschriften auf einem Objekttyp

#### Abfragen zu Deutungen

- 8 - Deutungen zu einer Inschrift mit Literaturangaben
- 9 - Sprachliche Klassifikation der Inschriften
- 10 - Deutungen zu einer Inschrift mit Syntax und Literaturangaben
- 11 - Syntaktische Struktur

#### Abfragen zu Wortmaterial

- 12 - Wortmaterial der Inschriften nach Wortklassen
- 13 - Wortbildungstypen im Wortmaterial der Inschriften
- 14 - Stämme und Flexionen
- 15 - Germanischer Stamm
- 16 - Wurzel
- 17 - Wörter zu einer Inschrift

#### Abfragen zu Literatur

- 18 - Bibliographie nach Autorennamen
- 19 - Rezensionen zu Veröffentlichungen

Figure C.2. Range of possible, predefined queries on the German version of **KDB**.



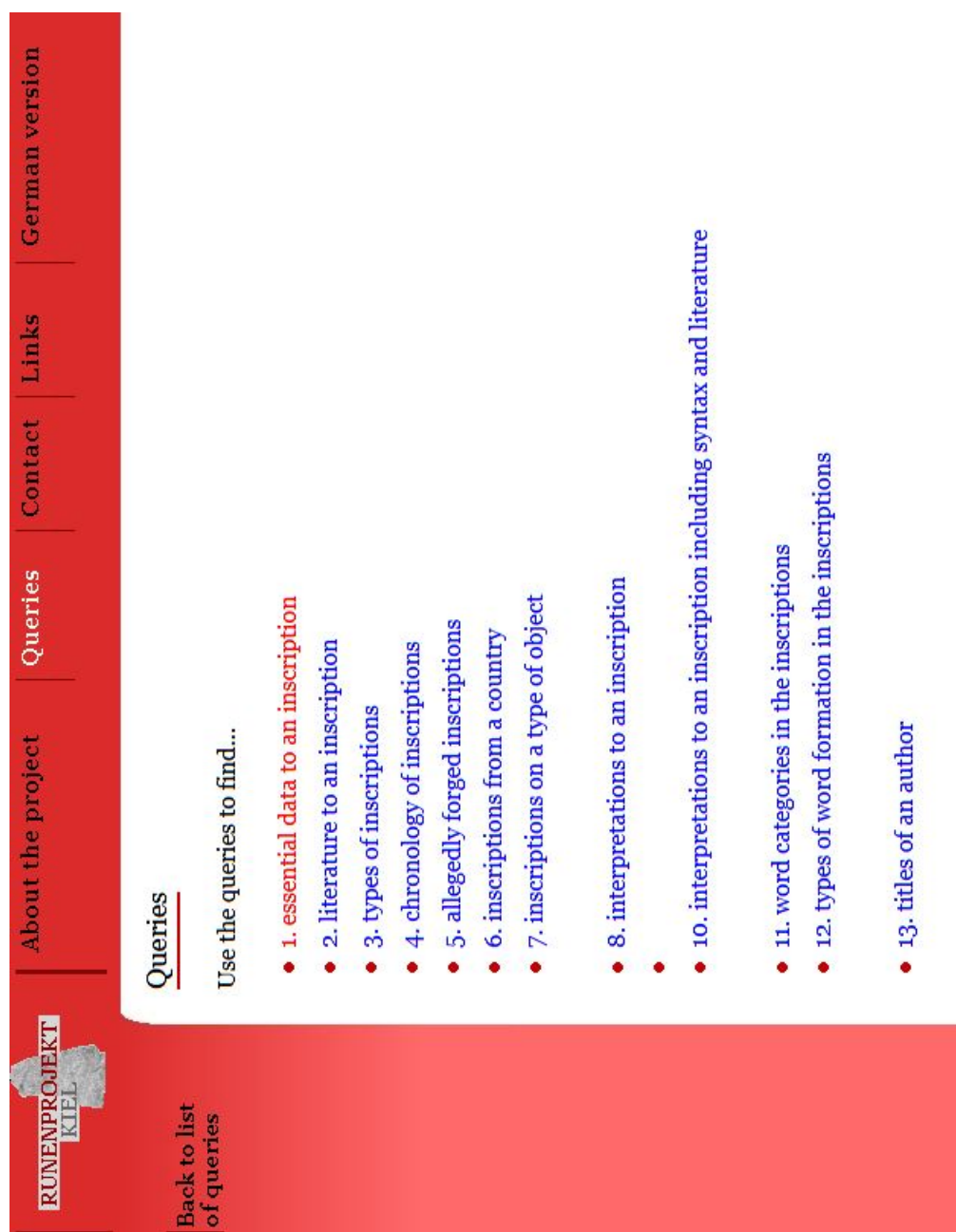


Figure C.3. Range of possible, predefined queries on the English version of KDB.

Figure C.4. Comparison of all currently available runic databases

	Data	Samnordisk runtexdatabas	Kieler Run- endatenbank	Runer fra Bryggen	RunesDB
Script-internal	Transrunification	-	-	-	-
	Transliteration	+	+	+	+
	Normalisation	+	+	(+)	
	Translation	+	+	-	
	Visual documentation	linked where available	(+)	(+)	
	Different versions of any of the above	-	+	-	
	Rune types/classification	+	+	-	
	Linguistic/textual purpose	+	-	-	
	Communicative situation	-	(+)	-	
	Object classification	+	+	+	
Script-eternal / Context	Relationship between inscription and carrier	-	+	-	
	Stress marks	-	+	-	
	Characteristic style	-	-	-	
	Provenance/Original site for runestones	+	+	-	
	Coordinates	(+)	-	-	
	Find spot/location	+	+	+	
	Coordinates find spot/location	+	-	-	
	Usage	+	+	-	
	Type of deposition	-	+	(+)	
	Circumstances of discovery	-	+	(+)	
	Period/Dating	+	+	+	
	Dating method	?	+	+	
	Material	+	+	(+)	
	Alternative	+	+	+	
	signum/references/signatures	(+)	+	+	
General information	Literature references	(+)	+	+	
	Present location	+	+	+	
Data structure		6 files containing information, connected by signum	relational MS Access DB, 4 entity types	no information available	MySQL
User interface		downloadable to Windows-PCs	web-based, Javascript	web-based, PHP	web-based, TYPO3
	Languages	Swedish, English	German, English	Norwegian (English)	German, English
	Help	+	-	-	
Search functionality		highly configurable, but difficult to use	prescribed, mostly unconfigurable	(-)	
	Saving queries	+	-	-	
Export functionality		rtf, txt; coordinates to Google Earth & Maps, gpx, shp, csv	copying from website	copying from website	

	Data	Samnordisk runtextdatabas	Kieler Run- endatenbank	Runer fra Bryggen	RunesDB
Additional information		Runecarvers; Find spot/location (in case runestone has been moved); Inscription purpose; Cross form; Style group	State of inscription & carrier; Socio- historical interpretation; Syntactic structures; Grammatical structures; Single words in inscriptions; Rune types/- classification; Potentially falsified		

## D. Chapter 3

### Additional figures

	Transliterations	Normalizations	Translations	Line divisions	Damaged or uncertain letters	Unreadable or missing but countable letters	Unreadable or missing and uncountable letters	Reconstructions or conjectural restorations	Bind-runes (ligatures)
Wimmer	s p a c i n g	<i>italics</i>	“quotes”		( )	[xxxx]	...	[ ]	ēr
DR	<b>boldface</b>	<i>italics</i>	s p a c i n g		( )	xxxx	...	[ ]	ēr
IR	s p a c i n g	<i>italics</i>		line by line	( )	----	---	[ ]	ēr
SR	<b>boldface</b>	<i>italics</i>	“quotes”	line by line	dots ....	----	...	[ ]	ēr
NlyR	<b>boldface</b>	<i>italics</i>	“quotes”	line by line	( )	****	...	[ ]	ēr
Krause	<b>boldface</b>	<i>italics</i>	“quotes”	line by line	dots ....	xxxx or [xxxx]	///	[ ]	ēr
Dickins	‘quotes’				<i>italics</i>	....	....	[ ]	e/r
Page	‘quotes’	<i>italics</i>	‘quotes’		<i>italics</i>	* or [.]	—	[ ]	e/r
Antonsen	<b>boldface</b>	<i>italics</i>	‘quotes’	line by line		****		[ ]	
Leiden					dots ....	.... or [...]	} or or [ ]	[ ]	

Figure D.1. Conventions of marking up text in runic corpus editions as collected by Thompson (1981).

Figure D.2. Character encoding in Gullskoen and Gullhornet with the runic characters occupying the slots reserved for other characters in today's Unicode Standard.

Code point	Name of sign supposed to be represented	Gullskoen grapheme	Gullhornet grapheme
0024	DOLLAR SIGN	ḁ	ḁ
0025	PERCENT SIGN	Ḃ	Ḃ
0026	AMPERSAND	Ḃ	Ḃ
0028	LEFT PARENTHESIS	Ḃ	Ḃ
0029	RIGHT PARENTHESIS	Ḃ	Ḃ
002A	ASTERISK	Ḃ	Ḃ
002B	PLUS SIGN	Ḃ	Ḃ
002C	COMMA	Ḃ	Ḃ
002E	FULL STOP	Ḃ	Ḃ
0030	DIGIT ZERO	Ḃ	Ḃ
0031	DIGIT ONE	Ḃ	Ḃ
0032	DIGIT TWO	Ḃ	Ḃ
0033	DIGIT THREE	Ḃ	Ḃ
0034	DIGIT FOUR	Ḃ	Ḃ
0035	DIGIT FIVE	Ḃ	Ḃ
0036	DIGIT SIX	Ḃ	Ḃ
0037	DIGIT SEVEN	Ḃ	Ḃ
0038	DIGIT EIGHT	Ḃ	Ḃ
0039	DIGIT NINE	Ḃ	Ḃ
003A	COLON	Ḃ	Ḃ
003B	SEMICOLON	Ḃ	Ḃ
003C	LESS-THAN SIGN	Ḃ	Ḃ
003D	EQUALS SIGN	Ḃ	Ḃ
003E	GREATER-THAN SIGN	Ḃ	Ḃ
003F	QUESTION MARK	Ḃ	Ḃ
0040	COMMERCIAL AT	Ḃ	Ḃ
0041	LATIN CAPITAL LETTER A	Ḃ	Ḃ
0042	LATIN CAPITAL LETTER B	Ḃ	Ḃ
0043	LATIN CAPITAL LETTER C	Ḃ	Ḃ
0044	LATIN CAPITAL LETTER D	Ḃ	Ḃ
0045	LATIN CAPITAL LETTER E	Ḃ	Ḃ
0046	LATIN CAPITAL LETTER F	Ḃ	Ḃ
0047	LATIN CAPITAL LETTER G	Ḃ	Ḃ
0048	LATIN CAPITAL LETTER H	Ḃ	Ḃ
0049	LATIN CAPITAL LETTER I	Ḃ	Ḃ
004A	LATIN CAPITAL LETTER J	Ḃ	Ḃ
004B	LATIN CAPITAL LETTER K	Ḃ	Ḃ
004C	LATIN CAPITAL LETTER L	Ḃ	Ḃ
004D	LATIN CAPITAL LETTER M	Ḃ	Ḃ
004E	LATIN CAPITAL LETTER N	Ḃ	Ḃ
004F	LATIN CAPITAL LETTER O	Ḃ	Ḃ
0050	LATIN CAPITAL LETTER P	Ḃ	Ḃ
0051	LATIN CAPITAL LETTER Q	Ḃ	Ḃ
0052	LATIN CAPITAL LETTER R	Ḃ	Ḃ
0053	LATIN CAPITAL LETTER S	Ḃ	Ḃ
0054	LATIN CAPITAL LETTER T	Ḃ	Ḃ
0055	LATIN CAPITAL LETTER U	Ḃ	Ḃ
0056	LATIN CAPITAL LETTER V	Ḃ	Ḃ
0057	LATIN CAPITAL LETTER W	Ḃ	Ḃ
0058	LATIN CAPITAL LETTER X	Ḃ	Ḃ

Code point	Character name	Gullskoen grapheme	Gullhornet grapheme
0059	LATIN CAPITAL LETTER Y	ʏ	Ÿ
005A	LATIN CAPITAL LETTER Z	Ʒ	Ʒ
005B	LEFT SQUARE BRACKET	h	ʅ
005C	REVERSE SOLIDUS	†	
005D	RIGHT SQUARE BRACKET	.	.
0061	LATIN SMALL LETTER A	ı	Ɔ
0062	LATIN SMALL LETTER B	B	B
0063	LATIN SMALL LETTER C	h	k
0064	LATIN SMALL LETTER D	ı	W
0065	LATIN SMALL LETTER E	ı	M
0066	LATIN SMALL LETTER F	Ɔ	Ɔ
0067	LATIN SMALL LETTER G	Ɔ	X
0068	LATIN SMALL LETTER H	*	H
0069	LATIN SMALL LETTER I	ı	ı
006A	LATIN SMALL LETTER J	ı	ı
006B	LATIN SMALL LETTER K	Ɔ	<
006C	LATIN SMALL LETTER L	ı	ı
006D	LATIN SMALL LETTER M	Ÿ	M
006E	LATIN SMALL LETTER N	ı	ı
006F	LATIN SMALL LETTER O	ı	Œ
0070	LATIN SMALL LETTER P	B	Ɔ
0071	LATIN SMALL LETTER Q	ı	ı
0072	LATIN SMALL LETTER R	R	R
0073	LATIN SMALL LETTER S	ı	ı
0074	LATIN SMALL LETTER T	ı	ı
0075	LATIN SMALL LETTER U	ı	ı
0076	LATIN SMALL LETTER V	Ɔ	ı
0077	LATIN SMALL LETTER W	P	P
0078	LATIN SMALL LETTER X	*	
0079	LATIN SMALL LETTER Y	ı	Ÿ
007A	LATIN SMALL LETTER Z	φ	Ʒ
007B	LEFT CURLY BRACKET	ı	
007C	VERTICAL LINE	ı	ı
007D	RIGHT CURLY BRACKET	.	
00A1	INVERTED EXCLAMATION MARK	ı	
00A2	CENT SIGN	ı	
00A3	POUND SIGN	ı	
00A4	CURRENCY SIGN	ı	
00A5	YEN SIGN	ı	
00A7	SECTION SIGN	ı	ı
00A9	COPYRIGHT SIGN	ı	ı
00AA	FEMININE ORDINAL INDICATOR	ı	
00AB	LEFT-POINTING DOUBLE ANGLE QUOTATION MARK	ı	
00AC	NOT SIGN	ı	
00AE	REGISTERED SIGN	ı	
00B0	DEGREE SIGN	D	
00B1	PLUS-MINUS SIGN	ı	
00B6	PILCROW SIGN	ı	ı
00BA	MASCULINE ORDINAL INDICATOR	ı	
00BB	RIGHT-POINTING DOUBLE ANGLE QUOTATION MARK	ı	ı



Code point	Character name	Gullskoen grapheme	Gullhornet grapheme
00C0	LATIN CAPITAL LETTER A WITH GRAVE	À	+
00C1	LATIN CAPITAL LETTER A WITH ACUTE	Á	ŷ
00C2	LATIN CAPITAL LETTER A WITH CIRCUMFLEX	Â	Ȧ
00C4	LATIN CAPITAL LETTER A WITH DIAERESIS	Ä	Ɑ
00C7	LATIN CAPITAL LETTER C WITH CEDILLA	Ç	α
00C8	LATIN CAPITAL LETTER E WITH GRAVE	È	
00C9	LATIN CAPITAL LETTER E WITH ACUTE	É	
00CA	LATIN CAPITAL LETTER E WITH CIRCUMFLEX	Ê	Ϸ
00CB	LATIN CAPITAL LETTER E WITH DIAERESIS	Ë	
00CC	LATIN CAPITAL LETTER I WITH GRAVE	Ì	
00CD	LATIN CAPITAL LETTER I WITH ACUTE	Í	
00CE	LATIN CAPITAL LETTER I WITH CIRCUMFLEX	Î	
00CF	LATIN CAPITAL LETTER I WITH DIAERESIS	Ï	
00C0	LATIN CAPITAL LETTER A WITH GRAVE	À	
00C1	LATIN CAPITAL LETTER A WITH ACUTE	Á	
00C2	LATIN CAPITAL LETTER A WITH CIRCUMFLEX	Â	
00C4	LATIN CAPITAL LETTER A WITH DIAERESIS	Ä	
00C7	LATIN CAPITAL LETTER C WITH CEDILLA	Ç	
00C8	LATIN CAPITAL LETTER E WITH GRAVE	È	
00C9	LATIN CAPITAL LETTER E WITH ACUTE	É	
00CA	LATIN CAPITAL LETTER E WITH CIRCUMFLEX	Ê	
00CB	LATIN CAPITAL LETTER E WITH DIAERESIS	Ë	
00CC	LATIN CAPITAL LETTER I WITH GRAVE	Ì	
00CD	LATIN CAPITAL LETTER I WITH ACUTE	Í	
00CE	LATIN CAPITAL LETTER I WITH CIRCUMFLEX	Î	
00CF	LATIN CAPITAL LETTER I WITH DIAERESIS	Ï	
00D2	LATIN CAPITAL LETTER O WITH GRAVE	Ò	

Code point	Character name	Gullskoen grapheme	Gullhornet grapheme
00D3	LATIN CAPITAL LETTER O WITH ACUTE	Ǫ	Ɔ
00D4	LATIN CAPITAL LETTER O WITH CIRCUMFLEX	ǫ	
00D6	LATIN CAPITAL LETTER O WITH DIAERESIS	Ȯ	Ȯ
00D8	LATIN CAPITAL LETTER O WITH STROKE	Ȧ	Ȧ
00D9	LATIN CAPITAL LETTER U WITH GRAVE	Ǿ	
00DA	LATIN CAPITAL LETTER U WITH ACUTE	Ǟ	
00DB	LATIN CAPITAL LETTER U WITH CIRCUMFLEX	ǟ	↓
00DC	LATIN CAPITAL LETTER U WITH DIAERESIS	ǟ̈	
00DF	LATIN SMALL LETTER SHARP S	ß	ſ
00E0	LATIN SMALL LETTER A WITH GRAVE	ǎ	ǎ
00E1	LATIN SMALL LETTER A WITH ACUTE	Ǻ	Ǻ
00E2	LATIN SMALL LETTER A WITH CIRCUMFLEX	ǻ	ǻ
00E4	LATIN SMALL LETTER A WITH DIAERESIS	Ǽ	Ǽ
00E5	LATIN SMALL LETTER A WITH RING ABOVE	Ǽ̊	Ǽ̊
00E6	LATIN SMALL LETTER AE	Ǽ	Ǽ
00E7	LATIN SMALL LETTER C WITH CEDILLA	ç	ç
00E8	LATIN SMALL LETTER E WITH GRAVE	ǝ	ǝ
00E9	LATIN SMALL LETTER E WITH ACUTE	Ǟ	Ǟ
00EA	LATIN SMALL LETTER E WITH CIRCUMFLEX	ǟ	ǟ
00F4	LATIN SMALL LETTER O WITH CIRCUMFLEX	ǫ	ǫ
00F6	LATIN SMALL LETTER O WITH DIAERESIS	Ȯ	Ȯ
00F7	DIVISION SIGN	∕	∕
00F8	LATIN SMALL LETTER O WITH STROKE	Ȧ	Ȧ
00F9	LATIN SMALL LETTER U WITH GRAVE	Ǿ	Ǿ
00FA	LATIN SMALL LETTER U WITH ACUTE	Ǟ	Ǟ
00FB	LATIN SMALL LETTER U WITH CIRCUMFLEX	ǟ	ǟ
00FC	LATIN SMALL LETTER U WITH DIAERESIS	ǟ̈	ǟ̈
0178	LATIN CAPITAL LETTER Y WITH DIAERESIS	Ÿ	Ÿ

Code point	Character name	Gullskoen grapheme	Gullhornet grapheme
00D3	LATIN CAPITAL LETTER O WITH ACUTE	Ǫ	Ɔ
00D4	LATIN CAPITAL LETTER O WITH CIRCUMFLEX	Ȫ	
00D6	LATIN CAPITAL LETTER O WITH DIAERESIS	Ȭ	Ȯ
00D8	LATIN CAPITAL LETTER O WITH STROKE	Ȱ	Ȳ
00D9	LATIN CAPITAL LETTER U WITH GRAVE	Ɔ	
00DA	LATIN CAPITAL LETTER U WITH ACUTE	Ȫ	
00DB	LATIN CAPITAL LETTER U WITH CIRCUMFLEX	Ȭ	↓
00DC	LATIN CAPITAL LETTER U WITH DIAERESIS	Ȯ	
00DF	LATIN SMALL LETTER SHARP S	ß	Ȳ
00E0	LATIN SMALL LETTER A WITH GRAVE	Ǻ	Ǻ
00E1	LATIN SMALL LETTER A WITH ACUTE	Ǻ	Ǻ
00E2	LATIN SMALL LETTER A WITH CIRCUMFLEX	Ǻ	Ǻ
00E4	LATIN SMALL LETTER A WITH DIAERESIS	Ǻ	Ǻ
00E5	LATIN SMALL LETTER A WITH RING ABOVE	Ǻ	Ǻ
00E6	LATIN SMALL LETTER AE	Ǻ	Ǻ
00E7	LATIN SMALL LETTER C WITH CEDILLA	ß	~
00E8	LATIN SMALL LETTER E WITH GRAVE	Ǻ	Ǻ
00E9	LATIN SMALL LETTER E WITH ACUTE	Ǻ	Ǻ
00EA	LATIN SMALL LETTER E WITH CIRCUMFLEX	Ǻ	Ǻ
00F4	LATIN SMALL LETTER O WITH CIRCUMFLEX	Ǻ	Ǻ
00F6	LATIN SMALL LETTER O WITH DIAERESIS	Ǻ	Ǻ
00F7	DIVISION SIGN	ß	ß
00F8	LATIN SMALL LETTER O WITH STROKE	Ǻ	Ǻ
00F9	LATIN SMALL LETTER U WITH GRAVE		Ǻ
00FA	LATIN SMALL LETTER U WITH ACUTE	Ǻ	Ǻ
00FB	LATIN SMALL LETTER U WITH CIRCUMFLEX	Ǻ	Ǻ
00FC	LATIN SMALL LETTER U WITH DIAERESIS	Ǻ	Ǻ
0178	LATIN CAPITAL LETTER Y WITH DIAERESIS	Ǻ	

Code point	Character name	Gullskoen grapheme	Gullhornet grapheme
0192	LATIN SMALL LETTER F WITH HOOK	ƒ	

Figure D.3. All slots of the Unicode code block Runic with the respective characters displayed in the fonts JunICODE and Segoe UI Symbol.

Code Point	Character Name	JunICODE	Segoe UI Symbol
16A0	RUNIC LETTER FEHU FEOH FE F	ƒ	ƒ
16A1	RUNIC LETTER V	ƒ	ƒ
16A2	RUNIC LETTER URUZ UR U	ƒ	ƒ
16A3	RUNIC LETTER YR	ƒ	ƒ
16A4	RUNIC LETTER Y	ƒ	ƒ
16A5	RUNIC LETTER W	ƒ	ƒ
16A6	RUNIC LETTER THURISAZ THURS THORN	ƒ	ƒ
16A7	RUNIC LETTER ETH	ƒ	ƒ
16A8	RUNIC LETTER ANSUZ A	ƒ	ƒ
16A9	RUNIC LETTER OS O	ƒ	ƒ
16AA	RUNIC LETTER AC A	ƒ	ƒ
16AB	RUNIC LETTER AESC	ƒ	ƒ
16AC	RUNIC LETTER LONG-BRANCH-OSS O	ƒ	ƒ
16AD	RUNIC LETTER SHORT-TWIG-OSS O	ƒ	ƒ
16AE	RUNIC LETTER O	ƒ	ƒ
16AF	RUNIC LETTER OE	ƒ	ƒ
16B0	RUNIC LETTER ON	ƒ	ƒ
16B1	RUNIC LETTER RAIDO RAD REID R	ƒ	ƒ
16B2	RUNIC LETTER KAUNA	ƒ	ƒ
16B3	RUNIC LETTER CEN	ƒ	ƒ
16B4	RUNIC LETTER KAUN K	ƒ	ƒ
16B5	RUNIC LETTER G	ƒ	ƒ
16B6	RUNIC LETTER ENG	ƒ	ƒ
16B7	RUNIC LETTER GEBO GYFU G	ƒ	ƒ
16B8	RUNIC LETTER GAR	ƒ	ƒ
16B9	RUNIC LETTER WUNJO WYNN W	ƒ	ƒ
16BA	RUNIC LETTER HAGLAZ H	ƒ	ƒ
16BB	RUNIC LETTER HA EGL H	ƒ	ƒ
16BC	RUNIC LETTER LONG-BRANCH-HAGALL H	ƒ	ƒ
16BD	RUNIC LETTER SHORT-TWIG-HAGALL H	ƒ	ƒ
16BE	RUNIC LETTER NAUDIZ NYD NAUD N	ƒ	ƒ
16BF	RUNIC LETTER SHORT-TWIG-NAUD N	ƒ	ƒ
16C0	RUNIC LETTER DOTTED-N	ƒ	ƒ
16C1	RUNIC LETTER ISAZ IS ISS I	ƒ	ƒ
16C2	RUNIC LETTER E	ƒ	ƒ
16C3	RUNIC LETTER JERAN J	ƒ	ƒ

Code Point	Character Name	Junicode	Segoe UI Symbol
16C4	RUNIC LETTER GER	ᚠ	ᚠ
16C5	RUNIC LETTER LONG-BRANCH-AR AE	ᚡ	ᚡ
16C6	RUNIC LETTER SHORT-TWIG-AR A	ᚢ	ᚢ
16C7	RUNIC LETTER IWAZ EOH	ᚣ	ᚣ
16C8	RUNIC LETTER PERTHO PEORTH P	ᚤ	ᚤ
16C9	RUNIC LETTER ALGIZ EOLHX	ᚥ	ᚥ
16CA	RUNIC LETTER SOWILO S	ᚦ	ᚦ
16CB	RUNIC LETTER SIGEL LONG-BRANCH-SOL S	ᚧ	ᚧ
16CC	RUNIC LETTER SHORT-TWIG-SOL S	ᚨ	ᚨ
16CD	RUNIC LETTER C	ᚩ	ᚩ
16CE	RUNIC LETTER Z	ᚪ	ᚪ
16CF	RUNIC LETTER TIWAZ TIR TYR T	ᚫ	ᚫ
16D0	RUNIC LETTER SHORT-TWIG-TYR T	ᚬ	ᚬ
16D1	RUNIC LETTER D	ᚭ	ᚭ
16D2	RUNIC LETTER BERKANAN BEORC BJARKAN B	ᚮ	ᚮ
16D3	RUNIC LETTER SHORT-TWIG-BJARKAN B	ᚯ	ᚯ
16D4	RUNIC LETTER DOTTED-P	ᚰ	ᚰ
16D5	RUNIC LETTER OPEN-P	ᚱ	ᚱ
16D6	RUNIC LETTER EHWAZ EH E	ᚲ	ᚲ
16D7	RUNIC LETTER MANNAZ MAN M	ᚳ	ᚳ
16D8	RUNIC LETTER LONG-BRANCH-MADR M	ᚴ	ᚴ
16D9	RUNIC LETTER SHORT-TWIG-MADR M	ᚵ	ᚵ
16DA	RUNIC LETTER LAUKAZ LAGU LOGR L	ᚶ	ᚶ
16DB	RUNIC LETTER DOTTED-L	ᚷ	ᚷ
16DC	RUNIC LETTER INGWAZ	ᚸ	ᚸ
16DD	RUNIC LETTER ING	ᚹ	ᚹ
16DE	RUNIC LETTER DAGAZ DAEG D	ᚺ	ᚺ
16DF	RUNIC LETTER OTHALAN ETHEL O	ᚻ	ᚻ
16E0	RUNIC LETTER EAR	ᚼ	ᚼ
16E1	RUNIC LETTER IOR	ᚽ	ᚽ
16E2	RUNIC LETTER CWEORTH	ᚾ	ᚾ
16E3	RUNIC LETTER CALC	ᚿ	ᚿ
16E4	RUNIC LETTER CEALC	ᛀ	ᛀ
16E5	RUNIC LETTER STAN	ᛁ	ᛁ
16E6	RUNIC LETTER LONG-BRANCH-YR	ᛂ	ᛂ
16E7	RUNIC LETTER SHORT-TWIG-YR	ᛃ	ᛃ
16E8	RUNIC LETTER ICELANDIC-YR	ᛄ	ᛄ

Code Point	Character Name	Junicode	Segoe UI Symbol
16E9	RUNIC LETTER Q	ᚠ	ᚠ
16EA	RUNIC LETTER X	ᚡ	ᚡ
16EB	RUNIC SINGLE PUNCTUATION	·	•
16EC	RUNIC MULTIPLE PUNCTUATION	:	:
16ED	RUNIC CROSS PUNCTUATION	+	+
16EE	RUNIC ARLAUG SYMBOL	†	†
16EF	RUNIC TVIMADUR SYMBOL	✕	✕
16F0	RUNIC BELGTHOR SYMBOL	ϕ	ϕ
16F1	RUNIC LETTER K	ᚢ	□
16F2	RUNIC LETTER SH	ᚣ	□
16F3	RUNIC LETTER OO	ᚤ	□
16F4	RUNIC LETTER FRANKS CASKET OS	ᚥ	□
16F5	RUNIC LETTER FRANKS CASKET IS	ᚦ	□
16F6	RUNIC LETTER FRANKS CASKET EH	ᚧ	□
16F7	RUNIC LETTER FRANKS CASKET AC	ᚨ	□
16F8	RUNIC LETTER FRANKS CASKET AESC	ᚩ	□
16F9	<reserved>		
16FA	<reserved>		
16FB	<reserved>		
16FC	<reserved>		
16FD	<reserved>		
16FE	<reserved>		
16FF	<reserved>		





Character	Long-branch	Short-twig	Staveless	Middle Ages
†	a	a		æ
└		a		
┐			a	
┌				a
└				a
┐				a
┌				a
└	ǣ	ǣ		o
┐	ǣ			o
┌	ǣ	ǣ		ø, ƿ
└			ǣ	
┐		s		s, c, z
┌	s			c, s, z
└	s			c, s, z
┐			Stavlaus	
┌				s, c, z
└				s, c, z
┐				s
┌				s
└				s
┐	s			s
┌	t			
└		t		t
┐		t		t
┌			t	
└				d
┐				d
┌				d
└				d
┐				d
┌				d
└	b			b
┐	b			b
┌		b, ǣ		
└			b	
┐				b
┌				b
└				p
┐	m			m
┌	m			m
└	m			
┐		m		
┌		m		
└			m	
┐	l	l		l
┌			l	
└				l
┐				l
┌				R, y
└				R, y
┐				y
┌				y
└				y
┐				y
┌	ǣ	b		ø, ƿ
└	ǣ	ǣ		ø, ƿ

Character	Long-branch	Short-twig	Staveless	Middle Ages
𐌲				ø, q
𐌳				ø, q
𐌴				ø, q
𐌵				ø, q
𐌶				ø, q
𐌷				ng
𐌸		ǣ		o
𐌹				k, p
𐌺				k, p
𐌻				p
𐌼				q
𐌽				q
𐌾		R		s
𐌿			R	
𐍀				v
𐍁				v
𐍂				w
𐍃				x
𐍄				x
𐍅				x
𐍆		x		
𐍇				x
𐍈				x
𐍉				z

Uni- code		99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
16A0	ƿ			ƿ	ƿ	ƿ	ƿ	ƿ	ƿ	ƿ	ƿ	ƿ	ƿ				
		ƿ99	ƿ00	ƿ01	ƿ02	ƿ03	ƿ04	ƿ05	ƿ06	ƿ07	ƿ08	ƿ09	ƿ10				
16A2	ᚠ			ᚠ	ᚠ	ᚠ	ᚠ	ᚠ	ᚠ	ᚠ	ᚠ	ᚠ	ᚠ				
		ᚠ99	ᚠ00	ᚠ01	ᚠ02	ᚠ03	ᚠ04	ᚠ05	ᚠ06	ᚠ07							
16A6	ᚢ			ᚢ	ᚢ	ᚢ	ᚢ	ᚢ	ᚢ	ᚢ	ᚢ	ᚢ	ᚢ				
		ᚢ99	ᚢ00	ᚢ01	ᚢ02	ᚢ03	ᚢ04	ᚢ05	ᚢ06	ᚢ07	ᚢ08	ᚢ09	ᚢ10				
16AE	ᚥ			ᚥ	ᚥ	ᚥ	ᚥ										
		ᚥ99	ᚥ00	ᚥ01	ᚥ02	ᚥ03	ᚥ04										
16B1	ᚦ			ᚦ	ᚦ	ᚦ	ᚦ	ᚦ	ᚦ	ᚦ	ᚦ	ᚦ	ᚦ				
		ᚦ99	ᚦ00	ᚦ01	ᚦ02	ᚦ03	ᚦ04	ᚦ05	ᚦ06	ᚦ07	ᚦ08	ᚦ09	ᚦ10				
16B4	ᚧ			ᚧ	ᚧ	ᚧ	ᚧ	ᚧ	ᚧ	ᚧ	ᚧ	ᚧ	ᚧ				
		ᚧ99	ᚧ00	ᚧ01	ᚧ02	ᚧ03	ᚧ04	ᚧ05	ᚧ06	ᚧ07	ᚧ08	ᚧ09	ᚧ10				
16BC	*			*	*	*	*	*	*								
		*99	*00	*01	*02	*03	*04	*05	*06								
16BF	ᚫ			ᚫ	ᚫ	ᚫ	ᚫ	ᚫ									
		ᚫ99	ᚫ00	ᚫ01	ᚫ02	ᚫ03	ᚫ04	ᚫ05									
16C1	ᚬ			ᚬ	ᚬ	ᚬ	ᚬ										
		ᚬ99	ᚬ00	ᚬ01	ᚬ02	ᚬ03	ᚬ04										
16C6	ᚭ			ᚭ	ᚭ	ᚭ	ᚭ	ᚭ	ᚭ	ᚭ							
		ᚭ99	ᚭ00	ᚭ01	ᚭ02	ᚭ03	ᚭ04	ᚭ05	ᚭ06	ᚭ07							
16CC	ᚮ			ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ	ᚮ
		'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14
16D0	ᚯ			ᚯ	ᚯ	ᚯ	ᚯ	ᚯ	ᚯ	ᚯ	ᚯ	ᚯ	ᚯ				
		ᚯ99	ᚯ00	ᚯ01	ᚯ02	ᚯ03	ᚯ04	ᚯ05	ᚯ06	ᚯ07	ᚯ08	ᚯ09	ᚯ10				
16D2	ᚰ			ᚰ	ᚰ	ᚰ	ᚰ	ᚰ	ᚰ	ᚰ	ᚰ	ᚰ	ᚰ				
		ᚰ99	ᚰ00	ᚰ01	ᚰ02	ᚰ03	ᚰ04	ᚰ05	ᚰ06	ᚰ07	ᚰ08	ᚰ09					
16D8	ᚱ			ᚱ	ᚱ	ᚱ	ᚱ	ᚱ	ᚱ	ᚱ							
		ᚱ99	ᚱ00	ᚱ01	ᚱ02	ᚱ03	ᚱ04	ᚱ05	ᚱ06								
16DA	ᚲ			ᚲ	ᚲ	ᚲ	ᚲ	ᚲ									
		ᚲ99	ᚲ00	ᚲ01	ᚲ02	ᚲ03	ᚲ04	ᚲ05									
16E3	ᚳ			ᚳ	ᚳ	ᚳ	ᚳ	ᚳ									
		ᚳ99	ᚳ00	ᚳ01	ᚳ02	ᚳ03	ᚳ04	ᚳ05									
16AF	ᚴ			ᚴ	ᚴ	ᚴ	ᚴ	ᚴ	ᚴ	ᚴ							
		ᚴ99	ᚴ00	ᚴ01	ᚴ02	ᚴ03	ᚴ04	ᚴ05	ᚴ06	ᚴ07							
16D5	ᚵ			ᚵ	ᚵ	ᚵ											
		ᚵ99	ᚵ00	ᚵ01	ᚵ02	ᚵ03											

Figure D.5. Rune variation encoding table.

## E. Chapter 4

### Code & queries

Query E.1 Query to create **TAKERUN** in an existing installation of MySQL/MariaDB

```
1 CREATE DATABASE takerun
2 CHARACTER SET utf8mb4
3 COLLATE utf8mb4_general_ci;
```

Query E.2 Model query for table creation

```
1 CREATE TABLE inscriptions (
2   insid varchar(8) NOT NULL PRIMARY KEY,
3   altnr varchar(15),
4   alttil int(9),
5   bno int(6),
6   bnoin varchar(7),
7   niyr varchar(7)
8 );
```

The values in this query are taken from Figure 4.5; the resulting table will therefore resemble **INSCRIPTION**. Using the values for the other tables creates these instead.

## F. Chapter 5

### Additional figures

<i>tlitid</i>	<i>transliteration</i>	<i>patid</i>	<i>own</i>	<i>latin</i>	<i>names</i>	<i>namesno</i>	<i>insnid</i>	<i>spelling</i>	<i>interlocutor</i>	<i>invocation</i>	<i>normalised</i>	<i>tlitsource</i>
tlit2129	aria	pat549	1	0	1	1	insn628	ari	1	0	Ari	markali1983
tlit2130	santi ulab?[-	pat550	\N	\N	1	1	insn823	ulab?	1	1	Ólafr	markali1983
tlit645	aria	pat399	1	0	1	1	insn430	ari	1	0	Ari	niyrvi
tlit2270	santi ulab[- -	pat1024	0	1	1	1	insn431	ulab	1	1	Ólafr	niyrvi
tlit2270	santi ulab[- -	pat1025	1	0	1	1	insn431	ulab	1	1	Ólafr	niyrvi
tlit2308	ari a	pat803	1	0	1	1	insn2	ari	1	0	Ari	samtextbas
tlit12	santi ulab- ...	pat27	1	0	1	1	insn3	ulab	1	1	Ólafr	samtextbas
tlit12	santi ulab- ...	pat802	0	1	1	1	insn3	ulab	1	1	Ólafr	samtextbas

Figure F.1. The result set from **TAKERUN** when running a query for the first example from Figure 5.14 and section 5.5.4.

<i>tlitid</i>	<i>transliteration</i>	<i>patid</i>	<i>own</i>	<i>latin</i>	<i>names</i>	<i>namesno</i>	<i>insnid</i>	<i>spelling</i>	<i>interlocutor</i>	<i>invocation</i>	<i>normalised</i>	<i>tlitsource</i>
tlit2136	kolbiǵna	pat621	1	0	1	1	insn945	kolbiǵn	1	0	Kolbeinn	markali1983
tlit2136	kolbiǵna	pat621	1	0	1	1	insn945	kolbiǵn	1	0	Kolbjørn	markali1983
tlit743	kolbiǵna	pat496	1	0	1	1	insn574	kolbiǵn	1	0	Kolbjørn	niyrvi
tlit109	kolbiǵn a	pat121	1	0	1	1	insn150	kolbiǵn	1	0	Kolbjørn	samtextbas

Figure F.2. The result set from **TAKERUN** when running a query for the second example from Figure 5.14 and section 5.5.4.

```

> stem(onlydi)

The decimal point is 1 digit(s) to the right of the |

 0 | 111111112222233334444555566677788899
 1 | 11222233444566777888
 2 | 000111233334445566
 3 | 000111122225679
 4 | 01134667799
 5 | 68
 6 | 12226888
 7 | 33
 8 | 22348
 9 | 1233468
10 | 68
11 | 06
12 | 3
13 | 1
14 | 47
15 | 4
16 | 9
17 | 11
18 | 8
19 |
20 | 3

```

Figure F.3. Stem-and-leaf plot of the Category-1 and Category-2-names found in DI.



```

> stem(onlydn, scale = 6)

The decimal point is 1 digit(s) to the right of the |

 0 | 1111111122333334446668888889
 1 | 1112334789
 2 | 112334456777
 3 | 001235
 4 | 035678888
 5 | 014
 6 | 7
 7 | 235
 8 | 04599
 9 | 77
10 | 0
11 |
12 | 12478
13 | 3579
14 |
15 | 45667
16 | 045
17 |
18 | 24
19 | 35
20 | 189
21 | 019
22 |
23 |
24 | 2
25 | 1115999
26 | 128
27 | 0239
28 | 3345
29 | 7
30 | 899
31 | 9
32 |
33 | 019
34 | 5
35 | 1356
36 | 358
37 | 7
38 | 3
39 | 2
40 | 7
41 |
42 | 5
43 | 0
44 | 00
45 |
46 | 34
47 | 1
48 |

```

Figure F.4. Part of the stem-and-leaf plot of the Category-1 and Category-2-names found in DN showing the lower end of the scale with the biggest clusters.

## Code & queries

Query F.1 Retrieving the count of individual occurrences for each **idionym** from **IDIONYM**

```
1 SELECT normalised ,dn ,di
2 FROM idionym ;
```

The query can be modified to only show the count for one particular **idionym**, only **idionyms**, only bynames, etc. by adding a **WHERE**-clause.

Query F.2 Retrieving a count of how many inscriptions from Bergen contain names from **PATTERNING**

```
1 SELECT COUNT(DISTINCT transliteration.insid )
2 FROM transliteration LEFT JOIN patterning
3 ON transliteration.tlitleid=patterning.tlitleid
4 WHERE patterning.names=1;
```

COUNT() is an **SQL** function which automatically counts tokens. **DISTINCT** is a modifier specifying that only different tokens should be returned, i.e. if *ins12* appears 5 times, it still only appears once in the result set. **DISTINCT** needs to be inside the brackets because in this case only distinct *insids* shall be counted. Were it outside, the count would be at 743, meaning there are 743 patterns where the name **BOOL** is set to 1.

If a list of *insids* is the aim of the query, COUNT() has to be deleted.

Query F.3 Retrieving a data subset for manual or automatic counting of all **idionym** occurrences in the Bergen corpus

```
1 SELECT transliteration.insid , transliteration.tlitleid ,
   transliteration.transliteration ,
2 transliteration.tlitlesource , patterning.patid , patterning.own ,
   patterning.latin , patterning.nonlexical , patterning.names ,
   patterning.namesno , patterning.bynames , patterning.bynamesno ,
   inscriptionnames.insnid , inscriptionnames.spelling ,
   inscriptionnames.interlocutor , inscriptionnames.invocation ,
   idionym.normalised
3 FROM
4 (((((transliteration LEFT JOIN patterning ON
   transliteration.tlitleid=patterning.tlitleid)
5 LEFT JOIN sequences ON patterning.patid=sequences.patid)
6 LEFT JOIN inscriptionnames ON
   sequences.insnid=inscriptionnames.insnid)
7 LEFT JOIN namejoin ON inscriptionnames.insnid=namejoin.insnid)
8 LEFT JOIN idionym ON namejoin.idioid=idionym.idioid
9 WHERE patterning.names=1
10 ORDER BY transliteration.insid ,
   transliteration.tlitlesource , transliteration.tlitleid ,
   inscriptionnames.insnid ;
```

Query F.4 Three queries nested into each other in order to retrieve the maximum number of tokens of single **idionyms** from the Bergen corpus.

```

1 SELECT normalised , MAX(countinsid) , MAX(countinsnid)
2 FROM
3 (
4 SELECT normalised , tlitsource , COUNT(DISTINCT insid) AS countinsid ,
5 COUNT(DISTINCT insnid) AS countinsnid
6 FROM
7 (
8 SELECT DISTINCT transliteration.insid , transliteration.tlitsource ,
9 inscriptionnames.insnid , idionym.normalised
10 FROM
11 (((transliteration LEFT JOIN patterning ON
12 transliteration.tlitid=patterning.tlitid)
13 LEFT JOIN sequences ON patterning.patid=sequences.patid)
14 LEFT JOIN inscriptionnames ON
15 sequences.insnid=inscriptionnames.insnid)
16 LEFT JOIN namejoin ON inscriptionnames.insnid=namejoin.insnid)
17 LEFT JOIN idionym ON namejoin.idioid=idionym.idioid
18 WHERE patterning.names=1) AS inbetween
19 GROUP BY normalised , tlitsource) AS bergennos
20 GROUP BY normalised ;

```

If the **WHERE**-clause in the query is replaced with “WHERE patterning.names=1 AND inscriptionnames.interlocutor=1 AND inscriptionnames.invocation=0”, only tokens not marked as *interlocutor* will be counted. *bergeninsid*, *bergeninsnid*, *noinvoinsid* and *noinvoinsnid* are updated by running an UPDATE-query using this nested query.

Query F.5 Retrieving counts of various tokens from different columns in **IDIONYM**

```

1 SELECT SUM([ corpus ]) FROM idionym ;

```

[corpus] needs to be replaced by either “insnidnoin, bergeninsnid, di, dn”. An optional **WHERE**-clause can be added to count tokens with a country assignation: WHERE pred="[qualifier]", with the qualifier for example being “I, N, PS”.

Query F.6 Creating the selection of **idionyms** upon which to run the  $\chi^2$ -test from the database

```

1 SELECT normalised , di , dn
2 FROM idionym
3 WHERE bergeninsid IS NOT NULL
4 AND (di > 0 OR dn > 0) ORDER BY normalised ;

```

The columns *normalised*, *di*, *dn* are the only columns required for this task; the **WHERE**-clause limits the dataset to **idionyms** attested in the Bergen corpus (bergeninsid IS NOT NULL) and those with a value of more than 0 in either *di* or *dn* (AND (di > 0 OR dn > 0)), by which mythological **idionyms** not in use as **PNs** in the diplomataria are excluded. **Idionyms** used as **PNs** in the diplomataria are included, though. ORDER BY sorts the resulting list alphabetically.

#### Query F.7 Reading the exported csv-file into R

```
1 ditodn <- read.csv("ditodn.csv", encoding="UTF-8")
```

#### Query F.8 Compiling a complete list of **idionyms**

```
1 ditodnnames <- ditodn[,1]
```

#### Query F.9 Traditional $\chi^2$ -test

```
1 chi.ditodn <- chisq.test(x=ditodn[,2:3], simulate.p.value=T,
  B=10000)
```

*chi.ditodn* is the traditional test giving an overall result, whereas the code following *ditodneachname* provides the results for each **idionym**.

#### Query F.10 $\chi^2$ -test for each single **idionym**

```
1 set.seed(1313)
2
3 ditodneachname <- matrix(NA, ncol=3, nrow=dim(ditodn)[1])
4 colnames(ditodneachname) <- c("observedChi2", "df", "p")
5 ditodneachname <- data.frame(ditodneachname)
6
7 for (i in 1:dim(ditodn)[1])
8 {
9   tab <- rbind(ditodn[i, 2:3], colSums(ditodn[, 2:3]))
10  chi <- chisq.test(tab, simulate.p.value=T, B=10000)
11  ditodneachname$observedChi2[i] <- chi$statistic
12  ditodneachname$p[i] <- chi$p.value
13 }
```

#### Query F.11 Adding **idionym** to respective row

```
1 rownames(ditodneachname) <- ditodnnames
```

#### Query F.12 Calculating number of **idionyms** with $p < .05$

```
1 table(ditodneachname$p < .05)
```

#### Query F.13 Calculating number of **idionyms** with $p < .01$

```
1 table(ditodneachname$p < .01)
```

#### Query F.14 Creating a list of **idionyms** with $p < .01$

```
1 ditodncat1 <- ditodneachname[ditodneachname$p < .01,]
```

#### Query F.15 Creating a list of **idionyms** with $p > .01$

```
1 ditodncat2 <- ditodneachname[ditodneachname$p > .01,]
```

Before the following two queries can be run, the results of the  $\chi^2$ -test need to be imported into **TAKERUN**, for example by using an INSERT INTO-statement. It is preferable to import them into a separate table instead of adding them to IDIONYM, for example designated CHITABLE.

Query F.16 Querying for the **idionyms** in Category 1a and 1b

```
1 SELECT idionym.normalised , idionym.di/5978*100, idionym.dn/35074*100
2 FROM idionym
3 INNER JOIN chitable ON idionym.normalised=chitable.normalised
4 WHERE ((chitable.pditodn < 0.01) AND (idionym.di/5978 >
   idionym.dn/35074))
5 ORDER BY normalised;
```

If instead of >, < is used in “idionym.di/5978 > idionym.dn/35074”, the query will return Category 1b.

Query F.17 Creating the data subsets *dionly* and *dnonly* for export into R and subsequent calculations of **mean**, **median**, standard deviation, stem-and-leaf plot and **quartiles**

```
1 SELECT normalised , [corpus]
2 FROM idionym
3 WHERE bergeninsid IS NOT NULL
4 AND [corpus] IS NOT NULL AND [corpus] <> 0
5 AND idionym = 1 AND byname = 0;
```

[corpus] needs to be replaced by “di” or “dn”. The **WHERE**-clause excludes all **idionyms** not found in Bergen and the corpus in question (bergeninsid IS NOT NULL AND di/dn IS NOT NULL), those with 0 occurrences in the respective corpus (di/dn <> 0) and those also identified as bynames (idionym = 1 AND byname = 0). Because AND is used, the result set needs to fulfill *all* conditions specified in the query. **Idionyms** not fulfilling one of the latter conditions belong to Category 3 or are not part of the dataset (cf. Section 5.7.4).

Query F.18 Calculating **mean**, **median**, standard deviation, stem-and-leaf plots and **quartiles** in R for *dionly* and *dnonly*

```
1 dnonly <- read.csv("dnonly.csv", encoding="UTF-8")
2 onlydn = dnonly$dn
3 mean(onlydn)
4 sd(onlydn)
5 median(onlydn)
6 stem(onlydn, scale = 6)
7 quantile(onlydn)
```

Replacing “dnonly” with “dionly” will return the required results for DI.

Alternatively running these queries will give the same results:

Query F.19 Calculating the **means** for DN and DI in **SQL**

```
1 SELECT AVG([corpus])
2 FROM idionym
3 WHERE bergeninsid IS NOT NULL AND [corpus] IS NOT NULL
```

```

4 AND [corpus] <> 0 AND idionym = 1
5 AND byname = 0;

```

[corpus] must be replaced with either “di” or “dn”. The AVG() function does this for any numeric column in a database. Mark that in both cases, the **WHERE**-clause limits the rows in the same way the former query for exporting the data did. They also return the exact same results.

Query F.20 Calculating the **median** for **idionyms** in DN and DI in **SQL**; code by velcrow 2018

```

1 SELECT AVG([corpus]) AS median_val
2 FROM (
3 SELECT [corpus], @rownum:=@rownum+1 AS rownumber,
   @total_rows:=@rownum
4 FROM idionym, (SELECT @rownum:=0) r
5 WHERE bergeninsid IS NOT NULL AND [corpus] IS NOT NULL
6 AND [corpus] <> 0 AND idionym = 1
7 AND byname = 0 ORDER BY [corpus]) AS dd
8 WHERE dd.rownumber IN ( FLOOR(( @total_rows+1)/2) ,
   FLOOR(( @total_rows+2)/2));

```

[corpus] must be replaced with “di” or “dn”.

Query F.21 Query selecting all **idionyms** for the  $\chi^2$ -test comparing Bergen and DI/DN

```

1 SELECT normalised, [corpus], insnidnoin FROM idionym
2 WHERE (([corpus] = 0 OR [corpus] IS NULL OR [corpus] <> 0) AND
   insnidnoin <> 0)
3 OR ([corpus] <> 0 AND insnidnoin=0);

```

[corpus] must be replaced with “di” or “dn”. The column used to retrieve the count of tokens for Bergen is *insnidnoin*, *inscription name id no invocation*. The numbers in this column are in turn based on F.4, which excludes every token that might be an invocation. Since the  $\chi^2$ -test cannot work when several values show 0/**NULL**, these entries are excluded for the most part by the **WHERE**-clause. Because the dataset is retrieved using *insnidnoin*, both columns can actually show a count of 0. Viable combinations of the two column values are:

corpus = 0 AND insnidnoin <> 0 (if [corpus] has zero tokens, insnidnoin cannot have 0 tokens)

corpus IS NULL AND insnidnoin <> 0 (if [corpus] is set to **NULL**, insnidnoin cannot have 0 tokens)

corpus <> 0 AND insnidnoin <> 0 (all entries where [corpus] and insnidnoin show a value other than 0)

corpus <> 0 AND insnidnoin = 0 (if insnidnoin is 0, [corpus] cannot have 0 tokens)

Number 3 must be included because otherwise, all entries where [corpus] has values starting from 1 will be excluded. Some more checking is required after the dataset has been retrieved;

**NULL** must be replaced by 0 so the test can properly work, and the correct values for

*Ió(h)an/Jó(h)an* must be entered manually, cf. 5.7.1.

Query F.22 Running a  $\chi^2$ -test to compare frequencies of **idionyms** in DI or DN and Bergen

```

1 bergendi <- read.csv("bergendi.csv", encoding="UTF-8")
2 bdinames <- bergendi[,1]
3 set.seed(1313)
4
5 chi.bergendi <-
  chisq.test(x=bergendi[,2:3], simulate.p.value=T, B=10000)
6
7 bergendichi <- matrix(NA, ncol=3, nrow=dim(bergendi)[1])
8 colnames(bergendichi) <- c("observedChi2", "df", "p")
9 bergendichi <- data.frame(bergendichi)
10
11 for (i in 1:dim(bergendi)[1])
12 {
13   tab <- rbind(bergendi[i,2:3], colSums(bergendi[,2:3]))
14   chi <- chisq.test(tab, simulate.p.value=T, B=10000)
15   bergendichi$observedChi2[i] <- chi$statistic
16   bergendichi$p[i] <- chi$p.value
17 }
18
19 rownames(bergendichi) <- bdinames

```

Replacing “bergendi” with “bergendn” runs the same test for the other dataset.

Query F.23 Creating **VIEW** *bignametable* from **IDIONYM** and **CHITABLE**

```

1 CREATE VIEW bignametable AS
2 SELECT idioside.*, chitable.pditodn, chitable.pbergendn,
  chitable.pbergendi FROM
3 (SELECT normalised, gender, idionym, byname, dn, di, bergeninsid,
  bergeninsnid, insnidnoin, di/5978*100 AS iceperc, dn/35074*100
  AS norperc, insnidnoin/409*100 AS berperc, lindlocalisation,
  pred,quarti, quartn, di/6640*100 AS diperc, dn/20000*100 AS
  dnperc
4 FROM idionym) AS idioside
5 INNER JOIN chitable ON idioside.normalised=chitable.normalised
6 ORDER BY normalised;

```

To simplify working with **TAKERUN** and also to decrease query time, **VIEW**s can be created, which are

[...] virtual table[s] based on the result-set of an **SQL** statement. A view contains rows and columns, just like a real table. The fields in a view are fields from one or more real tables in the database (w3schools 2020).

**VIEW**s are treated like proper tables, however the data contained in them is made up of fields and columns from different tables – in this case a combination of data from **IDIONYM** and **CHITABLE**. Since the data is already collected in one single **VIEW**, queries can be run faster, as



the **RDBMS** does not need to retrieve it from several different tables. All regular **SQL**-statements can be used on **VIEWS** just like they are used on tables. Using these subsets of data instead of long-winded queries can also reduce confusion and errors in linking tables together.

Query F.24 Retrieving the numbers for several tables in Section 5.7.1 and Section 5.7.2

```
1 SELECT normalised , [columns]
2 FROM bignametable
3 WHERE [p-value-column] < .01;
```

[columns] can be replaced by any and all combinations of “pred, iceperc, norperc, berperc, quarti, quartn, insnidnoin, di, dn”, depending on what particular subset is desired at the time.

[p-value-column] needs to be replaced by “pbergendi” or “pbergendn”. < .01 will give all **idionyms** for which the test finds a statistically significant difference between the two corpora in question, > .01 all those where there is none. Further possible modifications include for example: AND iceperc > berperc (only **idionyms** where DI has the higher relative frequency); AND pred="N" (only **idionyms** appearing predominantly in DN) and various others that are too numerous to be listed here. This basic query and its multiple variations was the most important tool for analysing the results of the various tests and comparisons in this section.

Query F.25 Selecting the **idionyms** in Category 3 from **IDIONYM**

```
1 SELECT normalised
2 FROM
3 ( SELECT * FROM idionym
4 WHERE idionym = 1 AND byname = 0) AS inbetween
5 WHERE bergeninsid IS NOT NULL
6 AND ((dn IS NULL AND di IS NULL) OR (dn=0 AND di=0))
7 ORDER BY normalised;
```

The subquery first defines a data subset of tokens identified as **idionyms** (idionym = 1) and at the same time excludes tokens which can be both **idionym** and byname (AND byname = 0). The main query then eliminates tokens not attested in the Bergen corpus (bergeninsid IS NOT NULL) and defines that the remaining tokens should either have a NULL value or a 0 in the *dn*- and *di*-columns (AND ((dn IS NULL AND di IS NULL) OR (dn=0 AND di=0))).

Query F.26 The queries Tables F.1 and F.2 are based on

```
1 SELECT normalised , gender , idionym , byname , dn , di , bergeninsid ,
   bergensnid , insnidnoin , lindlocalisation , pred
2 FROM bignametable;
3
4 SELECT normalised , di/5978*100 , dn/35074*100 , insnidnoin/409*100 ,
   quarti , quartn , di/6640*100 , dn/20000*100 , pditodn , pbergendi ,
   pbergendn
5 FROM bignametable;
```

## Additional tables

Table F.1. List of all **idionyms** in **IDIONYM**, sorted alphabetically (F.26), and their tokens in the various corpora. It includes all potential **idionyms** suggested by the scholars working with the material, but not attested before, and those normalisations where I was unable to figure out which **OWN idionym** they supposedly represent.

Normalised	Gender	<b>Idionym</b>	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count try
Abed-Nego	m	1	0			1	1	0		
Agi	m	1	0	2	0	1	1	1	N	P
Agnbjörg	f	1	0			1	1	1		
Alfvarðr	m	1	0			1	1	1		
Amor	m	1	0			1	1	0		
Ámundi	m	1	0	23	11	2	2	2		I
Án(n)	m	1	0	25	0	2	2	2		P
Andreas/Andrés	m	1	0	182	31	2	2	0		P
Áni	m	1	0	1	0	3	3	3		P
Anna	f	1	0	8	8	1	1	1		I
Anne	f	1	0			3	3	3		
Ari	m	1	0	30	203	2	2	2		I
Arnbjörg	f	1	0	48	0	1	1	1		N
Arnbjörn	m	1	0	297	83	1	1	1		I
Arnfinnr	m	1	0	356	68	1	1	1		P
Arni	m	1	0	89	41	12	13	13		I
Arnviðr	m	1	0	85	5	1	1	1		P
Ása	f	1	0	259	20	4	4	3		N
Ásbjörg	f	1	0	17	0	1	1	1		P
Ásgeirr	m	1	0	122	32	1	1	1		P
Ásgrímr	m	1	0	46	169	1	1	1		I
Áslákr	m	1	0	971	18	1	1	1		N
Ásmundr	m	1	0	494	94	1	1	1		P

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count objects	Tokens + invocations	Tokens - invocations	Lind	Count try
Auðmundr	m		0			1	1	1		
Auðr	mf		0	0	0	2	2	2		
Auðun	m		0	854	110	1	1	1		N
Bárðr	m		0	262	12	2	2	2		N
Benedikt	m		0	471	144	3	3	3		I
Benedikta	f		0	1	0	1	1	1		P
Bergsveinn	m		0	97	2	1	1	1	N	N
Bergþóra	f		0	0	0	1	1	1		
Bergþórr	m		0	259	91	2	2	2		I
Birgir	m		0	154	6	1	1	1		N
Biarni/Biarni	m		0	89	7	2	2	2		P
Biörn/Biörn	m		0	279	37	1	1	1		P
Bóthíldr	f		0	23	0	1	1	1		P
Bótleifr	m		0			1	1	1		
Bótolfr	m		0	440	15	1	1	1		N
Brandr	m		0	100	32	1	1	1		I
Bubba	f		0			1	1	1		
Búi	m		0	3	6	1	1	1		I
Búr-Almarr	m		0			1	1	1		
Christus	m		1			7	7	0		
Constantinus	m		0			1	1	0		
Didrik	m		0	19	12	1	1	1	N	I
Dionysius	m		0			1	2	0		
Egill	m		0	133	123	1	1	1		I
Einarr	m		0	127	13	4	5	5		P
Eindriði	m		0	242	68	5	6	6		I
Einri	m		0			1	1	1		

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count try
Eiríkr	m		1	0	464	40	11	11		N
Eldjarn/Eldiarn	m		1	1	0	12	1	1	I	I
Elisabet(h)	f		1	0	35	1	1	0	N	P
Erlendr	m		1	0	733	188	5	6		I
Erlingr	m		1	0	1435	49	2	2		N
Eygís/Eygils	m		1	0	8	0	1	1	N	P
Eyjólf/Eyjólf	m		1	0	137	56	2	2		I
Eysteinn	m		1	0	309	1	3	3		N
Eyvindr	m		1	0	643	11	1	1		N
Finnr	m		1	0	319	93	4	5		I
Fólkvarðr	m		1	0	48	0	1	1	N	N
Gabriel	m		1	0	6	0	1	0	N	P
Gísl	m		1	0	4	46	1	1		I
Glúmr	m		1	0	3	5	1	1		I
Grímnir	m		1	0	0	0	1	0	M	
Grímr	m		1	0	164	16	2	3		P
Guðmundr	m		1	0	377	62	3	3		P
Guðríðr	f		1	0	208	62	1	1		I
Guðrún	f		1	0	268	24	1	1		N
Guðsteinn	m		1	0	1	0	1	1	N	P
Guðþormr	m		1	0	363	84	1	1		P
Gunna	f		1	0	24	0	1	1	N	P
Gunnarr	m		1	0	155	14	12	13		P
Gunnhildr	f		1	0	184	17	1	1		P
Gunnsteinn	m		1	0	1	9	1	1		I
Gusir	m		1	0	0	0	1	1		
Gussir			0	0			1	1		

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count try
Gyða	f	1	0	48	5	2	2	2		P
Gyrðir		0	0			1	1	1		
Gyrðr	m	1	0	330	5	1	1	1		N
Gyrid		0	0			1	1	1		
Hafðjarfr	m	1	0	0	0	1	1	1	N	
Hafgrímr	m	1	0	0	1	1	1	1		P
Hákon	m	1	0	210	131	1	1	1		I
Hálfðan	m	1	0	33	41	1	1	1		I
Hallbjörg	f	1	0	4	1	1	1	1		P
Halldórr	m	1	0	365	6	2	2	2		N
Hallgrísl/Hallgísl	m	1	0	0	0	1	1	1	I	
Halli	m	1	0	121	13	2	2	2		P
Hallkatla	f	1	0	3	0	2	2	2		P
Hallkell	m	1	0	154	32	1	1	1		P
Hallsteinn	m	1	0	353	47	1	1	1		P
Hallvarðr	m	1	0	768	14	4	4	4		N
Haraldr	m	1	0	600	24	2	2	2		N
Hávarðr	m	1	0	852	23	1	1	1		N
Hávarr	m	0	0	0	1	1	1	1		P
Heðinn	m	1	0	27	3	1	1	1		P
Heinrekr	m	1	0	261	30	3	3	3		P
Helga	f	1	0	139	4	1	1	1		N
Helgi	m	1	0	283	8	3	3	3		N
Herikr	m	1	0			1	1	1		
Hernaðr	m	1	1			1	3	3		
Hermann	m	1	1	60	15	1	3	3		P
Holmr	m	1	0	26	0	1	1	1	N	P

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count objects	Tokens + invocations	Tokens - invocations	Lind	Count try
Hrólfr (Rólfr)	m	1	0	430	24	1	1	1		N
Illugi	m	1	0	0	147	1	1	1	I	I
Ími	m	1	0	0	5	1	2	1	I	I
Inga	f	1	0	32	4	1	1	1		P
Ingibjörg/Ingibjörg	f	1	0	537	108	3	3	3		P
Ingimundur	m	1	0	165	154	1	1	1		I
Ingirðr	f	1	0	251	30	1	1	1		P
Ingjaldr/Ingjaldr	m	1	0	195	31	1	1	1		P
Ió(h)an/Jó(h)an	m	1	0	135	25	6	6	6		P
Ióðgeirr/Ióðgeirr	m	1	0	8	0	1	1	1	N	P
Iógeirr/Iógeirr	m	1	0	6	0	1	1	1	N	P
Ívarr	m	1	0	283	9	4	4	4		N
Jesus	m	1	0			4	4	0		
Johannes	m	1	0			8	8	0		
Jón	m	1	0			7	9	9		
Jórunn/Iórunn	f	1	0	156	12	1	1	1		N
Karl	m	1	0	308	25	1	1	1		N
Kárr	m	1	0	9	31	1	1	1		I
Kátr		0	1	2	0	1	1	1		P
Kattr		0	0			1	1	1		
Klas	m	1	0			1	1	1		
Klémetr	m	1	0	309	32	1	2	0		N
Kolbeinn	m	1	0	285	171	3	4	4		I
Kolbjörn	m	1	0	440	3	2	2	2		N
Kormakr	m	1	0	2	2	1	1	0		P
Kottr		0	0	0	0	1	1	1	F	



Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count-try
Lafranz	m		0	272	4	2	2	1		N
Ljótr/Liotr	m		0	47	61	2	2	2		I
Loðinn	m		0	270	11	2	2	2		N
Lúcia	f		0	21	0	2	2	2	N	P
Lukas	m		0	1	1	5	6	0		P
Lunaney	f		0			1	1	1		
Magnús	m		0	160	26	1	1	1		P
Malchus	m		0			2	2	0		
Margrét(a)	f		0	581	106	2	2	2		P
Maria	f		0	8	0	18	19	2	N	P
Markús	m		0	45	93	5	5	0		I
Markvarðr	m		0	40	0	1	1	1	N	P
Martinianus	m		0			1	1	0		
Mat(t)heus	m		0	3	20	4	5	0		I
Maximianus	m		0			2	2	0		
Mesak	m		0			1	1	0		
Michael/Mikiáll	m		0	156	23	2	2	0		P
Munán	m		0	30	0	1	1	1	N	P
Myttar			0			1	1	1		
Narfi	m		0	416	204	1	1	1		I
Nikulás/Nikolás	m		0	507	44	3	3	2		N
Oddr	m		0	331	92	1	1	1		I
Óðinn	m		0	8	0	2	3	0	M	P
Qgmundr	m		0	762	43	3	3	3		N
Ólafr	m		0	355	35	9	11	9		N
Qlrekr	m		0	3	0	1	1	1	N	P
Qlvir/Qlvir	m		0	128	6	1	1	1		N

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoc-ations	Lind	Coun-try
Qnundr	m	1	0	763	31	1	1	1		N
Ormr	m	1	0	67	7	2	2	2		P
Ormrikr	m	1	0			1	1	1		
Óttarr	m	1	0	157	18	1	1	1		P
Ótto	m	1	0	84	2	1	1	1	N	N
Pálmi	m	1	0	21	0	1	1	1	N	P
Pétri	m	1	0	368	17	2	2	1		N
Philomena	f	1	0			1	1	0		
Poppe	m	1	0			1	1	1		
Ragnarr	m	1	0	6	14	1	1	1	N	I
Ran	f	1	0	0	0	1	1	0	M	
Rannveig	f	1	0	211	21	3	3	3		P
Raphael	m	1	0			1	1	0		
Raumr	m	1	1	0	0			0	F	
Reiðarr	m	1	0			1	1	1		
Rúnolfr	m	1	0	31	171	1	1	1		I
Sadrak	m	1	0			1	1	0		
Sámr	m	1	0	1	0	3	3	3		P
Samson	m	1	0	13	0	1	1	1	N	P
Sægunni	m	1	0			1	1	1		
Serapion	m	1	0			1	1	0		
Sessi		0	0			1	1	1		
Sigbaldr	m	1	0			1	1	1		
Siggi	m	1	0	11	0	1	1	1	N	P
Sighvatr	m	1	0	209	96	1	1	1		I
Sigolfr/Sigólfr	m	1	0	1	0	1	1	1	N	P
Sigríðr	f	1	0	508	82	5	5	5		P

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count objects	Tokens + invocations	Tokens - invocations	Lind	Count try
Sigurðr	m	1	0	1016	82	15	19	19		N
Sigvaldi	m	1	0			1	1	1		
Sigvaldr	m	1	0	27	0	2	2	2	N	P
Simon	m	1	0	463	47	3	3	3		N
Skeggi	m	1	0	22	58	1	1	1		I
Smiðr	m	1	0	97	3	1	1	1		N
Solveig	f	1	0	11	49	1	1	1		I
Sørkvíðr	m	1	0			1	1	1		
Sørkvir	m	1	0	54	7	1	1	1	N	P
Steinnarr	m	1	0	407	3	1	1	1		N
Styrkár	m	1	0	48	12	1	1	1		P
Sveinn	m	1	0	193	20	3	3	3		P
Sverðólfr	m	1	0			1	1	1		
Tast		0	1			1	1	1		
Tereus	m	1	0			1	1	0		
Thomás	m	1	0	201	116	1	1	0		I
Tobias	m	1	0			1	1	0		
Tonna	f	1	0			1	1	1		
Týhvatr/Tívatr	m	1	0	12	0	1	1	1	N	P
Týr	m	1	0	0	0	1	1	0	M	
Únás(s)	m	1	0	18	0	1	1	1		P
Vébrandr	m	1	0	11	1	1	1	1		P
Vémundr	m	1	0	14	8	1	1	1		I
Vigdís	f	1	0	4	26	1	1	1		I
Vígi	m	1	0	8	0	1	3	3		P
Vilhelmus/Vílhjálmr	m	1	0	219	73	1	1	1		I

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count try
Yggjar/Yggr	m		1	0	0	1	1	0	M	
Yngvildr	f		1	0	88	1	1	1		I
Þiðrikr	m		1	0		1	1	1		
Þjóðarr	m		1	0	0	1	1	1		
Þjóðgeir-	m		1	0	0	1	1	1		P
r/Þjóðgeirr										
Þólfir	m		1	0	392	1	1	1	N	N
Þóra	f		1	0	51	2	2	2		P
Þóraldi	m		1	0	73	3	3	3	N	N
Þóraldr	m		1	0	345	3	3	3	N	N
Þorbergr	m		1	0	50	1	1	1		I
Þorbjörg	f		1	0	80	1	1	1		I
Þorbjörn	m		1	0	259	3	3	3		N
Þórðr	m		1	0	351	3	4	4		N
Þorfinnr	m		1	0	124	2	2	2		I
Þorgarðr	m		1	0	72	1	1	1	N	N
Þorgeirr	m		1	0	251	1	1	1		N
Þorgíls/Þorgísl	m		1	0	383	5	5	5		N
Þorgrímr	m		1	0	273	1	1	1		I
Þorgunna	f		1	0	13	1	1	1		P
Þórhallr	m		1	0	0	2	2	2		I
Þóri	m		1	0		1	1	1		
Þórir	m		1	0	255	9	9	9		N
Þorkatla	f		1	0	1	2	2	2		P
Þorkell	m		1	0	284	5	5	5		N
Þorlákr	m		1	0	251	1	1	1		I
Þorleifr	m		1	0	509	1	1	1		P

Normalised	Gender	Idionym	By-name	Tokens DN	Tokens DI	Count ob-jects	Tokens + invoca-tions	Tokens - invoca-tions	Lind	Count try
Þormóðr	m	1	0	425	62	2	2	2		P
Þórr	m	0	0	17	0	3	3	2	M	P
Þorsteinn	m	1	0	339	30	6	6	6		N
Þorvaldr	m	1	0	43	36	1	1	1		I
Þorvarðr	m	1	0	75	46	1	1	1		I
Þorviðr	m	1	0	24	2	1	1	1		P
Þúfa	f	1	1	0	0	1	1	1		

Table F.2. List of all **idionyms** in **IDIONYM**, sorted alphabetically (F.26), and the relevant calculations of percentages,  $\chi^2$ -test-results and **quartile**. Percentages for the Bergen corpus are calculated on *insidnoin*, tokens without possible invocations.

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart-ile in DI	Quart-ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Abed-Nego			0.0000							
Agi	0.0000	0.0057	0.2445	1	1	0.0000	0.0100	1.0000000000	0.0661933800	0.0349965000
Agnbjörg			0.2445						0.0649935000	0.0114988500
Alfvarðr			0.2445						0.0638936100	0.0108989100
Amor			0.0000							
Ámundi	0.1840	0.0656	0.4890	2	1	0.1657	0.1150	0.0061993800	0.1998800100	0.0315968400
Án(n)	0.0000	0.0713	0.4890		2	0.0000	0.1250	0.0401959800	0.0044995500	0.0409959000
Andreas/Andrés	0.5186	0.5189	0.0000	3	3	0.4669	0.9100	1.0000000000	0.2641735800	0.1771822800
Áni	0.0000	0.0029	0.7335		1	0.0000	0.0050	1.0000000000	0.0002999700	0.0000999900
Anna	0.1338	0.0228	0.2445	1	1	0.1205	0.0400	0.0007999200	1.0000000000	0.0981901800
Anne			0.7335						0.0002999700	0.0000999900
Ari	3.3958	0.0855	0.4890	4	2	3.0572	0.1500	0.0000999900	0.0024997500	0.0540945900

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Armbjörg	0.0000	0.1369	0.2445		2	0.0000	0.2400	0.0081991800	0.0651934800	1.000000000000
Armbjörn	1.3884	0.8468	0.2445	4	3	1.2500	1.4850	0.0000999900	0.0665933400	0.2773722600
Arnfinnr	1.1375	1.0150	0.2445	4	4	1.0241	1.7800	0.4048595100	0.1298870100	0.1407859200
Arni	0.6858	0.2537	3.1785	3	2	0.6175	0.4450	0.0000999900	0.0000999900	0.0000999900
Arnviður	0.0836	0.2423	0.2445	1	2	0.0753	0.4250	0.0142985700	0.3334666500	1.0000000000
Ása	0.3346	0.7384	0.7335	2	3	0.3012	1.2950	0.0006999300	0.1866813300	1.0000000000
Ásbjörg	0.0000	0.0485	0.2445		1	0.0000	0.0850	0.1639836000	0.0679932000	0.1880811900
Ásgeirr	0.5353	0.3478	0.2445	3	2	0.4819	0.6100	0.0297970200	0.5263473700	1.0000000000
Ásgrímr	2.8270	0.1312	0.2445	4	2	2.5452	0.2300	0.0000999900	0.0016998300	1.0000000000
Áslákr	0.3011	2.7684	0.2445	2	4	0.2711	4.8550	0.0000999900	1.0000000000	0.0041995800
Ásmundur	1.5724	1.4085	0.2445	4	4	1.4157	2.4700	0.3479652000	0.0298970100	0.0483951600
Auðmundr			0.2445						0.0652934700	0.0124987500
Auður	0.0000	0.0000	0.4890			0.0000	0.0000		0.0040995900	0.0002999700
Auðun	1.8401	2.4349	0.2445	4	4	1.6566	4.2700	0.0064993500	0.0143985600	0.0059994000
Bárður	0.2007	0.7470	0.4890	2	3	0.1807	1.3100	0.0000999900	0.2311768800	0.6103389700
Benedikt	2.4088	1.3429	0.7335	4	4	2.1687	2.3550	0.0000999900	0.0397960200	0.3797620200
Benediktra	0.0000	0.0029	0.2445		1	0.0000	0.0050	1.0000000000	0.0623937600	0.0266973300
Bergsveinn	0.0335	0.2766	0.2445	1	2	0.0301	0.4850	0.0008999100	0.1871812800	1.0000000000
Bergþóra	0.0000	0.0000	0.2445			0.0000	0.0000		0.0655934400	0.0113988600
Bergþorr	1.5222	0.7384	0.4890	4	3	1.3705	1.2950	0.0000999900	0.1298870100	0.6083391700
Birgir	0.1004	0.4391	0.2445	1	3	0.0904	0.7700	0.0000999900	0.3683631600	0.7237276300
Bjarni/Biarni	0.1171	0.2537	0.4890	1	2	0.1054	0.4450	0.0573942600	0.1104889500	0.6339366100
Björn/Björn	0.6189	0.7955	0.2445	3	3	0.5572	1.3950	0.1735826400	0.5066493400	0.2708729100
Bóthildr	0.0000	0.0656	0.2445		1	0.0000	0.1150	0.0682931700	0.0691930800	0.2473752600
Bótleifr			0.2445						0.0683931600	0.0105989400
Bótolfr	0.2509	1.2545	0.2445	2	4	0.2259	2.2000	0.0000999900	1.0000000000	0.0715928400
Brandr	0.5353	0.2851	0.2445	3	2	0.4819	0.5000	0.0032996700	0.5139486100	1.0000000000

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Bubba			0.2445						0.0643935600	0.0129987000
Búi	0.1004	0.0086	0.2445	1	1	0.0904	0.0150	0.0008999100	0.3766623300	0.0452954700
Búr-Almarr			0.2445						0.0631936800	0.0115988400
Christus			0.0000							
Constantinus			0.0000							
Didrik	0.2007	0.0542	0.2445	2	1	0.1807	0.0950	0.0005999400	1.0000000000	0.2089791000
Dionysius			0.0000							
Egill	2.0575	0.3792	0.2445	4	2	1.8524	0.6650	0.0000999900	0.0103989600	0.7515248500
Einarr	0.2175	0.3621	1.2225	2	2	0.1958	0.6350	0.0939906000	0.0047995200	0.0193980600
Eindriði	1.1375	0.6900	1.4670	4	3	1.0241	1.2100	0.0007999200	0.6258374200	0.0738926100
Einri			0.2445						0.0621937800	0.0115988400
Eiríkr	0.6691	1.3229	2.6895	3	4	0.6024	2.3200	0.0001999800	0.0002999700	0.0317968200
Eldjarn/Eldiarn	0.2007	0.0000	0.2445	2		0.1807	0.0000	0.0000999900	1.0000000000	0.0095990400
Elisabet(h)	0.0167	0.0998	0.0000	1	2	0.0151	0.1750	0.0525947400	1.0000000000	1.0000000000
Erlendr	3.1449	2.0899	1.4670	4	4	2.8313	3.6650	0.0000999900	0.0694930500	0.4828517100
Erlingr	0.8197	4.0913	0.4890	3	4	0.7380	7.1750	0.0000999900	0.5832416800	0.0005999400
Eygísl/Eygils	0.0000	0.0228	0.2445		1	0.0000	0.0400	0.3829617000	0.0645935400	0.0952904700
Eyjolfur/Eyíólfr	0.9368	0.3906	0.4890	3	3	0.8434	0.6850	0.0000999900	0.4376562300	1.0000000000
Eysteinn	0.0167	0.8810	0.7335	1	4	0.0151	1.5450	0.0000999900	0.0007999200	0.8056194400
Eyvindr	0.1840	1.8333	0.2445	2	4	0.1657	3.2150	0.0000999900	1.0000000000	0.0231976800
Finnr	1.5557	0.9095	1.2225	4	4	1.4006	1.5950	0.0000999900	0.6880312000	0.6013398700
Fólkvarðr	0.0000	0.1369	0.2445		2	0.0000	0.2400	0.0079992000	0.0646935300	1.0000000000
Gabriel	0.0000	0.0171	0.0000		1	0.0000	0.0300	0.5980402000		1.0000000000
Gísl	0.7695	0.0114	0.2445	3	1	0.6928	0.0200	0.0000999900	0.3600639900	0.0576942300
Glúmr	0.0836	0.0086	0.2445	1	1	0.0753	0.0150	0.0017998200	0.3316668300	0.0461953800
Grímnir	0.0000	0.0000	0.0000			0.0000	0.0000			
Grímr	0.2676	0.4676	0.7335	2	3	0.2410	0.8200	0.0336966300	0.1167883200	0.4488551100



Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Guðmundr	1.0371	1.0749	0.7335	4	4	0.9337	1.8850	0.8432156800	0.6290371000	0.6299370100
Guðriðr	1.0371	0.5930	0.2445	4	3	0.9337	1.0400	0.0002999700	0.1278872100	0.5308469200
Guðrún	0.4015	0.7641	0.2445	2	3	0.3614	1.3400	0.0021997800	0.7340266000	0.2675732400
Guðsteinn	0.0000	0.0029	0.2445		1	0.0000	0.0050	1.0000000000	0.0654934500	0.0226977300
Guðþormr	1.4052	1.0350	0.2445	4	4	1.2651	1.8150	0.0127987200	0.0671932800	0.1429857000
Gunna	0.0000	0.0684	0.2445		2	0.0000	0.1200	0.0702929700	0.0595940400	0.2513748600
Gunnarr	0.2342	0.4419	3.1785	2	3	0.2108	0.7750	0.0194980500	0.0000999900	0.0000999900
Gunnhildr	0.2844	0.5246	0.2445	2	3	0.2560	0.9200	0.0135986400	1.0000000000	0.5437456300
Gunnsteinn	0.1506	0.0029	0.2445	2	1	0.1355	0.0050	0.0000999900	1.0000000000	0.0229977000
Gusir	0.0000	0.0000	0.2445			0.0000	0.0000		0.0617938200	0.0138986100
Gussir			0.2445						0.0645935400	0.0137986200
Gýða	0.0836	0.1369	0.4890	1	2	0.0753	0.2400	0.3347665200	0.0715928400	0.1181881800
Gyrðir			0.2445						0.0639936000	0.0119988000
Gyrðr	0.0836	0.9409	0.2445	1	4	0.0753	1.6500	0.0000999900	0.3346665300	0.1920807900
Gyrid			0.2445						0.0573942600	0.0105989400
Hafðjarfr	0.0000	0.0000	0.2445			0.0000	0.0000		0.0660933900	0.0114988500
Hafgrímr	0.0167	0.0000	0.2445	1		0.0151	0.0000	0.1484851500	0.1293870600	0.0115988400
Hákon	2.1914	0.5987	0.2445	4	3	1.9729	1.0500	0.0000999900	0.0092990700	0.5320468000
Hálfðan	0.6858	0.0941	0.2445	3	2	0.6175	0.1650	0.0000999900	0.3765623400	0.3176682300
Hallbjörg	0.0167	0.0114	0.2445	1	1	0.0151	0.0200	1.0000000000	0.1265873400	0.0554944500
Haldórr	0.1004	1.0407	0.4890	1	4	0.0904	1.8250	0.0000999900	0.0908909100	0.3278672100
Hallgísl/Hallgils	0.0000	0.0000	0.2445			0.0000	0.0000		0.0665933400	0.0110988900
Halli	0.2175	0.3450	0.4890	2	2	0.1958	0.6050	0.1421857800	0.2458754100	0.6556344400
Hallkatla	0.0000	0.0086	0.4890		1	0.0000	0.0150	1.0000000000	0.0038996100	0.0020997900
Hallkell	0.5353	0.4391	0.2445	3	3	0.4819	0.7700	0.3444655500	0.5161483900	0.7315268500
Hallsteinn	0.7862	1.0064	0.2445	3	4	0.7078	1.7650	0.1118888100	0.2614738500	0.1292870700
Hallvarðr	0.2342	2.1897	0.9780	2	4	0.2108	3.8400	0.0000999900	0.0267973200	0.1178882100

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Haraldr	0.4015	1.7107	0.4890	2	4	0.3614	3.0000	0.000099900	1.000000000	0.0712928700
Hávarðr	0.3847	2.4291	0.2445	2	4	0.3464	4.2600	0.000099900	0.7384261600	0.0054994500
Hávarr	0.0167	0.0000	0.2445	1		0.0151	0.0000	0.1437856200	0.1250874900	0.0128987100
Heðinn	0.0502	0.0770	0.2445	1	2	0.0452	0.1350	0.6074392600	0.2310768900	0.2804719500
Heinrekr	0.5018	0.7441	0.7335	3	3	0.4518	1.3050	0.0441955800	0.7288271200	1.0000000000
Helga	0.0669	0.3963	0.2445	1	3	0.0602	0.6950	0.0001999800	0.2823717600	0.7378262200
Helgi	0.1338	0.8069	0.7335	1	3	0.1205	1.4150	0.000099900	0.0334966500	1.0000000000
Herikr			0.2445					0.0642935700	0.0111988800	
Hermaðr			0.7335					0.0002999700	0.000099900	
Hermann	0.2509	0.1711	0.7335	2	2	0.2259	0.3000	0.1869813000	0.1082891700	0.0361963800
Holmr	0.0000	0.0741	0.2445		2	0.0000	0.1300	0.0427957200	0.0630936900	0.2674732500
Hrólfir (Rolfir)	0.4015	1.2260	0.2445	2	4	0.3614	2.1500	0.000099900	0.7212278800	0.1034896500
Illugi	2.4590	0.0000	0.2445	4		2.2139	0.0000	0.000099900	0.0054994500	0.0117988200
Ími	0.0836	0.0000	0.2445	1		0.0753	0.0000	0.000099900	0.3284671500	0.0112988700
Inga	0.0669	0.0912	0.2445	1	2	0.0602	0.1600	0.6468353200	0.2792720700	0.3165683400
Ingibjörg/Ingib- iörg	1.8066	1.5310	0.7335	4	4	1.6265	2.6850	0.1245875400	0.1177882200	0.2248775100
Ingimundr	2.5761	0.4704	0.2445	4	3	2.3193	0.8250	0.000099900	0.0041995800	0.7262273800
Ingiriðr	0.5018	0.7156	0.2445	3	3	0.4518	1.2550	0.0693930600	0.7140286000	0.3815618400
Ingjaldr/Ingialdr	0.5186	0.5560	0.2445	3	3	0.4669	0.9750	0.7809219100	0.5338466200	0.5259474100
Ió(h)an/Jó(h)an	0.4182	0.3849	1.4670	3	3	0.3765	0.6750	0.7366263400	0.000099900	0.000099900
Ióðgeirr/Jóðgeirr	0.0000	0.0228	0.2445		1	0.0000	0.0400	0.3834616500	0.0633936600	0.0997900200
Iógeirr/Jógeirr	0.0000	0.0171	0.2445		1	0.0000	0.0300	0.5976402400	0.0654934500	0.0808919100
Ívarr	0.1506	0.8069	0.9780	2	3	0.1355	1.4150	0.000099900	0.0076992300	0.7727227300
Jesus			0.0000							
Johannes			0.0000							
Jón			2.2005							

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Jórunn/Iórunn	0.2007	0.4448	0.2445	2	3	0.1807	0.7800	0.0094990500	1.0000000000	0.7280272000
Karl	0.4182	0.8781	0.2445	3	3	0.3765	1.5400	0.0003999600	0.7259274100	0.1940805900
Kárr	0.5186	0.0257	0.2445	3	1	0.4669	0.0450	0.0000999900	0.5322467800	0.1098890100
Kátr	0.0000	0.0057	0.2445		1	0.0000	0.0100	1.0000000000	0.0629937000	0.0330966900
Kattr			0.2445						0.0635936400	0.0123987600
Klas			0.2445						0.0615938400	0.0121987800
Klémetr	0.5353	0.8810	0.0000	3	4	0.4819	1.5450	0.0065993400	0.1692830700	0.0547945200
Kolbeinn	2.8605	0.8126	0.9780	4	3	2.5753	1.4250	0.0000999900	0.0240975900	0.7719228100
Kolbjörn	0.0502	1.2545	0.4890	1	4	0.0452	2.2000	0.0000999900	0.0368963100	0.1816818300
Kormakr	0.0335	0.0057	0.0000	1	1	0.0301	0.0100	0.1028897100	1.0000000000	1.0000000000
Kottr	0.0000	0.0000	0.2445			0.0000	0.0000		0.0662933700	0.0117988200
Lafranz	0.0669	0.7755	0.2445	1	3	0.0602	1.3600	0.0000999900	0.2687731200	0.2631736800
Ljóttr/Liotr	1.0204	0.1340	0.4890	3	2	0.9187	0.2350	0.0000999900	0.3237676200	0.1115888400
Loðinn	0.1840	0.7698	0.4890	2	3	0.1657	1.3500	0.0000999900	0.2069793000	0.5952404800
Lúcia	0.0000	0.0599	0.4890		1	0.0000	0.1050	0.0629937000	0.0033996600	0.0277972200
Lukas	0.0167	0.0029	0.0000	1	1	0.0151	0.0050	0.2682731700	1.0000000000	1.0000000000
Lunaney			0.2445						0.0654934500	0.0113988600
Magnús	0.4349	0.4562	0.2445	3	3	0.3916	0.8000	0.8395160500	0.7232276800	0.7301269900
Malchus			0.0000							
Margrét(a)	1.7732	1.6565	0.4890	4	4	1.5964	2.9050	0.5467453300	0.0677932200	0.0772922700
María	0.0000	0.0228	0.4890		1	0.0000	0.0400	0.3747625200	0.0042995700	0.0063993600
Markús	1.5557	0.1283	0.0000	4	2	1.4006	0.2250	0.0000999900	0.0151984800	0.6858314200
Markvarður	0.0000	0.1140	0.2445		2	0.0000	0.2000	0.0104989500	0.0671932800	0.3829617000
Martinianus			0.0000							
Mat(t)heus	0.3346	0.0086	0.0000	2	1	0.3012	0.0150	0.0000999900	0.3968603100	1.0000000000
Maximianus			0.0000							
Mesak			0.0000							

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Michael/Mikíall	0.3847	0.4448	0.0000	2	3	0.3464	0.7800	0.5319468100	0.4037596200	0.2642735700
Munán	0.0000	0.0855	0.2445		2	0.0000	0.1500	0.0322967700	0.0655934400	0.3078692100
Myrtar			0.2445						0.0633936600	0.0134986500
Narfi	3.4125	1.1861	0.2445	4	4	3.0723	2.0800	0.0000999900	0.0003999600	0.1050894900
Nikulás/Nikolás	0.7360	1.4455	0.4890	3	4	0.6627	2.5350	0.0000999900	0.7702229800	0.1363863600
Oddr	1.5390	0.9437	0.2445	4	4	1.3855	1.6550	0.0000999900	0.0489951000	0.1974802500
Óðinn	0.0000	0.0228	0.0000		1	0.0000	0.0400	0.3834616500		1.0000000000
Qgmundr	0.7193	2.1725	0.7335	3	4	0.6476	3.8100	0.0000999900	1.0000000000	0.0471952800
Ólafur	0.5855	1.0121	2.2005	3	4	0.5271	1.7750	0.0011998800	0.0014998500	0.0271972800
Qlrekr	0.0000	0.0086	0.2445		1	0.0000	0.0150	1.0000000000	0.0607939200	0.0474952500
Qlvir/Ølvir	0.1004	0.3649	0.2445	1	2	0.0904	0.6400	0.0015998400	0.3778622100	1.0000000000
Qnundr	0.5186	2.1754	0.2445	3	4	0.4669	3.8150	0.0000999900	0.5220478000	0.0068993100
Ormr	0.1171	0.1910	0.4890	1	2	0.1054	0.3350	0.2492750700	0.1073892600	0.1890810900
Ormríkr			0.2445						0.0652934700	0.0101989800
Óttarr	0.3011	0.4476	0.2445	2	3	0.2711	0.7850	0.1273872600	1.0000000000	0.7362263800
Ótto	0.0335	0.2395	0.2445	1	2	0.0301	0.4200	0.0017998200	0.1776822300	1.0000000000
Pálmi	0.0000	0.0599	0.2445		1	0.0000	0.1050	0.0623937600	0.0600939900	0.2261773800
Pétr	0.2844	1.0492	0.2445	2	4	0.2560	1.8400	0.0000999900	1.0000000000	0.1403859600
Philomena			0.0000							
Poppe			0.2445						0.0674932500	0.0119988000
Ragnarr	0.2342	0.0171	0.2445	2	1	0.2108	0.0300	0.0000999900	1.0000000000	0.0763923600
Ran	0.0000	0.0000	0.0000			0.0000	0.0000			
Rannveig	0.3513	0.6016	0.7335	2	3	0.3163	1.0550	0.0198980100	0.4039596000	0.7430257000
Raphael			0.0000							
Raumur	0.0000	0.0000	0.0000			0.0000	0.0000			
Reiðarr			0.2445						0.0655934400	0.0122987700
Rúnolfr	2.8605	0.0884	0.2445	4	2	2.5753	0.1550	0.0000999900	0.0019998000	0.3035696400

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Sadrak			0.0000							
Sámr	0.0000	0.0029	0.7335		1	0.0000	0.0050	1.0000000000	0.0002999700	0.0000999900
Samson	0.0000	0.0371	0.2445		1	0.0000	0.0650	0.2361763800	0.0631936800	0.1515848400
Sægunni			0.2445						0.0681931800	0.0114988500
Serapion			0.0000							
Sessi			0.2445						0.0650934900	0.0103989600
Sigbaldr			0.2445						0.0664933500	0.0117988200
Siggi	0.0000	0.0314	0.2445		1	0.0000	0.0550	0.2435756400	0.0638936100	0.1222877700
Sighvatr	1.6059	0.5959	0.2445	4	3	1.4458	1.0450	0.0000999900	0.0306969300	0.5345465500
Sigolfr/Sigólfr	0.0000	0.0029	0.2445		1	0.0000	0.0050	1.0000000000	0.0651934800	0.0214978500
Sigríðr	1.3717	1.4484	1.2225	4	4	1.2349	2.5400	0.6767323300	0.8409159100	0.8358164200
Sigurðr	1.3717	2.8967	4.6455	4	4	1.2349	5.0800	0.0000999900	0.0000999900	0.0554944500
Sigvaldi			0.2445						0.0612938700	0.0132986700
Sigvaldr	0.0000	0.0770	0.4890		2	0.0000	0.1350	0.0513948600	0.0042995700	0.0451954800
Simon	0.7862	1.3201	0.7335	3	4	0.7078	2.3150	0.0009999000	1.0000000000	0.3893610600
Skeggi	0.9702	0.0627	0.2445	3	1	0.8735	0.1100	0.0000999900	0.1849815000	0.2327767200
Smíðr	0.0502	0.2766	0.2445	1	2	0.0452	0.4850	0.0012998700	0.2315768400	1.0000000000
Solveig	0.8197	0.0314	0.2445	3	1	0.7380	0.0550	0.0000999900	0.2603739600	0.1271872800
Sørkviðr			0.2445						0.0618938100	0.0097990200
Sørkvir	0.1171	0.1540	0.2445	1	2	0.1054	0.2700	0.5960404000	1.0000000000	1.0000000000
Steinarr	0.0502	1.1604	0.2445	1	4	0.0452	2.0350	0.0000999900	0.2329767000	0.1023897600
Styrkarr	0.2007	0.1369	0.2445	2	2	0.1807	0.2400	0.2707729200	1.0000000000	1.0000000000
Sveinn	0.3346	0.5503	0.7335	2	3	0.3012	0.9650	0.0381961800	0.1789821000	0.7333266700
Sverðolfr			0.2445						0.0655934400	0.0115988400
Tast			0.2445						0.0632936700	0.0122987700
Tereus			0.0000							
Thomás	1.9404	0.5731	0.0000	4	3	1.7470	1.0050	0.0000999900	0.0066993300	0.1857814200

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Tobias			0.0000							
Tonna			0.2445						0.0659934000	0.0133986600
Týhvatr/Tivatr	0.0000	0.0342	0.2445	1	1	0.0000	0.0600	0.2405759400	0.0601939800	0.1396860300
Týr	0.0000	0.0000	0.0000			0.0000	0.0000			
Únás(s)	0.0000	0.0513	0.2445		1	0.0000	0.0900	0.0940905900	0.0640935900	0.1985801400
Vébrandr	0.0167	0.0314	0.2445	1	1	0.0151	0.0550	0.7037296300	0.1189881000	0.1372862700
Vémundr	0.1338	0.0399	0.2445	1	1	0.1205	0.0700	0.0099990000	1.0000000000	0.1579842000
Vigdís	0.4349	0.0114	0.2445	3	1	0.3916	0.0200	0.0000999900	0.7302269800	0.0534946500
Vígi	0.0000	0.0228	0.7335		1	0.0000	0.0400	0.3747625200	0.0004999500	0.0001999800
Vilhelms/Vil- hjálmr	1.2211	0.6244	0.2445	4	3	1.0994	1.0950	0.0000999900	0.0831916800	0.3854614500
Yggjar/Yggr	0.0000	0.0000	0.0000			0.0000	0.0000			
Yngvildr	1.4721	0.0000	0.2445	4		1.3253	0.0000	0.0000999900	0.0407959200	0.0120987900
Þiðrikr			0.2445						0.0651934800	0.0108989100
Þjóðarr	0.0000	0.0000	0.2445			0.0000	0.0000		0.0627937200	0.0113988600
Þjóðgeir- r/Þjóðgeirr	0.0000	0.0770	0.2445		2	0.0000	0.1350	0.0486951300	0.0658934100	0.2892710700
Þólfr	0.0000	1.1176	0.2445		4	0.0000	1.9600	0.0000999900	0.0597940200	0.1483851600
Þóra	0.0167	0.1454	0.4890	1	2	0.0151	0.2550	0.0103989600	0.0112988700	0.1217878200
Þóraldi	0.0167	0.2081	0.7335	1	2	0.0151	0.3650	0.0009999000	0.0007999200	0.0564943500
Þóraldr	0.3847	0.9836	0.7335	2	4	0.3464	1.7250	0.0000999900	0.4029597000	0.6415358500
Þorbergr	0.3847	0.1426	0.2445	2	2	0.3464	0.2500	0.0001999800	0.7330267000	1.0000000000
Þorbjörg	0.6524	0.2281	0.2445	3	2	0.5873	0.4000	0.0000999900	0.3789621000	1.0000000000
Þorbjörn	0.2676	0.7384	0.7335	2	3	0.2410	1.2950	0.0001999800	0.1188881100	1.0000000000
Þórðr	0.2844	1.0007	0.9780	2	4	0.2560	1.7550	0.0000999900	0.0451954800	1.0000000000
Þorfinnr	1.1375	0.3535	0.4890	4	2	1.0241	0.6200	0.0000999900	0.3207679200	0.6534346600
Þorgarðr	0.0000	0.2053	0.2445		2	0.0000	0.3600	0.0012998700	0.0633936600	1.0000000000

Normalised	DI / 5978 * 100	DN / 35074 * 100	B / 409 * 100	Quart- ile in DI	Quart- ile in DN	DI / 6640 * 100	DN / 20000 * 100	p-value DI/DN	p-value DN/Bergen	p-value DI/Bergen
Þorgeirr	0.3011	0.7156	0.2445	2	3	0.2711	1.2550	0.0002999700	1.0000000000	0.3784621500
Þorgils/Þorgísl	0.3513	1.0920	1.2225	2	4	0.3163	1.9150	0.0000999900	0.0233976600	0.8146185400
Þorgrímur	1.6393	0.7784	0.2445	4	3	1.4759	1.3650	0.0000999900	0.0344965500	0.2705729400
Þorgunna	0.0000	0.0371	0.2445		1	0.0000	0.0650	0.2393760600	0.0590940900	0.1502849700
Þórhallr	0.3680	0.0000	0.4890	2		0.3313	0.0000	0.0000999900	1.0000000000	0.0004999500
Þóri			0.2445						0.0652934700	0.0101989800
Þórir	0.0669	0.7270	2.2005	1	3	0.0602	1.2750	0.0000999900	0.0000999900	0.0034996500
Þorkatla	0.0335	0.0029	0.4890	1	1	0.0301	0.0050	0.0593940600	0.0223977600	0.0004999500
Þorkell	0.3513	0.8097	1.2225	2	3	0.3163	1.4200	0.0003999600	0.0228977100	0.4010598900
Þorlákur	1.2211	0.7156	0.2445	4	3	1.0994	1.2550	0.0001999800	0.0943905600	0.3878612100
Þorleifr	1.1040	1.4512	0.2445	4	4	0.9940	2.5450	0.0453954600	0.1252874700	0.0491950800
Þormóður	1.0371	1.2117	0.4890	4	4	0.9337	2.1250	0.2771722800	0.3315668400	0.2478752100
Þórr	0.0000	0.0485	0.4890		1	0.0000	0.0850	0.1607839200	0.0043995600	0.0192980700
Þorsteinn	0.5018	0.9665	1.4670	3	4	0.4518	1.6950	0.0001999800	0.0259974000	0.3018698100
Þorvaldr	0.6022	0.1226	0.2445	3	2	0.5422	0.2150	0.0000999900	0.5122487800	1.0000000000
Þorvarður	0.7695	0.2138	0.2445	3	2	0.6928	0.3750	0.0000999900	0.3727627200	1.0000000000
Þorviður	0.0335	0.0684	0.2445	1	2	0.0301	0.1200	0.4095590400	0.1883811600	0.2444755500
Þúfa	0.0000	0.0000	0.2445			0.0000	0.0000		0.0639936000	0.0108989100



## G. Chapter 6

### Code & queries

Query G.1 Retrieving the count of individual normalised inscriptions assigned ttags

```
1 SELECT COUNT(DISTINCT inscription.insid) FROM
2 (((((inscription LEFT JOIN transliteration ON
3      inscription.insid=transliteration.insid)
4 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
5 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
6 INNER JOIN texts ON normalisation.normid=texts.foreignid)
7 INNER JOIN texttags ON texts.textid=texttags.textid)
8 WHERE inscription.insid NOT IN (
9 SELECT DISTINCT inscription.insid FROM
10 (((((inscription LEFT JOIN transliteration ON
11      inscription.insid=transliteration.insid)
12 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
13 INNER JOIN texts ON patterning.patid=texts.foreignid)
14 INNER JOIN texttags ON texts.textid=texttags.textid)
15 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid);
```

Technically, it is not necessary to join to **INSCRIPTION** and **TTAGS**, because the *insids* are already present as **FKs** in **TRANSLITERATION**, and it is only necessary to confirm the presence of a *textid* in **TEXTTAGS** to know that this text has been tagged. This query includes those two tables just to show all of the tables from which **attributes** are involved in the result set.

Query G.2 Retrieving the count of individual patterned inscriptions assigned ttags

```
1 SELECT COUNT(DISTINCT inscription.insid) FROM
2 (((((inscription LEFT JOIN transliteration ON
3      inscription.insid=transliteration.insid)
4 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
5 INNER JOIN texts ON patterning.patid=texts.foreignid)
6 INNER JOIN texttags ON texts.textid=texttags.textid)
7 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid)
8 WHERE inscription.insid NOT IN
9 (SELECT DISTINCT inscription.insid FROM
10 (((((inscription LEFT JOIN transliteration ON
11      inscription.insid=transliteration.insid)
12 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
```

```

11 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
12 INNER JOIN texts ON normalisation.normid=texts.foreignid)
13 INNER JOIN texttags ON texts.textid=texttags.textid)
14 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid);

```

Two queries, each excluding the result set of the nested **WHERE**-query, are required to count the total on account of some texts being connected to patterns rather than **normalisations**.

Query G.3 Retrieving the count of individual patterned inscriptions assigned a type-ttag

```

1 SELECT DISTINCT ttagname
2 FROM ttags
3 WHERE ttagid IN
4 (SELECT ttagid FROM texttags
5 WHERE pctw="t" AND tagsource <> "samtextbas");

```

Query G.4 Retrieving the count of individual patterned inscriptions assigned a content-ttag

```

1 SELECT DISTINCT ttagname FROM ttags WHERE ttagid IN (SELECT ttagid
FROM texttags WHERE pctw="c" AND tagsource <> "samtextbas");

```

Query G.5 Retrieving the count of individual patterned inscriptions assigned a purpose-ttag

```

1 SELECT DISTINCT ttagname FROM ttags WHERE ttagid IN (SELECT ttagid
FROM texttags WHERE pctw="p" AND tagsource <> "samtextbas");

```

Query G.6 Retrieving the count of individual patterned inscriptions assigned a writer-ttag

```

1 SELECT DISTINCT ttagname FROM ttags WHERE ttagid IN (SELECT ttagid
FROM texttags WHERE pctw="w" AND tagsource <> "samtextbas");

```

Query G.7 Retrieving the count of individual patterned inscriptions assigned a situation-ttag

```

1 SELECT DISTINCT ttagname FROM ttags WHERE ttagid IN (SELECT ttagid
FROM texttags WHERE pctw="s" AND tagsource <> "samtextbas");

```

Query G.8 Retrieving *insids* and their connected tags by way of **NORMALISATION**

```

1 SELECT DISTINCT inscription.insid , ttags.ttagname
2 FROM (((((inscription LEFT JOIN transliteration ON
3 inscription.insid=transliteration.insid)
4 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
5 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
6 INNER JOIN texts ON normalisation.normid=texts.foreignid)
7 INNER JOIN texttags ON texts.textid=texttags.textid)
INNER JOIN ttags ON texttags.ttagid=ttags.ttagid;

```

Query G.9 Retrieving *insids* and their connected tags by way of **PATTERNING**

```

1 SELECT DISTINCT inscription.insid , ttags.ttagname

```

```

2 FROM (((inscription LEFT JOIN transliteration ON
   inscription.insid=transliteration.insid)
3 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
4 INNER JOIN texts ON patterning.patid=texts.foreignid)
5 INNER JOIN texttags ON texts.textid=texttags.textid)
6 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid;

```

The two queries can be united into one by using the **UNION**-operator, which is situated between the last line of the first and the first line of the second query. It is important to remember to remove ; at the end of the first query.

Query G.10 Retrieving the different variations of how the sides from INS38 can be reconnected into textual entities

```

1 SELECT texts.textid , COUNT(DISTINCT texts.foreignid)
2 FROM
3 (((((inscription LEFT JOIN transliteration ON
   inscription.insid=transliteration.insid)
4 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
5 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
6 INNER JOIN texts ON normalisation.normid=texts.foreignid)
7 INNER JOIN texttags ON texts.textid=texttags.textid)
8 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid
9 WHERE inscription.insid="ins38"
10 GROUP BY texts.textid;

```

Query G.11 The total number of **idionyms** with a status association

```

1 SELECT COUNT(DISTINCT normalised)
2 FROM idionym
3 WHERE sostat IS NOT NULL;

```

Query G.12 Retrieving all inscriptions and their ttags in which a certain **idionym** appears

```

1 SELECT DISTINCT inscription.insid , ttags.ttagname
2 FROM (((((inscription LEFT JOIN transliteration ON
   inscription.insid=transliteration.insid)
3 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
4 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
5 INNER JOIN texts ON normalisation.normid=texts.foreignid)
6 INNER JOIN texttags ON texts.textid=texttags.textid)
7 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid
8 WHERE inscription.insid IN
9 (SELECT DISTINCT inscription.insid
10 FROM (((((inscription LEFT JOIN transliteration ON
   inscription.insid=transliteration.insid)
11 LEFT JOIN patterning ON transliteration.tlitid=patterning.tlitid)
12 LEFT JOIN sequences ON patterning.patid=sequences.patid)

```

```

13 LEFT JOIN inscriptionnames ON
    sequences.insnid=inscriptionnames.insnid)
14 INNER JOIN namejoin ON inscriptionnames.insnid=namejoin.insnid)
15 INNER JOIN idionym ON namejoin.idioid=idionym.idioid
16 WHERE idionym.normalised ="[insert_idionym_of_choice]"
17 UNION
18 SELECT DISTINCT inscription.insid , ttags.ttagname
19 FROM (((((inscription LEFT JOIN transliteration ON
    inscription.insid=transliteration.insid)
20 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
21 INNER JOIN texts ON patterning.patid=texts.foreignid)
22 INNER JOIN texttags ON texts.textid=texttags.textid)
23 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid
24 WHERE inscription.insid IN
25 (SELECT DISTINCT inscription.insid
26 FROM (((((inscription LEFT JOIN transliteration ON
    inscription.insid=transliteration.insid)
27 LEFT JOIN patterning ON transliteration.tlitid=patterning.tlitid)
28 LEFT JOIN sequences ON patterning.patid=sequences.patid)
29 LEFT JOIN inscriptionnames ON
    sequences.insnid=inscriptionnames.insnid)
30 INNER JOIN namejoin ON inscriptionnames.insnid=namejoin.insnid)
31 INNER JOIN idionym ON namejoin.idioid=idionym.idioid
32 WHERE idionym.normalised ="[insert_idionym_of_choice]");

```

#### Query G.13 Creating **VIEW** *tagnames*

```

1 CREATE VIEW tagnames AS
2 SELECT DISTINCT inter.insid , inter.ttagname ,
    timelocatednames.normalised , timelocatednames.sostat
3 FROM
4 (SELECT DISTINCT inscription.insid , ttags.ttagname
5 FROM (((((inscription LEFT JOIN transliteration ON
    inscription.insid=transliteration.insid)
6 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
7 INNER JOIN normalisation ON patterning.patid=normalisation.patid)
8 INNER JOIN texts ON normalisation.normid=texts.foreignid)
9 INNER JOIN texttags ON texts.textid=texttags.textid)
10 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid
11 UNION
12 SELECT DISTINCT inscription.insid , ttags.ttagname
13 FROM (((((inscription LEFT JOIN transliteration ON
    inscription.insid=transliteration.insid)
14 INNER JOIN patterning ON transliteration.tlitid=patterning.tlitid)
15 INNER JOIN texts ON patterning.patid=texts.foreignid)
16 INNER JOIN texttags ON texts.textid=texttags.textid)
17 INNER JOIN ttags ON texttags.ttagid=ttags.ttagid) AS inter

```

```
18 INNER JOIN timelocatednames ON inter.insid=timelocatednames.insid;
```

Cf. Query F.23 on the use and purpose of **VIEWS**.

Query G.14 Retrieving the total count of how often an **idionym** was connected to a tag

```
1 SELECT normalised , ttagname , MAX(countags)
2 FROM
3 (SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
4 FROM tagsnames
5 WHERE tagsource="niyrvi"
6 GROUP BY normalised , ttagname
7 UNION
8 SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
9 FROM tagsnames
10 WHERE tagsource="knirk1997gotlending"
11 GROUP BY normalised , ttagname
12 UNION
13 SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
14 FROM tagsnames
15 WHERE tagsource="liestoel1964viking"
16 GROUP BY normalised , ttagname
17 UNION
18 SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
19 FROM tagsnames
20 WHERE tagsource="marold2000"
21 GROUP BY normalised , ttagname
22 UNION
23 SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
24 FROM tagsnames
25 WHERE tagsource="liestoel1968runecorrespondence"
26 GROUP BY normalised , ttagname
27 UNION
28 SELECT normalised , ttagname , COUNT(DISTINCT ttagname) AS countags
29 FROM tagsnames
30 WHERE tagsource="liestoelrunerfrabryggen"
31 GROUP BY normalised , ttagname) AS inter
32 GROUP BY normalised , ttagname;
```

AND sostat="[insert social status of choice or sostat IS NULL]" added to the **WHERE**-clauses will only return the results for that particular group.

Query G.15 Retrieving the tags and **idionyms** connected to each other

```
1 SELECT DISTINCT ttagname
2 FROM tagsnames
3 WHERE sostat="[insert social status of choice or sostat IS NULL]";
```

Query G.16 Retrieving tags assigned to one group of **idionyms**, but not another

```
1 SELECT DISTINCT ttagname FROM tagnames WHERE sostat=" [insert_
social_status_of_choice_or_sostat_IS_NULL]" AND ttagname NOT IN
(SELECT DISTINCT ttagname FROM tagnames WHERE sostat=" [insert_
social_status_of_choice_or_sostat_IS_NULL]");
```

Query G.17 Counting untagged inscriptions with **idionyms**

```
1 SELECT COUNT(DISTINCT insid) FROM ippa WHERE insid NOT IN (SELECT
DISTINCT insid FROM alltags);
```

## Additional tables

Table G.1. Overview of the 41 labels in **T\_TAGS**, including how each label is defined.

Tag ID	Tag name	Tag criteria
am	ambiguous	everything else
amu	amulet	any text which can be interpreted to have served an amuletic function
ana	alphabet	not skilled or entirely alphabetic in either script
bad	bad	simply implies that the topic is mentioned in a negative way, i.e. lovesickness etc.
be	benediction	benediction
bs	balance sheet	counting up goods and debts
chr	christian	anything connected to Christian beliefs, figures, saints etc.
com	comment	statement of some sort
eti	følgeseddel	følgeseddel, etikett
in	incantation	spell, charm, formula, appealing to some higher instance
ins	instruction	recipe, usage instructions
learn	learned	person who has enjoyed some education, possibly even abroad
let	letter	letter
li	liturgy	anything connected to Christian liturgy
list	list	text counting up names, days etc.
luv	love	mentioning love in any way
ma	magic	somehow connected to magic, whether Christian or heathen
mne	mnemo-device	a text written with the intent of helping one's memory, for example during a performance
mot	motto	NIyR VI, 19
ni	not interpretable	cannot be interpreted to make any sense

Tag ID	Tag name	Tag criteria
nor	norse mythology	anything connected to norse mythology, beliefs, gods etc.
off	official	anything concerning official business of state, like for example taxes
ords	ordspill	play on words
own	ownership tag	personal name and a form of eiga
p	poetry	Edda, Skaldic, Vagantenlyrik or simply metric
pc	period context	other than references, pc refers to the text indicating relationships to current events
pn	personal name	consisting solely of a personal name and nothing else, notwithstanding non-lexical sequences
pray	prayer	prayer
pub	pub environment	pub environment
q	quote	quoting anything known from another known source (parallels included)
ref	references	references to mythology or events, used consciously to a purpose
reg	regular	moderately educated person skilled in writing runes, if not Latin
rel	religious	generally with some religious significance
rist	carver formula	x carved
ros	compliment	complimentary utterance
sex	sex	as in intercourse
smut	smut	lewd utterances which use sexualised language, but don't mention sex specifically
teach	teaching	used in a teaching context
tra	trade	concerning trade, commerce or business transactions
un	unfinished	text that is interpreted to not have been finished
we	writing exercise	any text which can be interpreted as having been carved in order to practice characters



Table G.2. Overview over which **idionyms** are connected to which tags, sorted by social status-association.

Idionym	Tags
Icelandic high-status <b>idionyms</b>	
Ari	christian, comment, <b>owner's tag</b> , PN
Arni	<b>owner's tag</b> , PN, trade
Benedikt	christian, incantation, magic, not interpretable, <b>owner's tag</b> , quote, trade
Brandr	<b>owner's tag</b> , trade
Egill	poetry
Eindriði	<b>owner's tag</b> , PN, trade
Erlendr	comment, pub environment
Eyjolfur/Eyíolfur	<b>owner's tag</b> , trade
Finnr	<b>owner's tag</b> , trade
Gísl	<b>owner's tag</b> , PN, trade
Hákon	letter, period context, unfinished
Hálfðan	<b>owner's tag</b> , trade
Ingimundr	balance sheet, trade
Kárr	<b>owner's tag</b> , trade
Ljótr/Liotr	not interpretable, <b>owner's tag</b> , PN, trade
Markús	ambiguous, christian, incantation
Rúnolfr	<b>owner's tag</b> , PN, trade
Sighvatr	carver formula, <b>owner's tag</b> , trade
Sölveig (f)	<b>owner's tag</b> , trade
Thomás	amulet, christian, incantation, magic
Vilhelmur/Vilhiálmur	amulet, christian, incantation, magic, prayer, quote, religious, teaching, writing exercise
Þorgrímr	<b>owner's tag</b> , PN, trade
Þorlákr	<b>owner's tag</b> , trade
Þorvaldr	<b>owner's tag</b> , PN, trade
Þorvarður	<b>owner's tag</b> , PN, trade
Icelandic low-status <b>idionyms</b>	
Búi	<b>owner's tag</b> , trade
Didrik	<b>owner's tag</b> , PN, trade
Eldjarn/Eldiárn	<b>owner's tag</b> , trade
Glúmr	prayer, quote
Gunnsteinn	følgeseddel, letter, unfinished
Ími	bad, incantation, magic, poetry
Mat(t)heus	ambiguous, christian, incantation
Ragnarr	<b>owner's tag</b> , trade

Idionym	Tags
Þórhallr	owner's tag, PN, trade
Norwegian high-status idionyms	
Ása (f)	learned, love, mnemo-device, poetry, quote
Bárðr	balance sheet, trade
Eiríkr	comment, owner's tag, PN, trade
Eysteinn	owner's tag, trade
Eyvindr	owner's tag, PN, trade
Halldórr	owner's tag, trade
Haraldr	prayer, quote
Helga (f)	følgeseddel, not interpretable, trade
Helgi	følgeseddel, not interpretable, trade
Ívarr	owner's tag, trade
Karl	owner's tag, PN, trade
Klémetr	amulet, christian, incantation, magic
Lafranz	amulet, christian, incantation, magic
Nikulás/Nikolás	amulet, christian, incantation, magic
Qgmundr	følgeseddel, not interpretable, owner's tag, PN, trade
Ólafr	amulet, christian, comment, incantation, letter, magic, owner's tag, period context, PN, quote, regular
Pétr	amulet, christian, incantation, magic
Sigurðr	comment, learned, letter, owner's tag, period context, PN, poetry, prayer, quote, trade
Þólfir	owner's tag, trade
Þóraldr	owner's tag, PN, trade
Þorbjörn	owner's tag, trade
Þorgils/Þorgísl	owner's tag, prayer, quote, trade
Þórir	not interpretable, owner's tag, trade
Þorkell	følgeseddel, owner's tag, trade
Þorsteinn	owner's tag, PN, trade
Norwegian low-status idionyms	
Bergsveinn	owner's tag, PN, trade
Ótto	letter, trade
Þóraldi	owner's tag, PN, trade
Pan-Scandinavian high-status idionyms	
Andreas/Andrés	amulet, christian, incantation, magic
Guðmundr	owner's tag, trade
Guðþormr	sex
Heinrekr	balance sheet, owner's tag, PN, trade
Ingibjörg/Ingibjörg (f)	comment, pub environment, smut

Idionym	Tags
Ingjaldr/Ingialdr	owner's tag, trade
Ió(h)an/Jó(h)an	learned, letter, owner's tag, period context, PN, trade
Jón	amulet, incantation, letter, period context, prayer, quote, regular, sex, unfinished
Magnús	prayer, quote
Margrét(a) (f)	christian, incantation, magic, not interpretable, quote
Sigríður (f)	owner's tag, trade
Þormóður	owner's tag, PN, trade
Pan-Scandinavian low-status idionyms	
Einarr	owner's tag, trade
Lukas	ambiguous, christian, incantation
Vébrandr	owner's tag, trade
Þorkatla (f)	owner's tag, trade

## H. Chapter 7

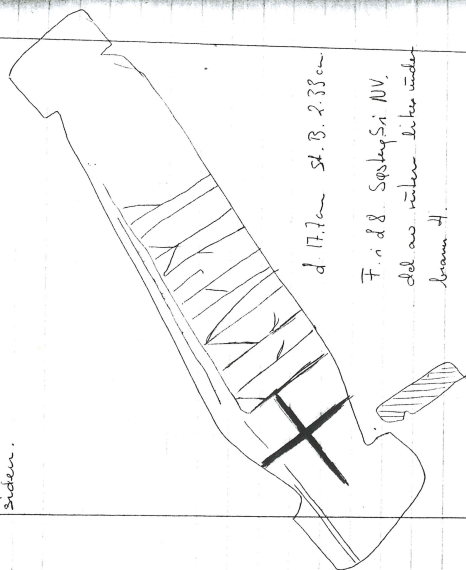
Additional figures





4209  
Fp 23007

Ringpinn av fôr? Tilnærmet rektangulær med to flakider. Tegn på den ene siden.

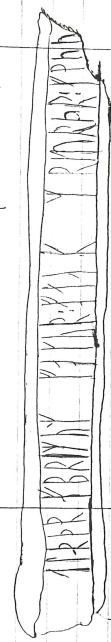


d 17.1 cm St. B. 2.33 cm

F i 28. Søsling S i 10V.  
del av ruten ligger under  
lamm 4.

4210  
Fp 23493

Tenning grovt likende ringpinn med ruten på begge flakidene. Brøkket i den ene enden. Langsidene er opfaset mot den av flakidene som har flest ruten.



4212  
Fp 23504<sup>abc</sup>

Ringpinn i tre deler. Til sammen skinner de en ca 19 cm lang ringpinn med inn- skrift på 3 sider. Sammenligges fôr?



8.8.13 cm st. B. 1.25 x 1.12 cm  
F i 18, i venter mellom Søsling. S og Skenhvis, Søsling. N under br H.

d. 18.5 cm, st. B. 2.5 cm

F i 18, Søsling S. i mva med 2 lag 3-4 under golvhus oppført like br H.

Ringpinn av fôr? Kvadratisk tverrsnitt. Smalere mot den ene siden, den andre siden brøkket. Ringeløp på en side.

Figure H.3. BR-Katalog.



834-64

Kat.nr. Tilvekst nr. 448/17  
 Gjenstand, navn og materialsort: *1 rannepinne (Pierier)*

Rute *06* Rutedel *NO* plan Bilag *Gård Gullst.*  
 Relasjon til funnsted: Over, under, i, i nivå med, på, foran, bak, mellom, i ø. del  
 av, i v. del av, i s. del av, i n. del av, østenfor, vestenfor, sønnenfor, nordenfor.

Funnsted: 0 Bygning, 01 ildsted, 02 østvegg, 03 v.vegg, 04 s.vegg, 05 n.vegg  
 1 Fundament, 11 bolverk i hus, 12 bolverk i kai, 13 grunnmur *14 betongblokker*  
 2 gate, passasje, almenning  
 3 dren, veit, grøft  
 4 Brønn  
 5 avtrede  
 6 Grav  
 7 Annen lokalitet

Funnstedets nr. på plan:  
 Avstand i cm til stratigr. skikt:  
 Avstand i cm til bebyggelsesskikt: *15*

Stratigrafisk skikt, Relasjoner: over, under, i, i nivå med, på,  
 Stratigrafisk skikt: 0 Mose, 1 kvist, 2 nøtter, 3 fylling, 4 kalk, mørtel,  
 5 grus, 6 sand, 7 leire, 8 slam, 9 gytje, 11 sot.  
 Bebyggelsesskikt, relasjoner: Over, under, i, i nivå med, på.  
 Bebyggelsesskikt: 0 bjelkelag nr. 1 golv, 2 gatedekke (passasje-,  
 almenningsdekke), 3 kaidekke, 4 dekke over dren, 5 bunn i dren, 6 hellelegning,  
 7 steinlag, 8 annet skikt:  
 Relasjoner til brannskikt: Over, under, i, i nivå med. *Br. 6 Kan m. h. VII*  
 Avstand i cm til " " : *3*  
 Andre opplysninger:

*40.50 x 110.30 g*

Figure H.4. Example of a pre-printed, completed card documenting a context.

Tilvekstnr. 70854

Gjenstand: bukskåp

Materiale: keramikk, roterende glass

Enheter: 3

Andre oppl.:

Bryggen

Katalognr.

Hullkortnr.

Signatur fra felt:

Kontroll:

Rute		R.del.	PL	B	x	y	÷	Niv.	1				2				3				4			
001		001							A	Nr.	A	Avst.	A	Avst.	A	Avst.	A	Avst.	A	Avst.				
001		001							01000	02105														
5		6		7		8		9		10														
D	Nr.	Avst.	D	Avst.	C	Col.	Avst.	B	Avst.	u/d	Ref.	Mat.												

Diverse: se 70849

26.3.72 104

HANDELSSTYRE

Figure H.5. Example of a pre-printed, completed card documenting a context.

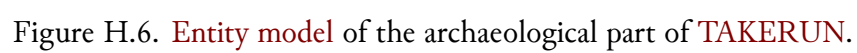


Figure H.7. Location of Icelandic high- and low-status **idionyms** during **period 2**. IH represented by yellow squares, IL by light blue number.

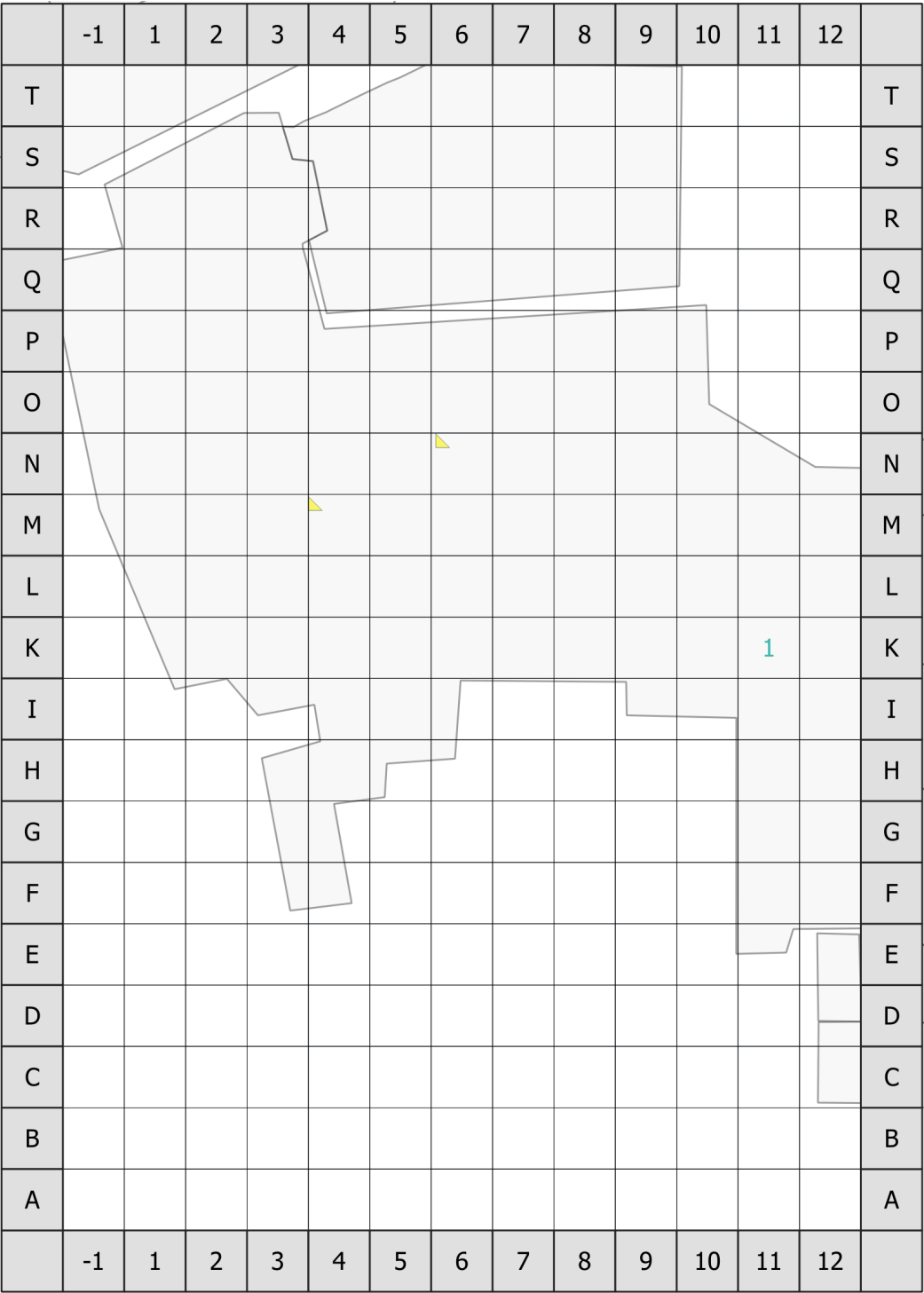


Figure H.8. Location of Norwegian high- and low-status **idionyms** during **period 2**. NH represented by light blue shape/number, NL by dark blue.

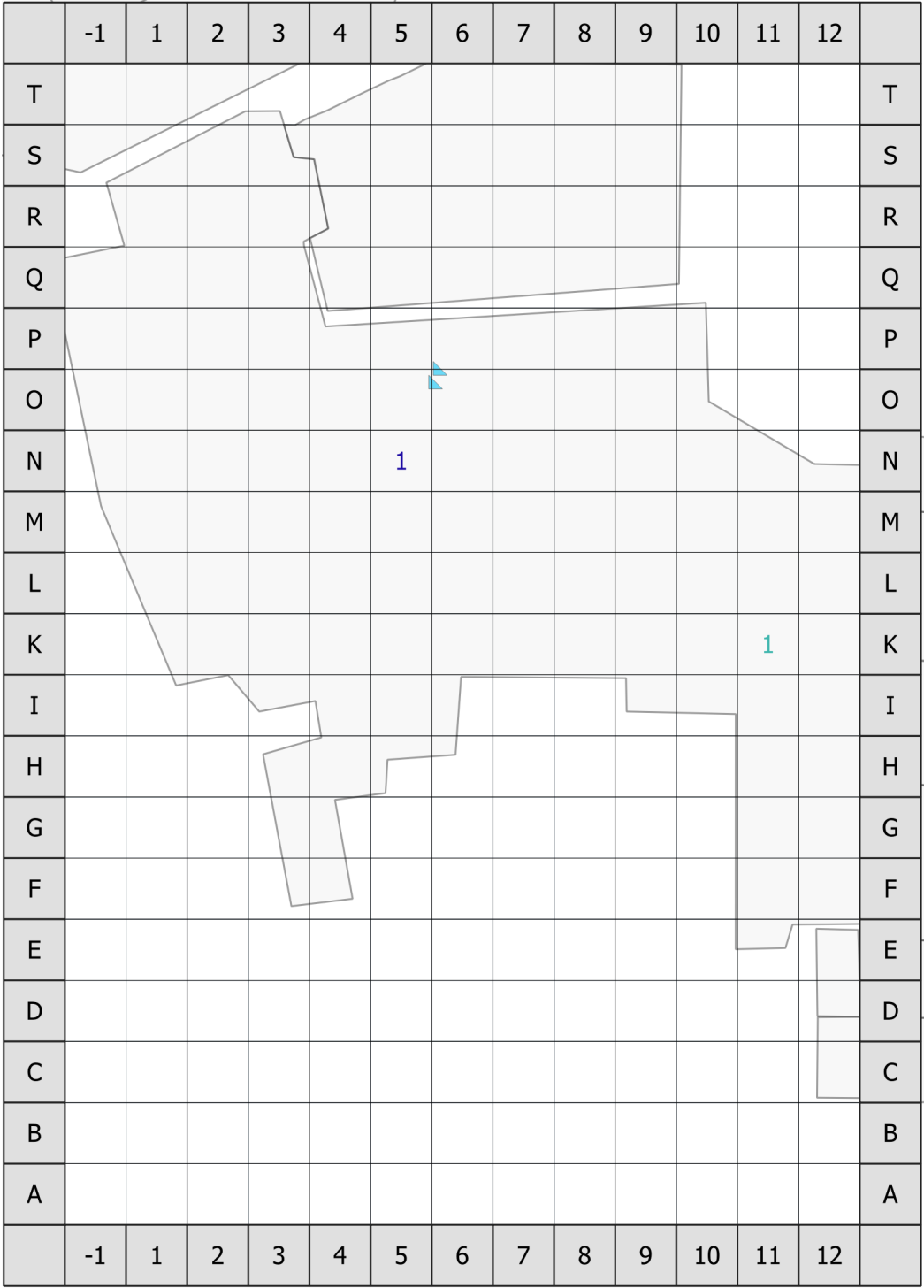


Figure H.9. Location of pan-Scandinavian high- and low-status *idionyms* during *period 2*. PSH represented by light blue, PSL by dark blue number.

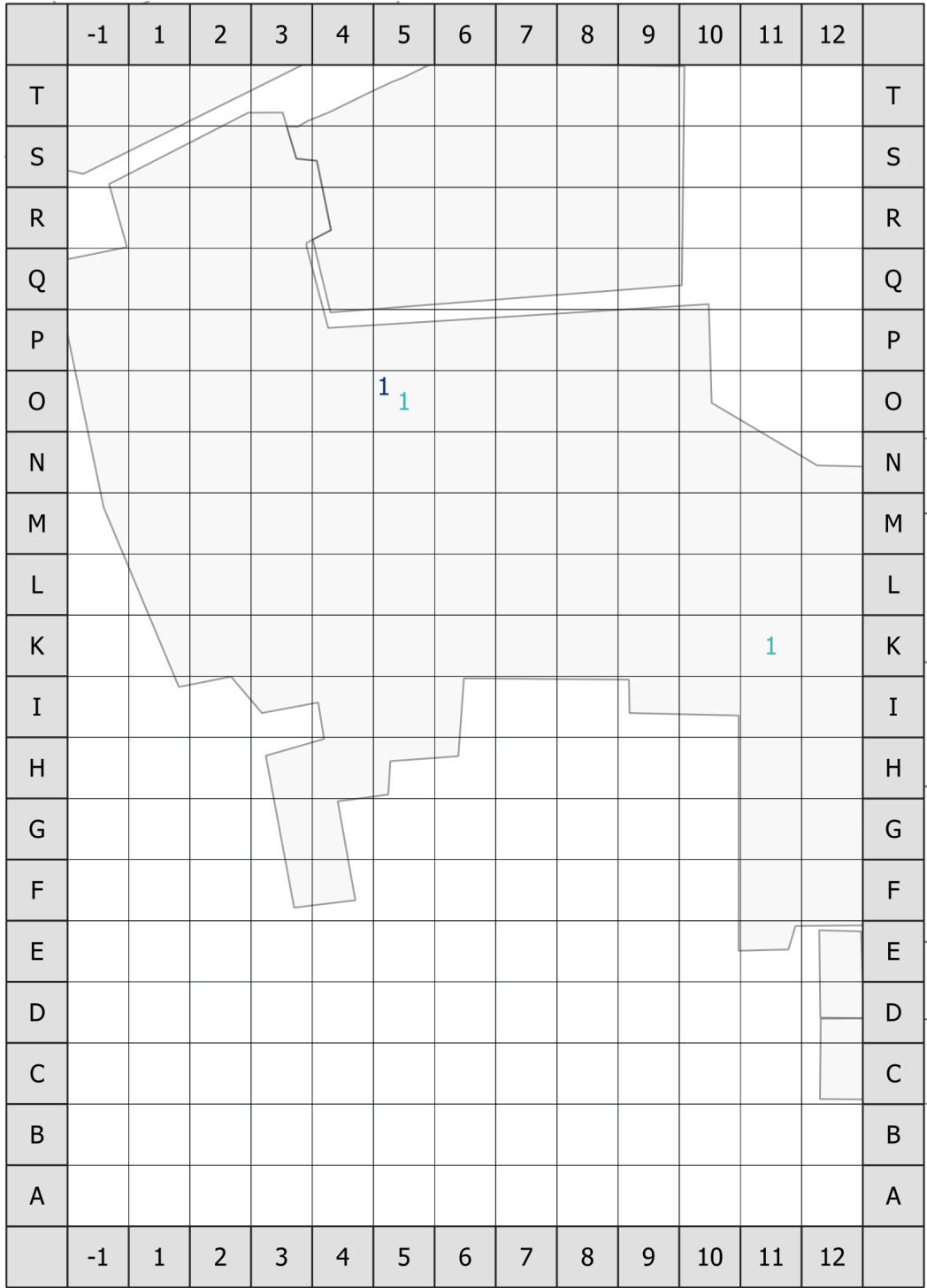


Figure H.10. Location of Icelandic high- and low-status **idionyms** during **period 3**. IH represented by yellow square/light blue number, IL by green square.

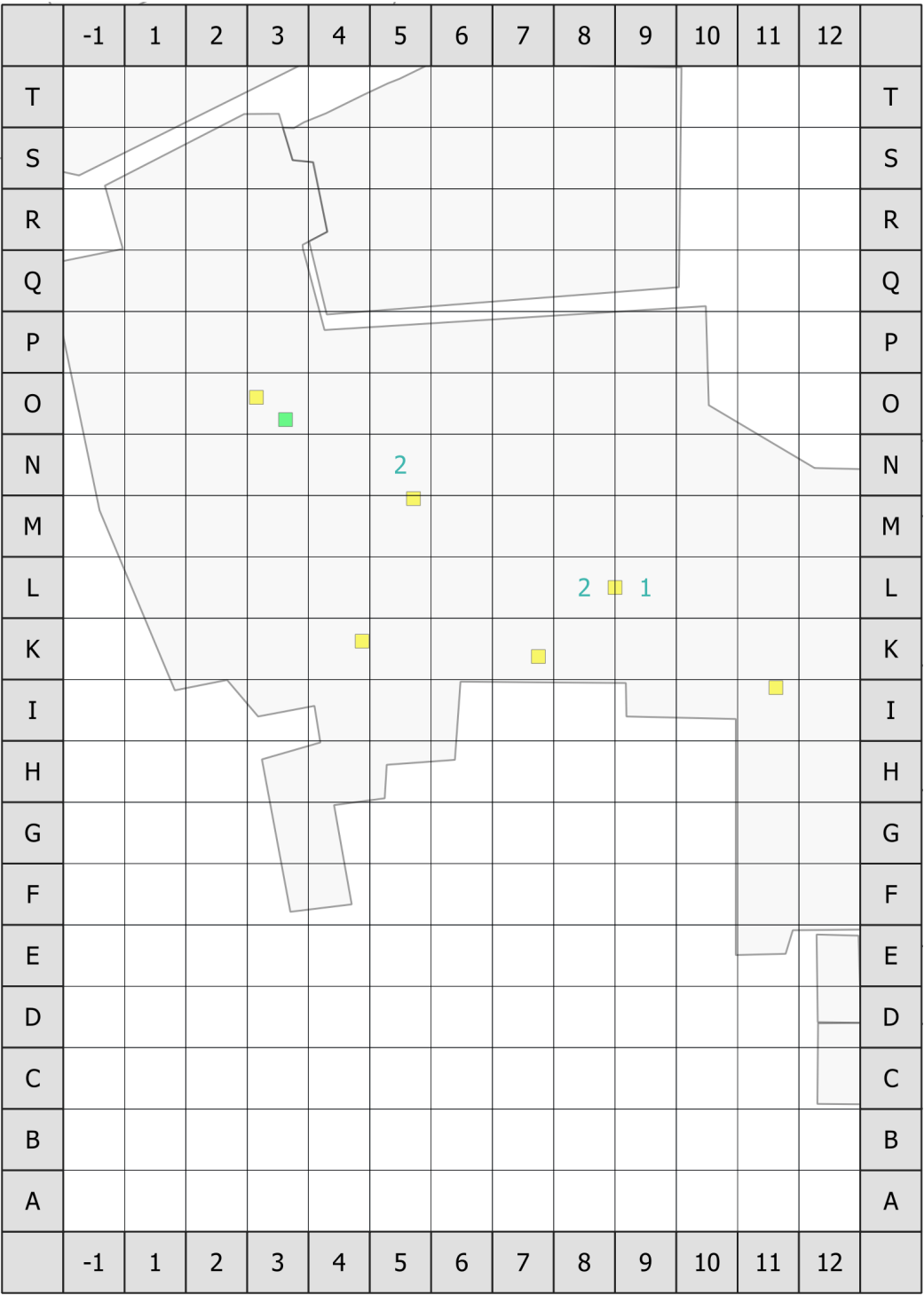




Figure H.11. Location of Norwegian high- and low-status **idionyms** during **period 3**. NH represented by light blue square/number, NL by dark blue.

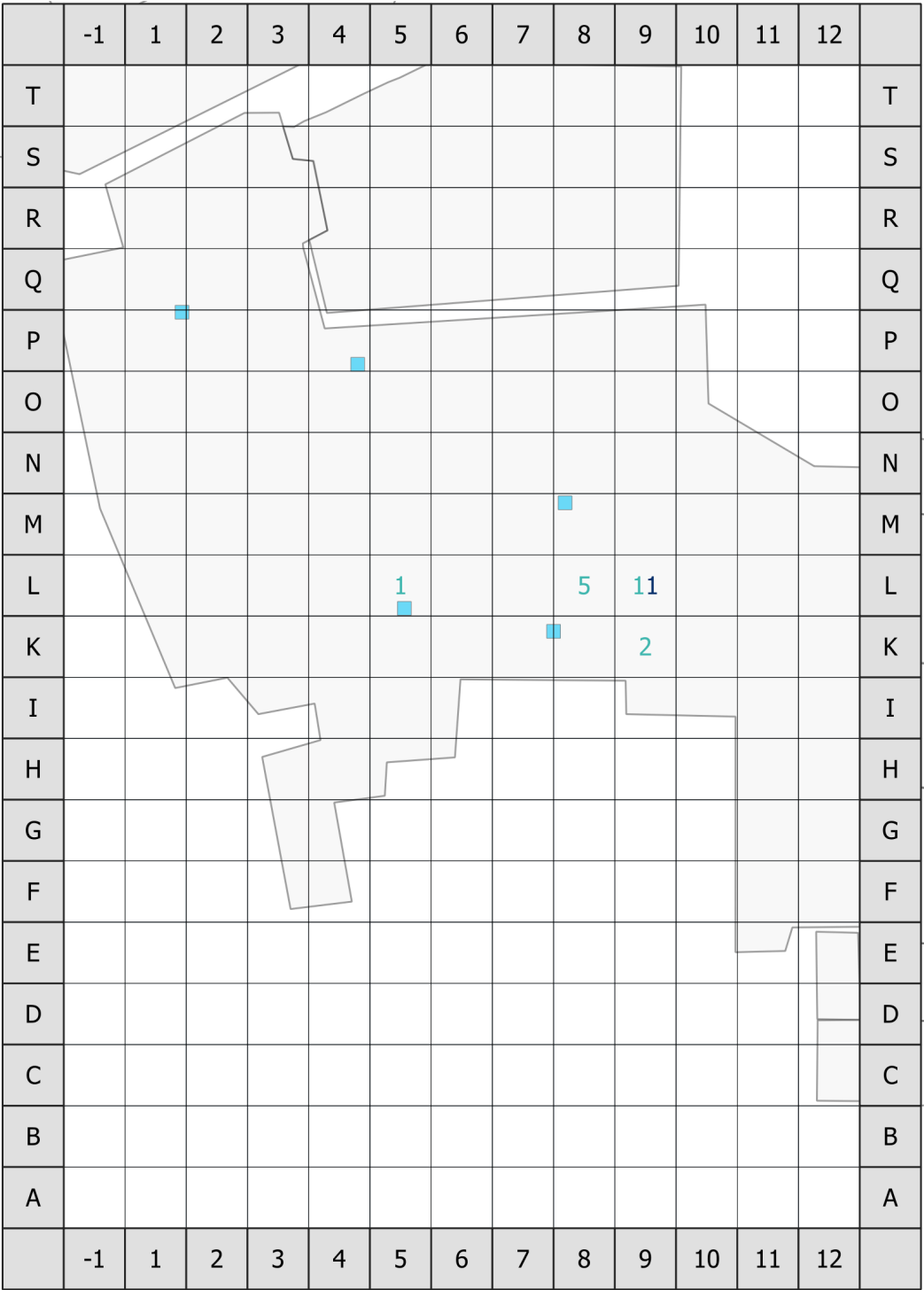


Figure H.12. Location of pan-Scandinavian high-status **idionyms** during **period 3**.

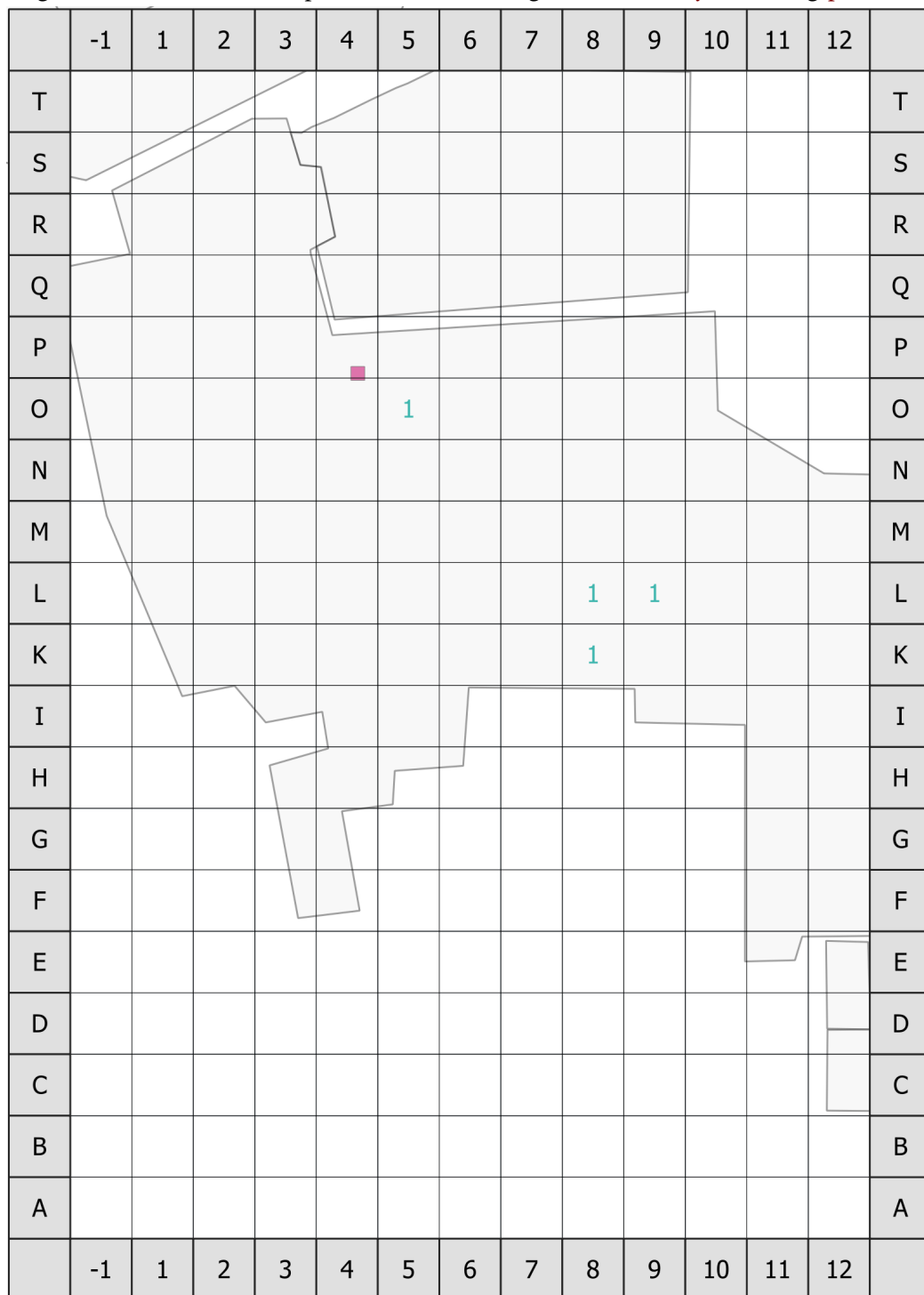


Figure H.13. Location of pan-Scandinavian low-status **idionyms** during **period 3**.

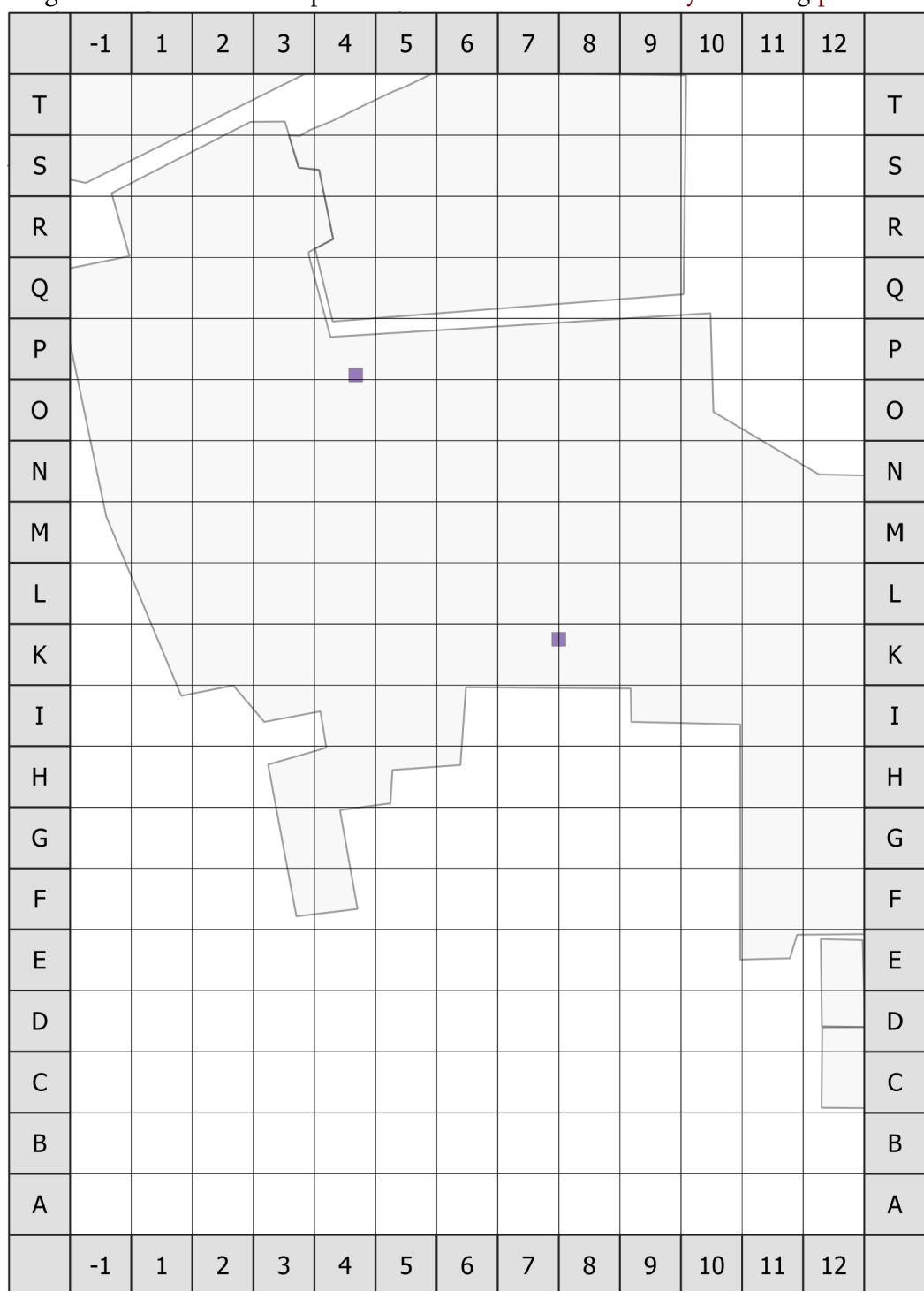


Figure H.14. Location of Icelandic high- and low-status **idionyms** during **period 4**. IH represented by yellow circles/light blue numbers, IL by green circles/dark blue numbers.

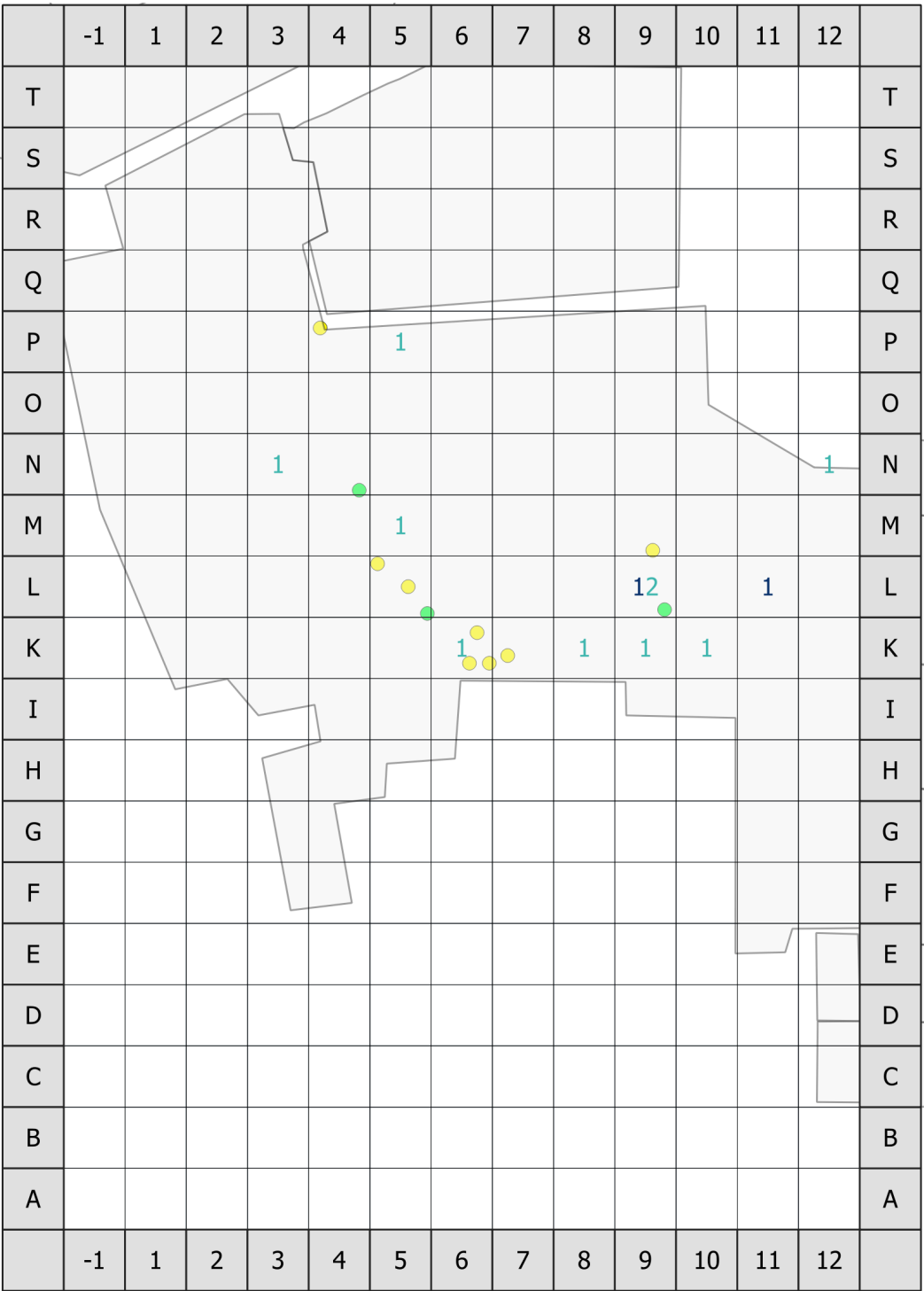


Figure H.15. Location of Norwegian high- and low-status **idionyms** during **period 4**. NH represented by light blue circles/numbers, NL by dark blue numbers.

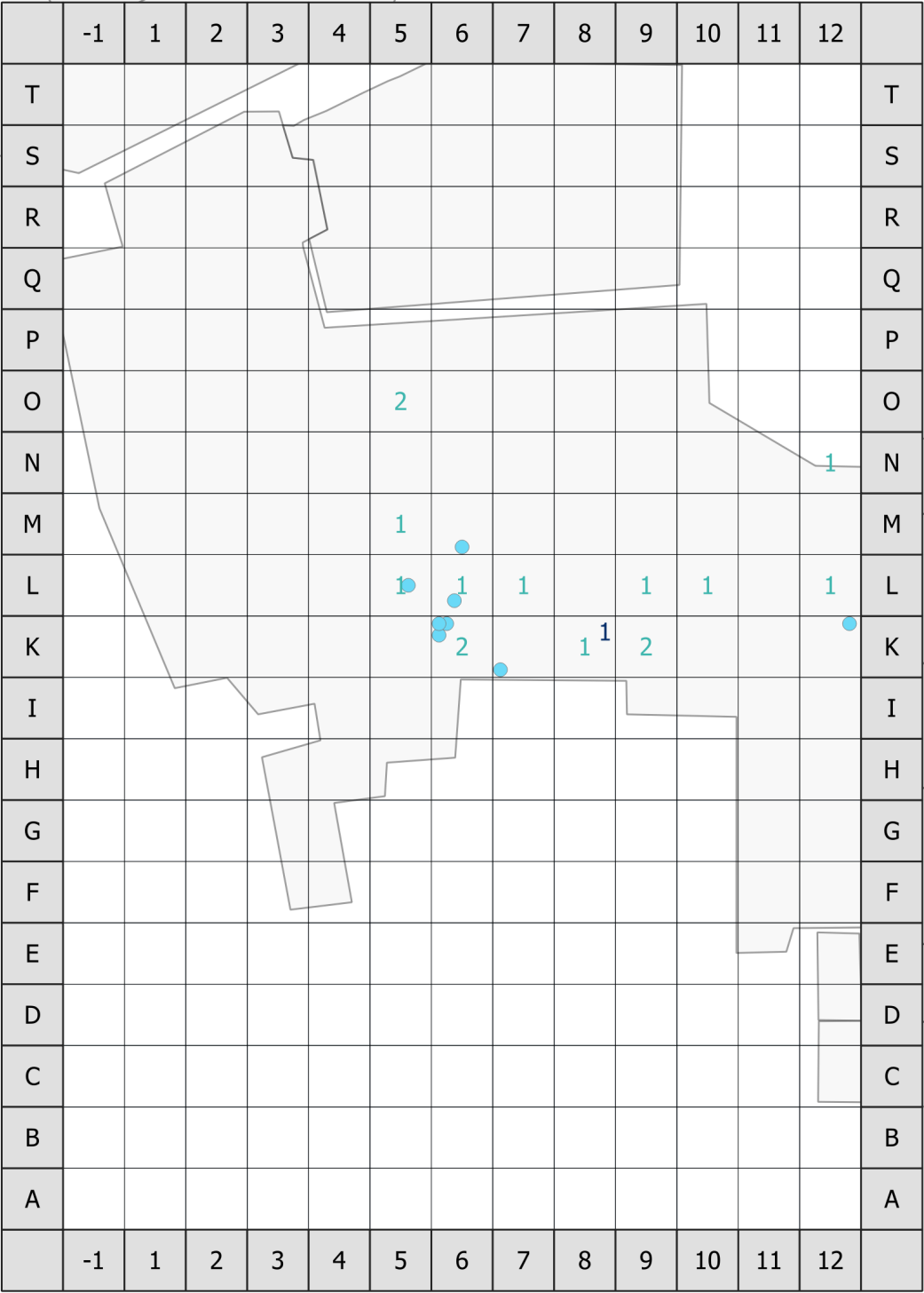


Figure H.16. Location of pan-Scandinavian high- and low-status **idionyms** during **period 4**. PSH represented by light blue numbers, PSL by violet circles/dark blue numbers.

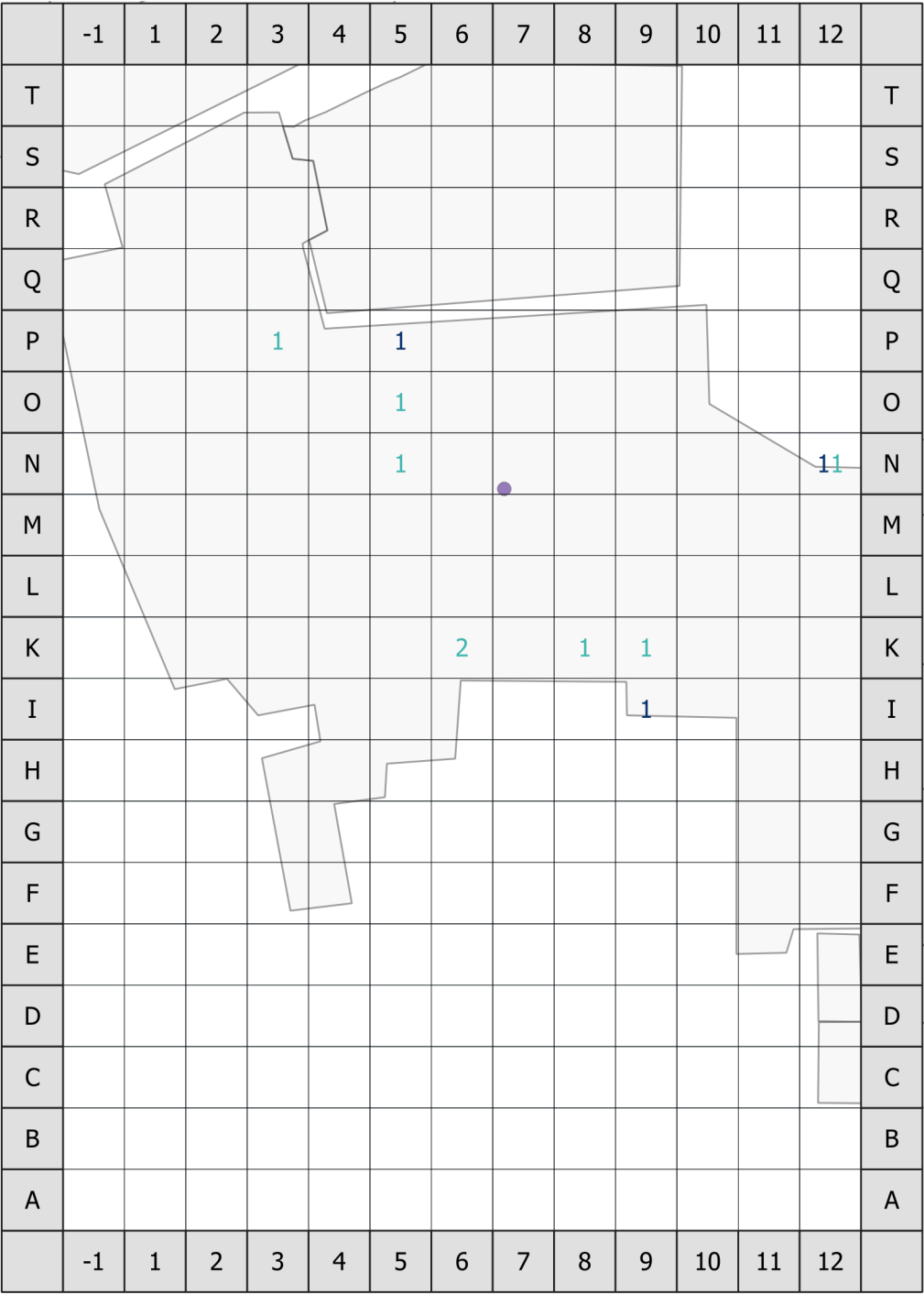


Figure H.17. Location of Icelandic high- and low-status **idionyms** during **period 5**. IH represented by yellow half-squares/light blue numbers, IL by green half-squares/dark blue numbers.

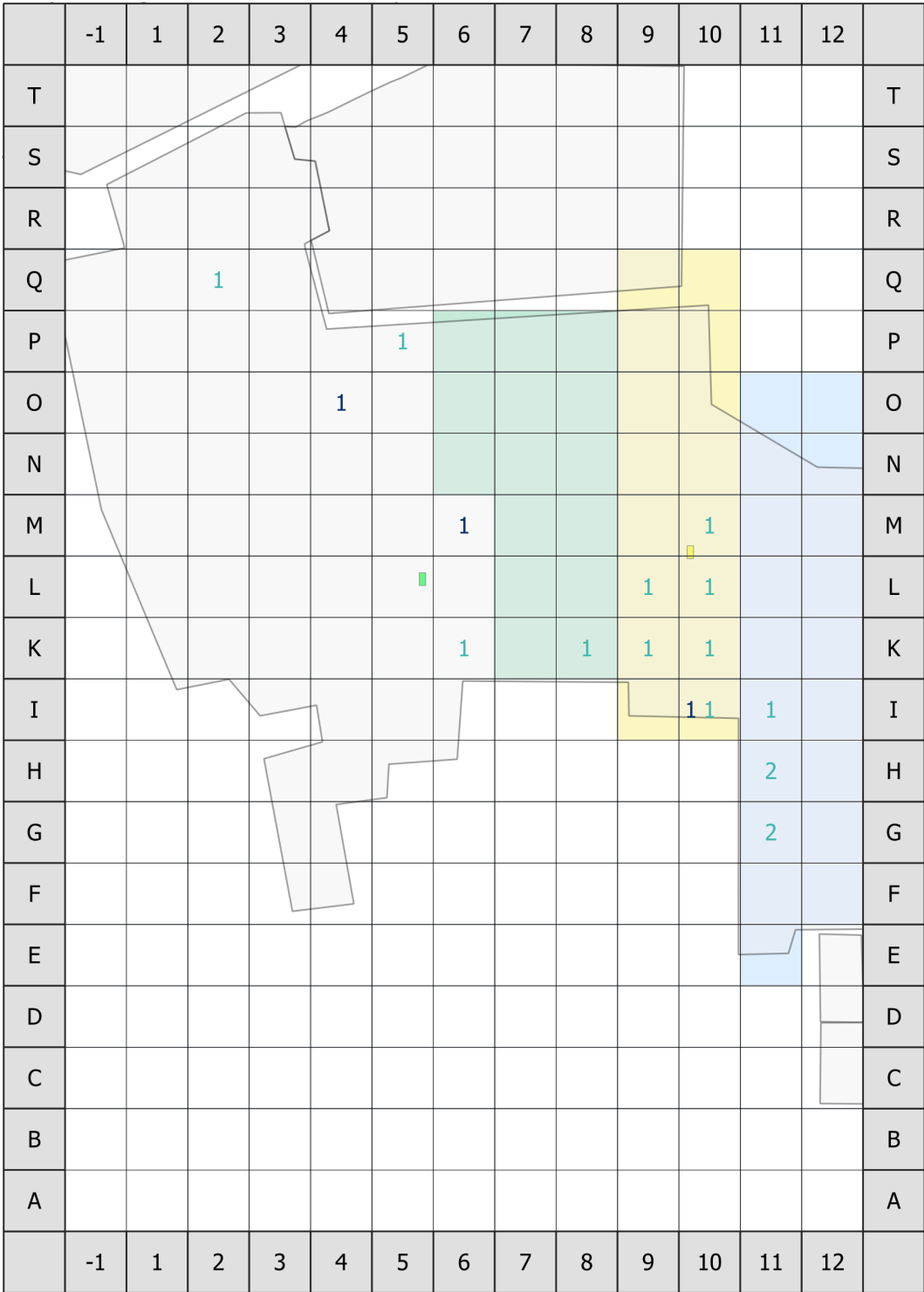




Figure H.18. Location of Norwegian high-status **idionyms** during **period 5**.

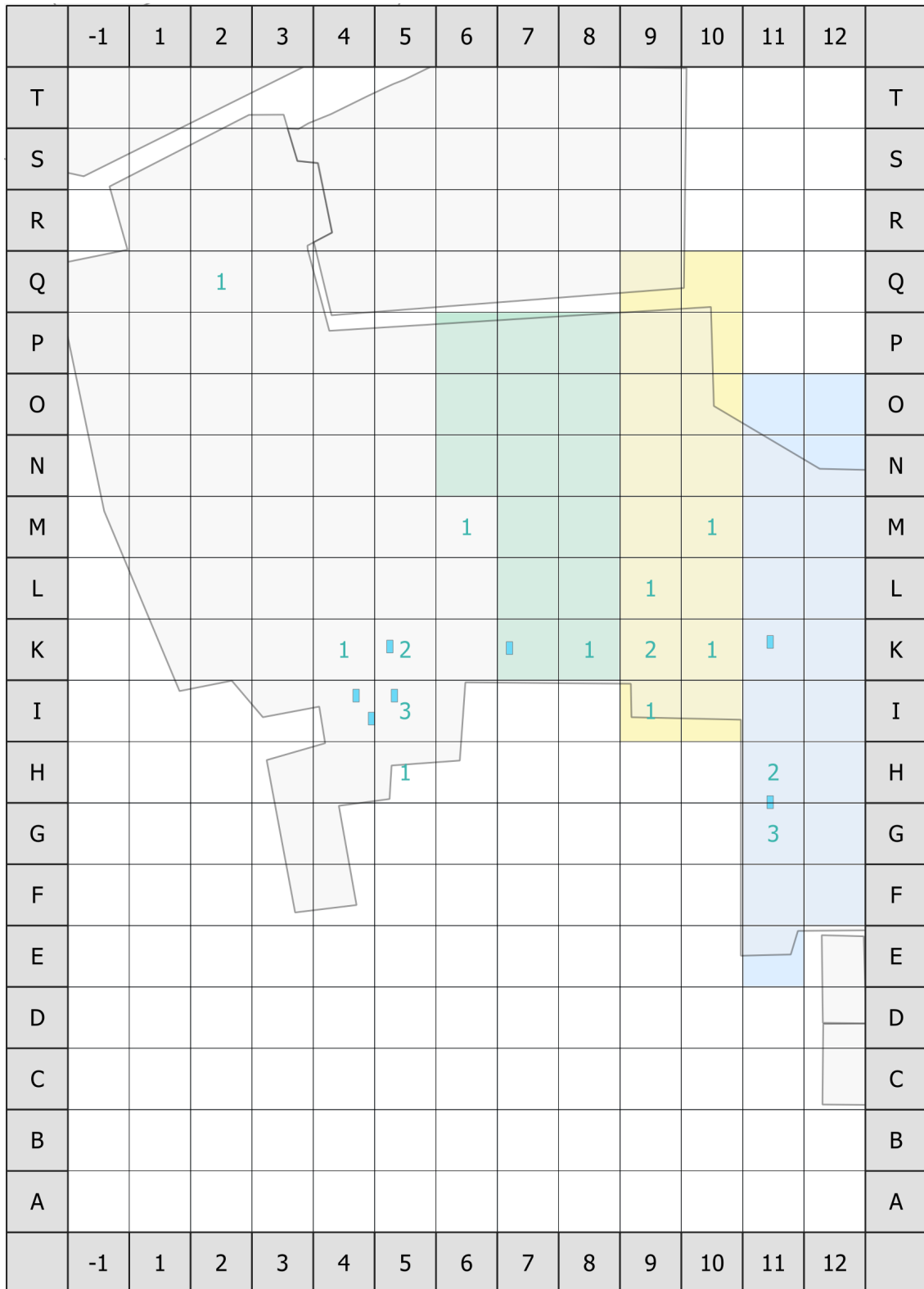


Figure H.19. Location of Norwegian low-status *idionyms* during *period 5*.

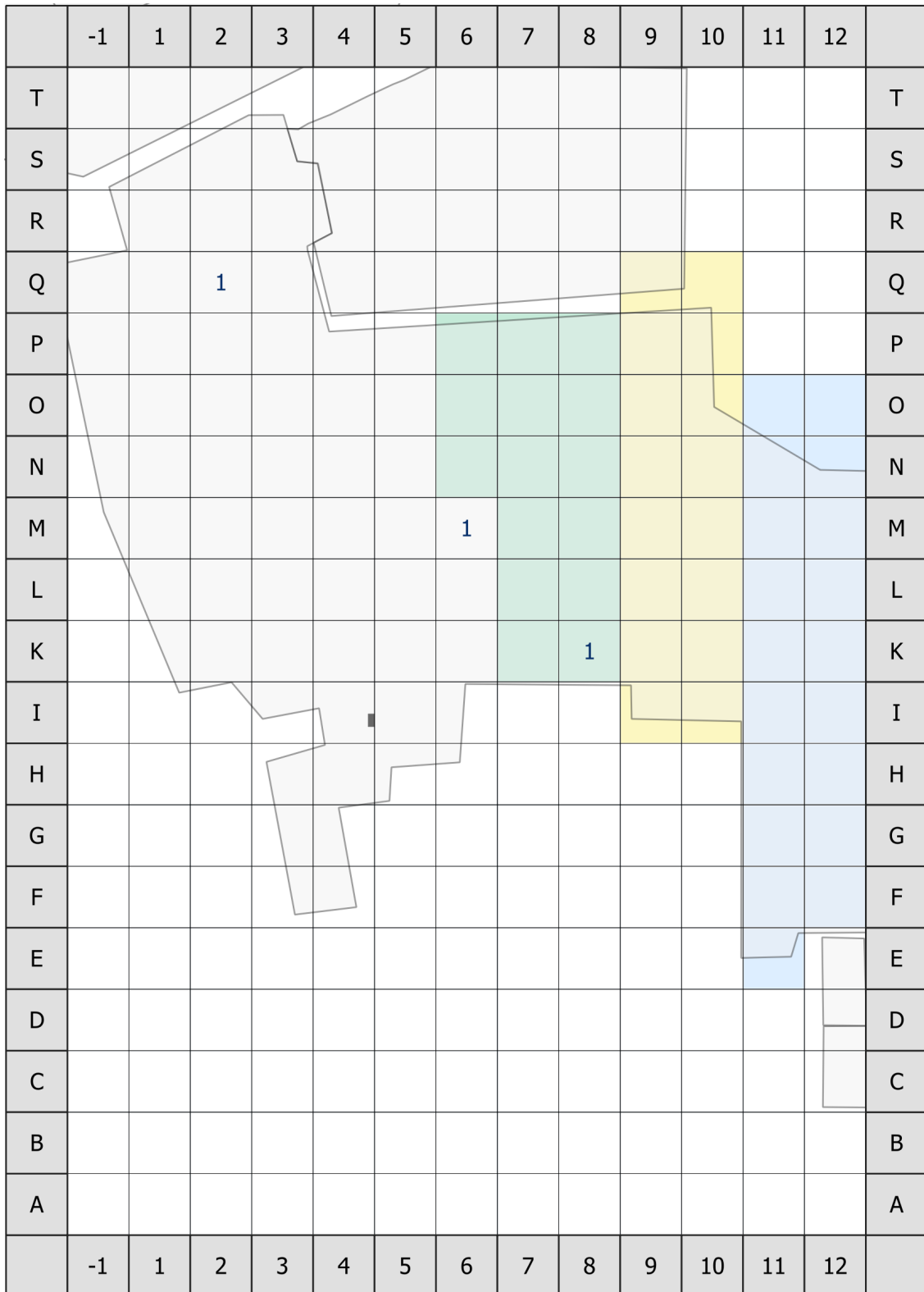


Figure H.20. Location of pan-Scandinavian high- and low-status **idionyms** during **period 5**. PSH represented by pink half-squares/light blue numbers, PSL by violet circles/dark blue numbers.

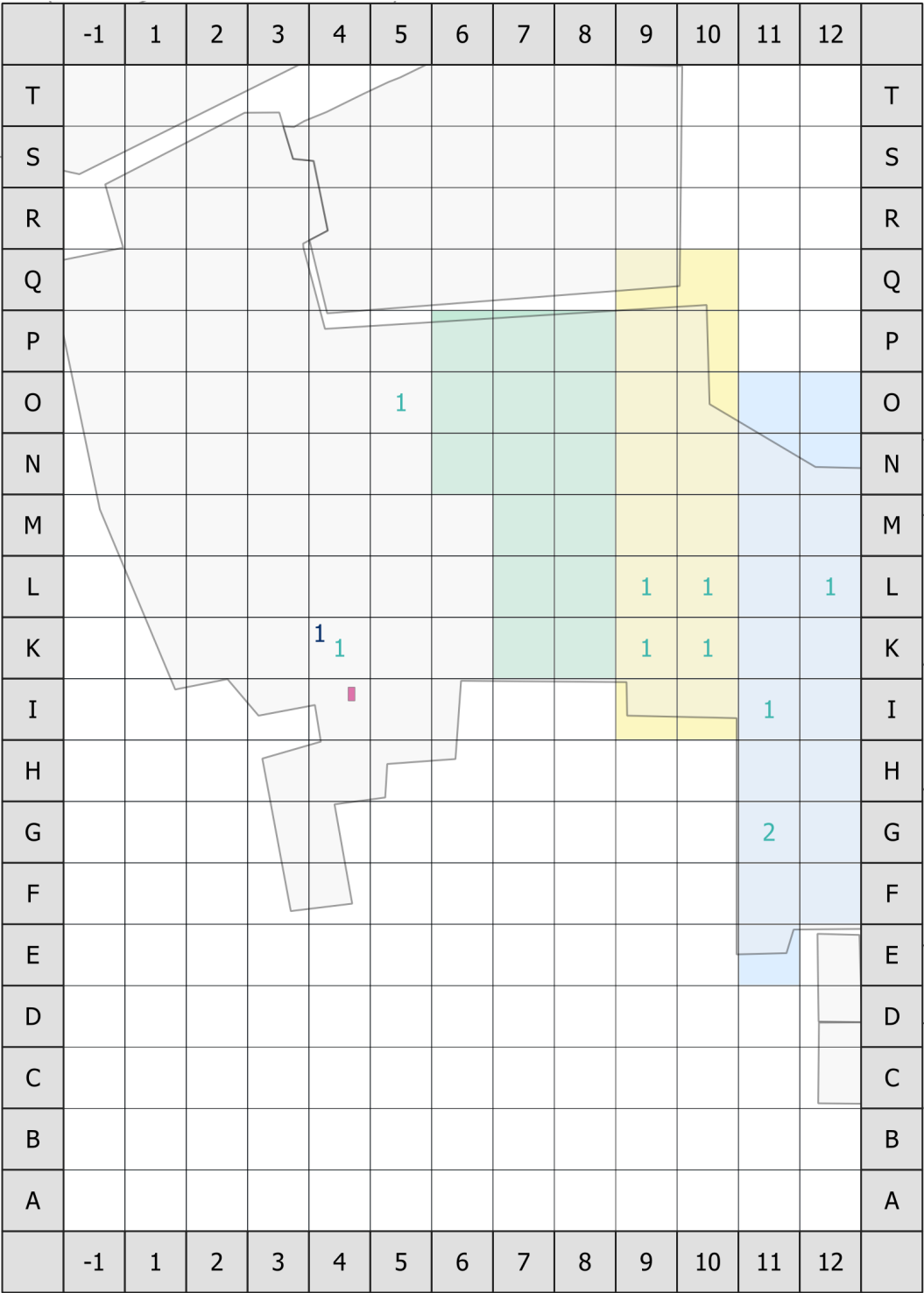


Figure H.21. Location of Icelandic high- and low-status **idionyms** during **period 6**. IH represented by yellow diamond/light blue numbers, IL by dark blue numbers.

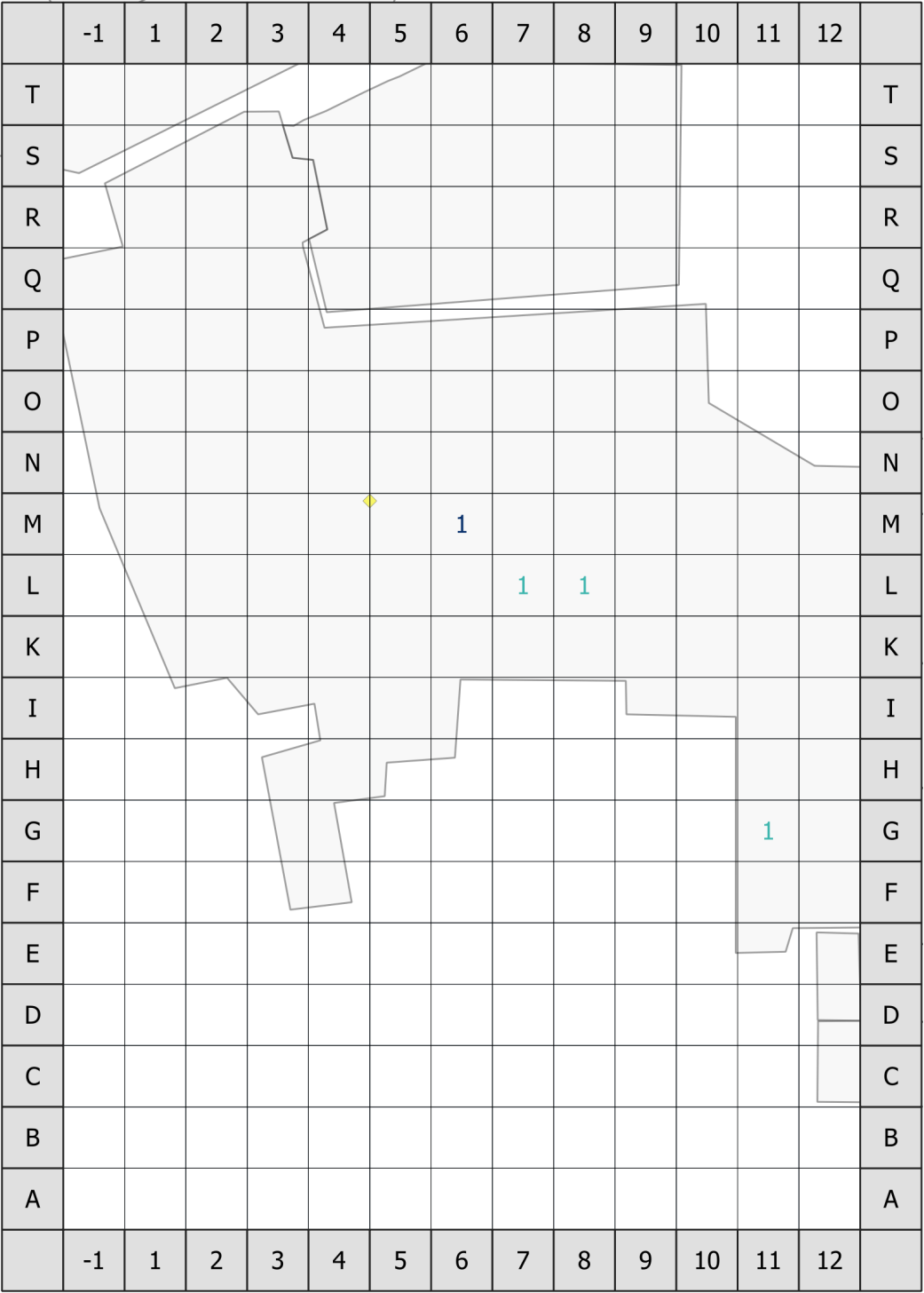


Figure H.22. Location of Norwegian high-status **idionyms** during **period 6**.

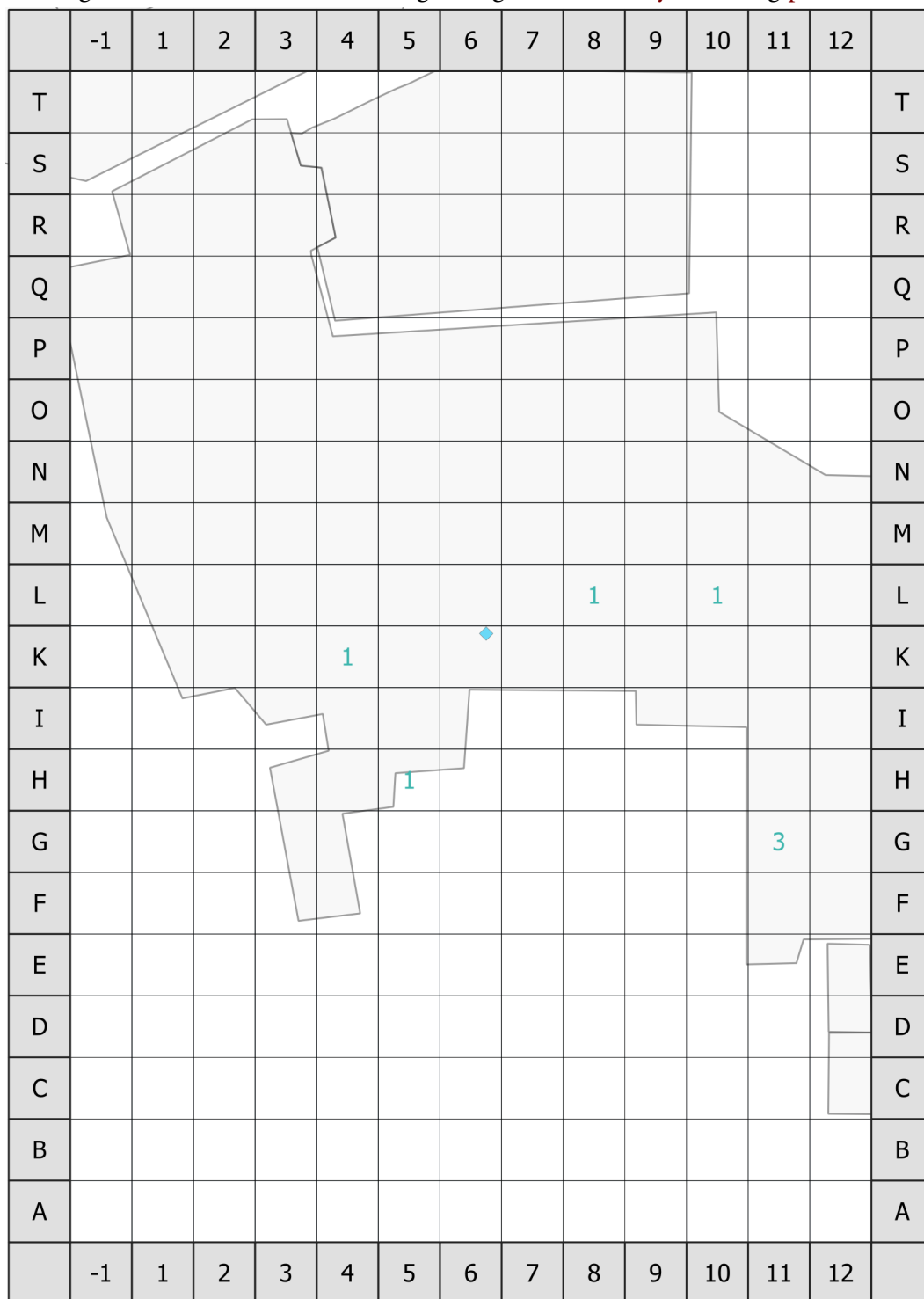


Figure H.23. Location of pan-Scandinavian high- and low-status **idionyms** during **period 6**. PSH represented by light, PSL by dark blue numbers.

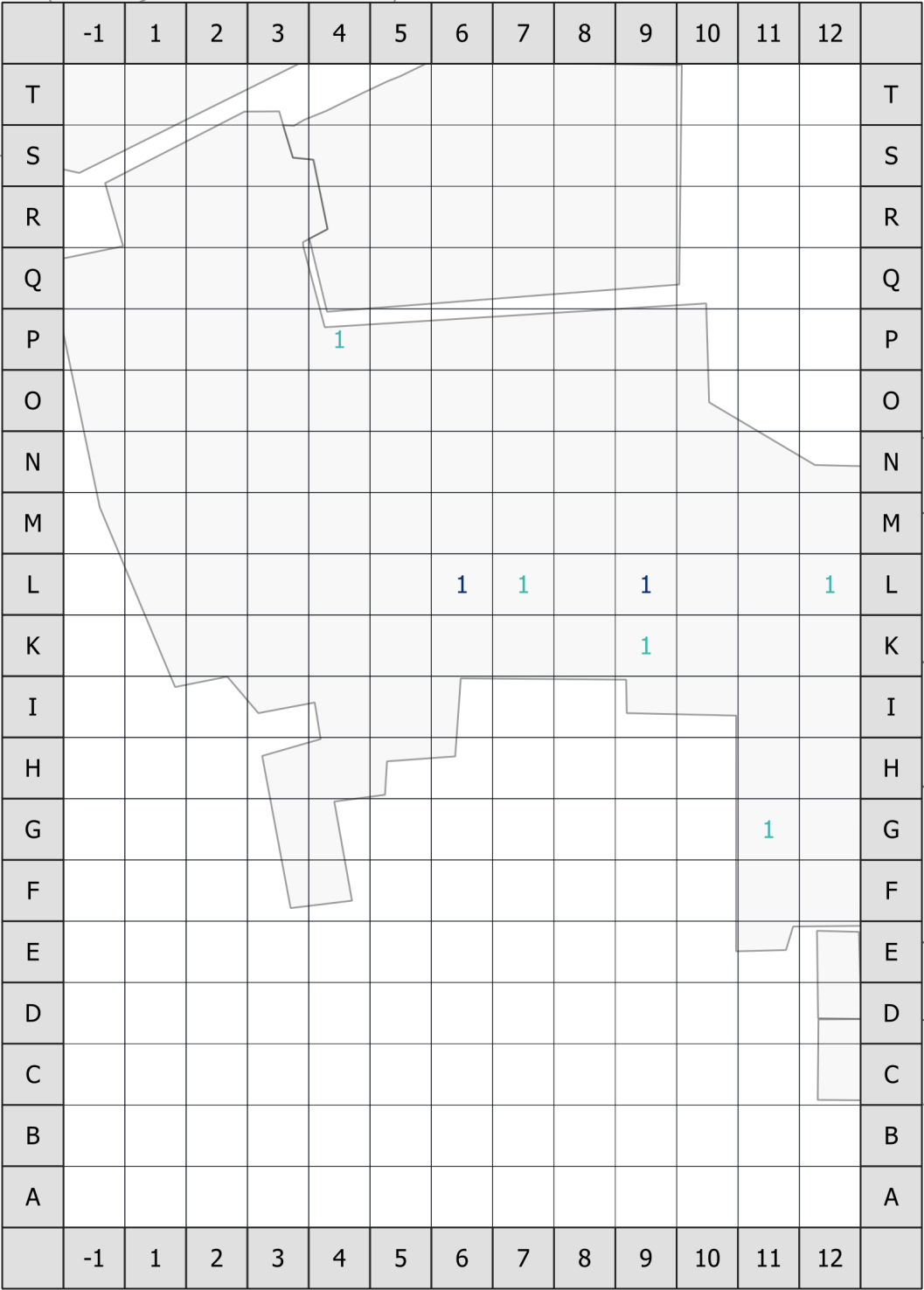


Figure H.24. Location of Norwegian high- and low-status as well as pan-Scandinavian low-status **idionyms** during **period 7**. NH represented by light blue hexagon/number(s), NL by dark blue, PSL by violet.

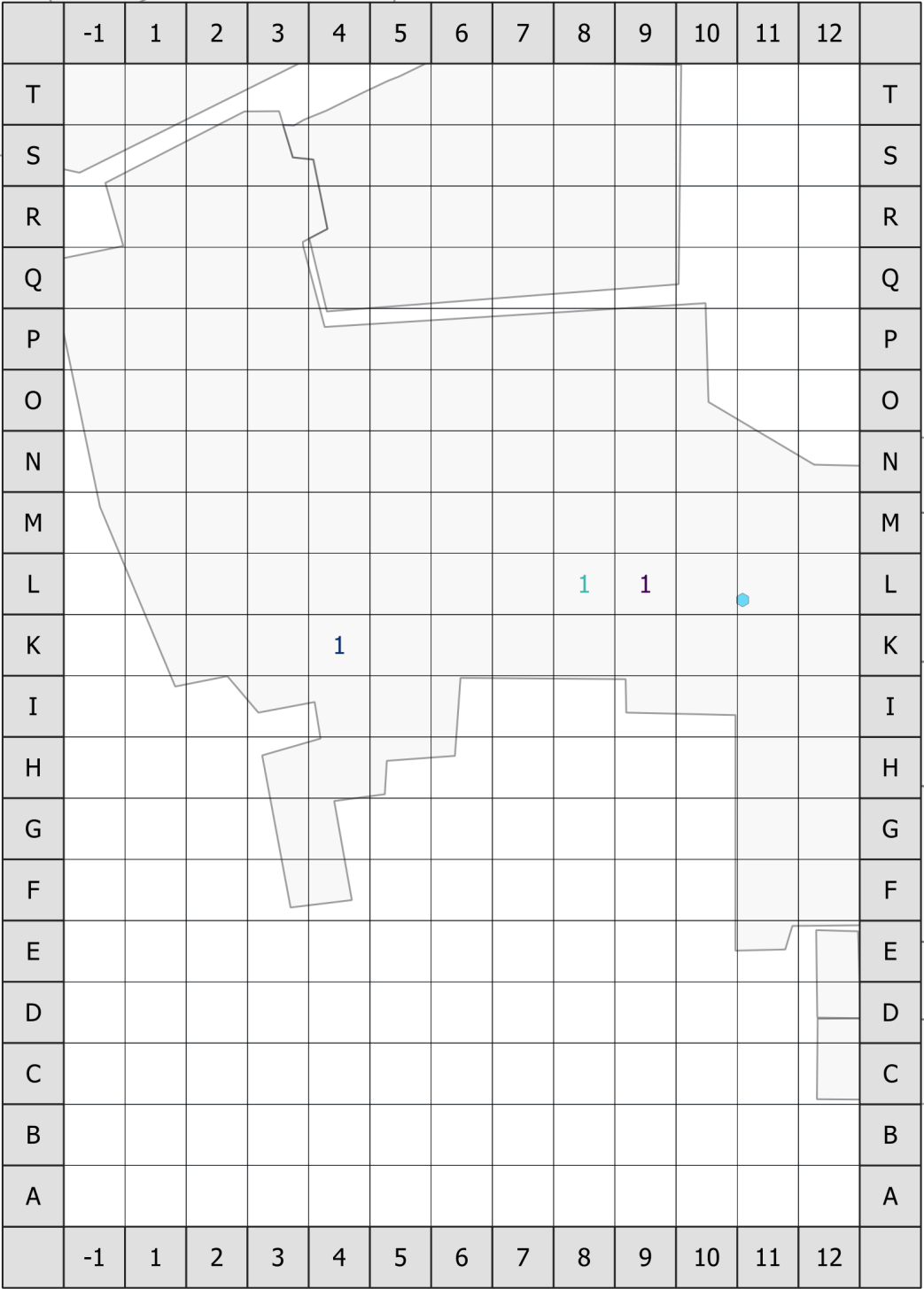




Figure H.25. Location of all objects carrying invocation-**idionyms** or classified as *prayer/incantation/christian/amulet* from **periods** 2 to 6. 2 represented by pink numbers, 3 by green dots/numbers, 4 by blue, 5 by orange and 6 by black; see Tables H.9 to H.13 for the relevant objects, **Query H.28, H.29**.

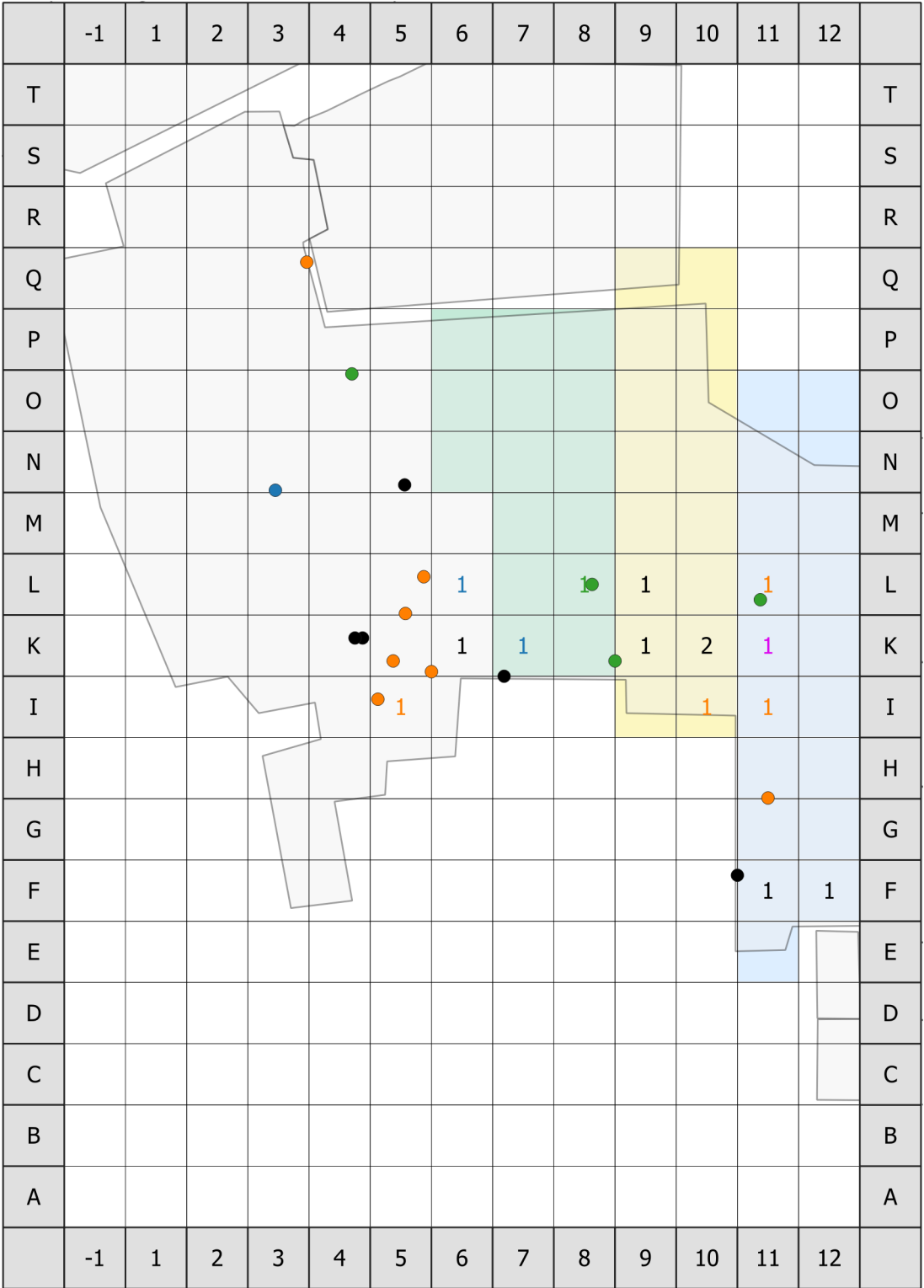


Figure H.26. Counts of different **idionyms** (I), their tokens (T) and count of objects (O) they appear on according to social status per **period** used for  $\chi^2$ -testing. Numbers acquired via **Query H.22, H.25**. The counts include different **normalisations** of the same letter sequence and objects dated to two different **periods**.

	Period 2			Period 3			Period 4		
	I	T	O	I	T	O	I	T	O
No status	5	6	4	14	16	9	32	42	33
IH	2	2	2	11	12	11	16	24	18
IL	1	1	1	1	1	1	5	5	5
NH	5	7	3	9	16	14	22	40	23
NH	1	1	1	1	1	1	1	1	1
PSH	3	3	2	6	6	5	7	11	8
PSH	1	1	1	2	2	2	3	5	4
No status %	27.78	28.57	28.57	31.82	29.63	20.93	37.21	32.81	35.87
IH %	11.11	9.52	14.29	25.00	22.22	25.58	18.60	18.75	19.57
IL %	5.56	4.76	7.14	2.27	1.85	2.33	5.81	3.91	5.43
NH %	27.78	33.33	21.43	20.45	29.63	32.56	25.58	31.25	25.00
NL %	5.56	4.76	7.14	2.27	1.85	2.33	1.16	0.78	1.09
PSH %	16.67	14.29	14.29	13.64	11.11	11.63	8.14	8.59	8.70
PSL %	5.56	4.76	7.14	4.55	3.70	4.65	3.49	3.91	4.35
	Period 5			Period 6			Period 7		
	I	T	O	I	T	O	I	T	O
No status	29	33	21	4	5	5	3	3	3
IH	14	18	16	4	5	4	0	0	0
IL	4	4	4	1	1	1	0	0	0
NH	23	36	28	10	11	8	2	2	2
NL	2	4	4	0	0	0	1	1	1
PSH	9	14	11	3	5	5	0	0	0
PSL	1	1	1	2	3	2	1	1	1
No status %	35.37	30.00	24.71	16.67	16.67	20.00	42.86	42.86	42.86
IH %	17.07	16.36	18.82	16.67	16.67	16.00	0.00	0.00	0.00
IL %	4.88	3.64	4.71	4.17	3.33	4.00	0.00	0.00	0.00
NH %	28.05	32.73	32.94	41.67	36.67	32.00	28.57	28.57	28.57
NL %	2.44	3.64	4.71	0.00	0.00	0.00	14.29	14.29	14.29
PSH %	10.98	12.73	12.94	12.50	16.67	20.00	0.00	0.00	0.00
PSL %	1.22	0.91	1.18	8.33	10.00	8.00	14.29	14.29	14.29

## Code & queries

Query H.1 Query returning all contexts where coordinates and excavation unit correspond

```
1 CREATE VIEW validcoscontexts AS
2 SELECT contexts.musitid FROM
3 contexts INNER JOIN conunit ON contexts.musitid LIKE conunit.musitid
4 WHERE (conunit.unitid LIKE "%-01" AND contexts.xco BETWEEN -800 AND
5 0)
6 OR (conunit.unitid LIKE "%01" AND contexts.xco BETWEEN 0 AND 800)
7 OR (conunit.unitid LIKE "%02" AND contexts.xco BETWEEN 800 AND 1600)
8 OR (conunit.unitid LIKE "%03" AND contexts.xco BETWEEN 1600 AND
9 2400)
10 OR (conunit.unitid LIKE "%04" AND contexts.xco BETWEEN 2400 AND
11 3200)
12 OR (conunit.unitid LIKE "%05" AND contexts.xco BETWEEN 3200 AND
13 4000)
14 OR (conunit.unitid LIKE "%06" AND contexts.xco BETWEEN 4000 AND
15 4800)
16 OR (conunit.unitid LIKE "%07" AND contexts.xco BETWEEN 4800 AND
17 5600)
18 OR (conunit.unitid LIKE "%08" AND contexts.xco BETWEEN 5600 AND
19 6400)
20 OR (conunit.unitid LIKE "%09" AND contexts.xco BETWEEN 6400 AND
21 7200)
22 OR (conunit.unitid LIKE "%10" AND contexts.xco BETWEEN 7200 AND
23 8000)
24 OR (conunit.unitid LIKE "%11" AND contexts.xco BETWEEN 8000 AND
25 8800)
26 OR (conunit.unitid LIKE "%12" AND contexts.xco BETWEEN 8800 AND
27 9600)
28 UNION
29 SELECT contexts.musitid FROM
30 contexts INNER JOIN conunit ON contexts.musitid=conunit.musitid
31 WHERE (conunit.unitid LIKE "A%" AND contexts.yco BETWEEN 0 AND 800)
32 OR (conunit.unitid LIKE "A%" AND contexts.yco BETWEEN 0 AND 800)
33 OR (conunit.unitid LIKE "B%" AND contexts.yco BETWEEN 800 AND 1600)
34 OR (conunit.unitid LIKE "C%" AND contexts.yco BETWEEN 1600 AND 2400)
35 OR (conunit.unitid LIKE "D%" AND contexts.yco BETWEEN 2400 AND 3200)
36 OR (conunit.unitid LIKE "E%" AND contexts.yco BETWEEN 3200 AND 4000)
37 OR (conunit.unitid LIKE "F%" AND contexts.yco BETWEEN 4000 AND 4800)
38 OR (conunit.unitid LIKE "G%" AND contexts.yco BETWEEN 4800 AND 5600)
39 OR (conunit.unitid LIKE "H%" AND contexts.yco BETWEEN 5600 AND 6400)
40 OR (conunit.unitid LIKE "I%" AND contexts.yco BETWEEN 6400 AND 7200)
41 OR (conunit.unitid LIKE "K%" AND contexts.yco BETWEEN 7200 AND 8000)
42 OR (conunit.unitid LIKE "L%" AND contexts.yco BETWEEN 8000 AND 8800)
43 OR (conunit.unitid LIKE "M%" AND contexts.yco BETWEEN 8800 AND 9600)
```

```

33 OR (conunit.unitid LIKE "N%" AND contexts.yco BETWEEN 9600 AND
    10400)
34 OR (conunit.unitid LIKE "O%" AND contexts.yco BETWEEN 10400 AND
    11200)
35 OR (conunit.unitid LIKE "P%" AND contexts.yco BETWEEN 11200 AND
    12000)
36 OR (conunit.unitid LIKE "Q%" AND contexts.yco BETWEEN 12000 AND
    12800)
37 OR (conunit.unitid LIKE "R%" AND contexts.yco BETWEEN 12800 AND
    13600)
38 OR (conunit.unitid LIKE "S%" AND contexts.yco BETWEEN 13600 AND
    14400)
39 OR (conunit.unitid LIKE "T%" AND contexts.yco BETWEEN 14400 AND
    15200);

```

Query H.2 Follow-up for the prior query, using the coordinates provided for objects

```

1 SELECT object.objectid FROM
2 (object INNER JOIN contexts ON object.musitid=contexts.musitid)
3 INNER JOIN conunit ON contexts.musitid=conunit.musitid
4 WHERE

```

See conditions in [Query H.1](#).

Query H.3 Retrieving all entries from **CONSTRUC** for which Magin 2017 and Magin 2018 added new data

```

1 SELECT DISTINCT musitid FROM construc
2 WHERE musitid IN
3 (SELECT DISTINCT musitid FROM construc WHERE bibtexkey LIKE
   "Elisabeth%")
4 AND bibtexkey <> "Elisabeth%";

```

Much the same query can be applied to any table and *-source*-column to find out which entries were added by which scholar at which point, provided *-source* contains the required values. Once NOT is added to the **WHERE**-clause, the result set then only shows entries for which the scholar in question has not added new entries.

Query H.4 Creating **VIEW** *datedonce*, containing all *insids* dated only once, and their dating

```

1 CREATE VIEW datedonce AS
2 SELECT phaseid, insid FROM (((phases LEFT JOIN conphase ON
   phases.phaseid=conphase.conphase)
3 LEFT JOIN contexts ON conphase.musitid=contexts.musitid)
4 LEFT JOIN object ON contexts.musitid=object.musitid)
5 LEFT JOIN inscription ON object.objectid=inscription.altnr
6 WHERE insid IN
7 (SELECT insid FROM
8 (SELECT COUNT(DISTINCT phaseid), insid

```

```

9 FROM
10 (SELECT phases.phaseid, inscription.insid
11 FROM (((phases LEFT JOIN conphase ON
12         phases.phaseid=conphase.conphase)
13 LEFT JOIN contexts ON conphase.musitid=contexts.musitid)
14 LEFT JOIN object ON contexts.musitid=object.musitid)
15 LEFT JOIN inscription ON object.objectid=inscription.altnr) AS
16 insphasec
17 GROUP BY insid
18 HAVING COUNT(DISTINCT phaseid) = 1) AS ips);

```

Cf. Query F.23 on the use and purpose of **VIEW**s.

Query H.5 Creating **VIEW** *datedtwice*, containing all *insids* dated more than once, and their dating

```

1 CREATE VIEW datedtwice AS
2 SELECT phaseid, insid FROM (((phases LEFT JOIN conphase ON
3         phases.phaseid=conphase.conphase)
4 LEFT JOIN contexts ON conphase.musitid=contexts.musitid)
5 LEFT JOIN object ON contexts.musitid=object.musitid)
6 LEFT JOIN inscription ON object.objectid=inscription.altnr
7 WHERE insid IN
8 (SELECT insid FROM
9 (SELECT COUNT(DISTINCT phaseid), insid
10 FROM
11 (SELECT phases.phaseid, inscription.insid
12 FROM (((phases LEFT JOIN conphase ON
13         phases.phaseid=conphase.conphase)
14 LEFT JOIN contexts ON conphase.musitid=contexts.musitid)
15 LEFT JOIN object ON contexts.musitid=object.musitid)
16 LEFT JOIN inscription ON object.objectid=inscription.altnr) AS
17 insphasec
18 GROUP BY insid
19 HAVING COUNT(DISTINCT phaseid) > 1) AS ips);

```

Query H.6 Count of objects dated once dating to individual building **period**

```

1 SELECT phaseid, COUNT(insid)
2 FROM datedonce
3 GROUP BY phaseid;

```

Query H.7 Count of objects dated more than once

```

1 SELECT phaseid, COUNT(DISTINCT insid)
2 FROM datedtwice
3 GROUP BY phaseid;

```

Query H.8 Count of all contexts with a value for fire

```

1 SELECT COUNT(DISTINCT musitid) FROM confire
2 WHERE fire <> '';

```

WHERE layertype <> '' or WHERE unitid <> '' queried from **CONLAYER** and **CONUNIT** will give the respective results for these.

Query H.9 Count of all contexts with one or more related buildings

```

1 SELECT COUNT(DISTINCT musitid) FROM construc;

```

Query H.10 Count of all contexts with a value for all four of the above

```

1 SELECT COUNT(DISTINCT musitid) FROM conunit
2 WHERE unitid <> ''
3 AND musitid IN (SELECT DISTINCT musitid FROM conlayer
4 WHERE layertype <> '')
5 AND musitid IN (SELECT DISTINCT musitid FROM construc)
6 AND musitid IN (SELECT DISTINCT musitid FROM confire
7 WHERE fire <> '');

```

Query H.11 Counting all inscriptions dated to a **period**

```

1 SELECT COUNT(DISTINCT insid)
2 FROM
3 ((conphase INNER JOIN contexts ON conphase.musitid=contexts.musitid)
4 INNER JOIN object ON contexts.musitid=object.musitid)
5 INNER JOIN inscription ON object.objectid=inscription.altnr;

```

Query H.12 Creating **VIEW** ippa (idionyms per **period** all)

```

1 CREATE VIEW ippa AS
2 SELECT DISTINCT phases.phaseid, inscription.insid,
3     idionym.normalised, inscriptionnames.insnid,
4     inscriptionnames.interlocutor, inscriptionnames.invocation,
5     namejoin.source
6 FROM
7 (((((((((phases LEFT JOIN conphase ON
8     phases.phaseid=conphase.conphase)
9 LEFT JOIN contexts ON conphase.musitid=contexts.musitid)
10 LEFT JOIN object ON contexts.musitid=object.musitid)
11 LEFT JOIN inscription ON object.objectid=inscription.altnr)
12 LEFT JOIN transliteration ON
13     inscription.insid=transliteration.insid)
14 LEFT JOIN patterning ON transliteration.tlitid=patterning.tlitid)
15 LEFT JOIN sequences ON patterning.patid=sequences.patid)
16 LEFT JOIN inscriptionnames ON
17     sequences.insnid=inscriptionnames.insnid)
18 LEFT JOIN namejoin ON inscriptionnames.insnid=namejoin.insnid)

```

```

13 LEFT JOIN idionym ON namejoin.idioid=idionym.idioid
14 WHERE idionym.normalised IS NOT NULL AND inscription.insid IS NOT
    NULL;

```

For this **VIEW**, the data subset consists of values from, respectively, **PHASES**, **INSCRIPTION**, **INSCRIPTIONNAMES**, **NAMEJOIN** and **IDIONYM**. Since several of the **JOINS** between the **entity types** will result in certain rows being duplicated, it is imperative to add **DISTINCT**.

Query H.13 Count of distinct **idionyms** appearing in more than one **period**, disregarding objects dated more than once

```

1 SELECT normalised , COUNT(DISTINCT phaseid) FROM ippa
2 WHERE insid IN (SELECT insid FROM datedonce)
3 GROUP BY normalised
4 HAVING COUNT(DISTINCT phaseid) > 1;

```

Query H.14 Count of distinct **idionyms** appearing in more than one **period** on objects dated more than once

```

1 SELECT normalised , COUNT(DISTINCT phaseid) FROM ippa
2 WHERE insid IN (SELECT insid FROM datedtwice)
3 GROUP BY normalised;

```

Query H.15 **Idionyms** appearing in more than one **period** on objects dated more than once

```

1 SELECT DISTINCT insid , normalised , phaseid FROM ippa
2 WHERE insid IN (SELECT DISTINCT insid FROM datedtwice)
3 ORDER BY normalised , insid , phaseid;

```

Query H.16 Count of distinct **idionyms** per **period**

```

1 SELECT COUNT(DISTINCT normalised)
2 FROM ippa
3 WHERE phaseid LIKE "[insert_phase_of_choice]";

```

While the **VIEW** IPPA contains duplicates of **idionyms** and *insids* both, there is only one column being queried here, *normalised*, (respectively *insid* when the count of objects is required) while another serves as a filter for the fire. Since the value of the **WHERE**-clause can be set to, for example, "3.\_", this renders the problem of **building phases** moot, since \_ indicates a **wildcard**, i.e., any character can stand in its place. This guarantees that even **idionyms** dated to **building phases** of one **period** only are counted once. The same applies to the next query. Further modifications used were AND interlocutor=1 and AND invocation=1.

Query H.17 Retrieving all **idionyms** dating to individual **periods**

```

1 SELECT DISTINCT normalised
2 FROM ippa
3 WHERE phaseid LIKE "[insert_phase_of_choice]"
4 ORDER BY normalised;

```



### Query H.18 Count of each token of **idionym** per **period**

```

1 SELECT phaseid , normalised , MAX(cinsnid)
2 FROM
3 (SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
4 FROM ippa
5 WHERE ippa.source="markali1983"
6 GROUP BY phaseid , normalised
7 UNION
8 SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
9 FROM ippa
10 WHERE ippa.source="niyrvi"
11 GROUP BY phaseid , normalised
12 UNION
13 SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
14 FROM ippa
15 WHERE ippa.source="samtextbas"
16 GROUP BY phaseid , normalised) AS maxcount
17 GROUP BY phaseid , normalised
18 ORDER BY phaseid , normalised ;

```

As in Chapter 5, the maximum number of tokens per **idionym** is counted. This query is the basis for several of the following analyses looking more more closely at the distribution of **idionyms**. It can be modified by, for example, adding AND invocation=0 to the **WHERE**-clauses in the first nested queries to only receive the results for **idionyms** identified as **PNs**. In this case, the two modifications used were AND interlocutor=1 and AND invocation=1. With the first modification, the query returns results for instances that have interlocutor set to 1, with the second, those that have invocation set to 1. It should be noted, however, that tokens where both interlocutor and invocation are set to 1 will appear and be counted in either result set. If a stricter division is desired, and **idionyms** used as either **PNs** or invocation are to be excluded, a combination of the two qualifiers can be employed, for example **WHERE** interlocutor=1 AND invocation=0.

Another possible modification is to add **WHERE** phaseid LIKE "[insert phase of choice]" to the main query, by which only entries dated to a particular **period** are returned. In order to avoid counting the double-dated entries twice, restricting the result set by adding **WHERE** insid IN (SELECT insid FROM datedonce) or alternatively **WHERE** insid IN (SELECT insid FROM datedtwice) in the nested query is an option that was also employed for retrieving accurate counts/**building phases**.

Lastly, the whole query can be nested once more into a query summing up **building phase** counts into a total for the whole **period**.

### Query H.19 Summing up the individual counts for each **idionym** for each **period**, disregarding inscriptions dated multiple times

```

1 SELECT normalised , SUM(maxinsnids)
2 FROM
3 (SELECT phaseid , normalised , MAX(cinsnid) AS maxinsnids

```

```

4 FROM
5 (SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
6 FROM ippa
7 WHERE ippa.source="markali1983" AND insid IN (SELECT insid FROM
8 datedonce)
9 GROUP BY phaseid , normalised
10 UNION
11 SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
12 FROM ippa
13 WHERE ippa.source="niyrvi" AND insid IN (SELECT insid FROM
14 datedonce)
15 GROUP BY phaseid , normalised
16 UNION
17 SELECT phaseid , normalised , COUNT(DISTINCT insnid) AS cinsnid
18 FROM ippa
19 WHERE ippa.source="samtextbas" AND insid IN (SELECT insid FROM
20 datedonce)
21 GROUP BY phaseid , normalised) AS maxcount
22 WHERE phaseid LIKE "[insert_phase_of_choice]"
23 GROUP BY phaseid , normalised) AS sumitup
24 GROUP BY normalised
25 ORDER BY normalised;

```

#### Query H.20 Total count of objects carrying **idionyms** per **period**

```

1 SELECT COUNT(DISTINCT insid) FROM ippa
2 WHERE phaseid LIKE "[insert_phase_of_choice]";

```

Again, when **DISTINCT** is used in conjunction with a **wildcard** in the **WHERE**-clause specifying the **period**, it is not necessary to additionally break the result set down by using *datedonce* or *datedtwice*. It can further be modified by adding AND interlocutor=1 or AND invocation=1 to the **WHERE**-clause for the results presented in Figure 7.21. As explained under **Query H.18**, excluding **idionyms** considered as either can be excluded from the result set by combining qualifiers in the **WHERE**-clause. This was not done for this study.

#### Query H.21 Creating **VIEW** timelocatednames

```

1 CREATE VIEW timelocatednames AS
2 SELECT inter.*, idionym.sostat
3 FROM
4 (SELECT DISTINCT conunit.unitid , contexts.musitid , ippa.*
5 FROM (((conunit LEFT JOIN contexts ON
6 conunit.musitid=contexts.musitid)
7 LEFT JOIN object ON contexts.musitid=object.musitid)
8 LEFT JOIN inscription ON object.objectid=inscription.altnr)
9 LEFT JOIN ippa ON inscription.insid=ippa.insid
10 WHERE ippa.normalised IS NOT NULL AND ippa.insid IS NOT NULL) AS
11 inter

```

```

10 INNER JOIN idionym ON inter.normalised=idionym.normalised
11 WHERE inter.insid IN (SELECT insid FROM singleunit);

```

Query H.22 Total count of **idionyms** per **period** according to their social status

```

1 SELECT sostat , COUNT(DISTINCT normalised)
2 FROM timelocatednames
3 WHERE phaseid LIKE "[insert_phase_of_choice]" AND interlocutor=1
4 GROUP BY sostat;

```

Query H.23 Total count of **idionyms**-tokens per **period**, sorted by social status

```

1 SELECT sostat , SUM(tokensostatsums)
2 FROM
3 (SELECT insid , sostat , normalised , MAX(countinsnid) AS
   tokensostatsums
4 FROM
5 (SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid) AS countinsnid
6 FROM timelocatednames
7 WHERE interlocutor=1 AND phaseid LIKE "7.%" AND
   timelocatednames.source="samtextbas"
8 GROUP BY unitid , insid , normalised
9 UNION
10 SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid)
11 FROM timelocatednames
12 WHERE interlocutor=1 AND phaseid LIKE "7.%" AND
   timelocatednames.source="markali1983"
13 GROUP BY unitid , insid , normalised
14 UNION
15 SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid)
16 FROM timelocatednames
17 WHERE interlocutor=1 AND phaseid LIKE "7.%" AND
   timelocatednames.source="niyrvi"
18 GROUP BY unitid , insid , normalised)
19 AS inbetween
20 GROUP BY normalised , insid , sostat) AS sumitup
21 GROUP BY sostat;

```

The principle is the same as before (H.19), although from a different dataset which now also includes information about the potential social status of **idionyms**. Tokens dating to more than one **period** are counted once for each, and tokens normalised as different **idionyms** appear as many times as there are different **normalisations** for them.

Query H.24 All **idionyms** appearing per excavation unit and **period** with their social status

```

1 SELECT inbetween.unitid , inbetween.insid , inbetween.normalised ,
   inbetween.sostat , MAX(inbetween.countinsnid) , idionym.gender
2 FROM
3 (SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid) AS countinsnid
4 FROM timelocatednames
5 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
   AND timelocatednames.source="samtextbas"
6 GROUP BY unitid , insid , normalised
7 UNION
8 SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid) AS countinsnid
9 FROM timelocatednames
10 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
   AND timelocatednames.source="markali1983"
11 GROUP BY unitid , insid , normalised
12 UNION
13 SELECT DISTINCT unitid , insid , normalised , sostat , COUNT(DISTINCT
   insnid) AS countinsnid
14 FROM timelocatednames
15 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
   AND timelocatednames.source="niyrvi"
16 GROUP BY unitid , insid , normalised)
17 AS inbetween
18 INNER JOIN idionym ON inbetween.normalised=idionym.normalised
19 GROUP BY inbetween.unitid , inbetween.insid , inbetween.normalised;

```

Using **WHERE** `inbetween.sostat="IH/IL/NH/NL/PSH/PSL/IS NULL"` returns only the records for each group.

#### Query H.25 Total count of interlocutor-**idionyms** per **period**

```

1 SELECT COUNT(DISTINCT normalised)
2 FROM timelocatednames
3 WHERE phaseid LIKE "[insert_phase_of_choice]" AND interlocutor=1;

```

Adding *sostat* as a column provides the numbers by social status, while swapping *normalised* for *insid* provides the total count of inscriptions.

#### Query H.26 Potential count of individuals the **idionyms** belong to

```

1 SELECT SUM(individs)
2 FROM (SELECT insid , MAX(countinsnid) AS individs FROM
3 (SELECT DISTINCT insid , COUNT(DISTINCT insnid) AS countinsnid
4 FROM timelocatednames
5 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
   AND timelocatednames.source="samtextbas"
6 GROUP BY insid
7 UNION

```

```

8 SELECT DISTINCT insid , COUNT(DISTINCT insnid) AS countinsnid
9 FROM timelocatednames
10 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
    AND timelocatednames.source="markali1983"
11 GROUP BY insid
12 UNION
13 SELECT DISTINCT insid , COUNT(DISTINCT insnid) AS countinsnid
14 FROM timelocatednames
15 WHERE interlocutor=1 AND phaseid LIKE "[insert_phase_of_choice]"
    AND timelocatednames.source="niyrvi"
16 GROUP BY insid) AS inbetween
17 GROUP BY insid) AS sumitup;

```

#### Query H.27 Creating **VIEW** datelocatedtags

```

1 CREATE VIEW datelocatedtags AS
2 SELECT DISTINCT inter.*, inbetween.phaseid
3 FROM
4 (SELECT conunit.unitid , conunit.musitid , alltags.*
5 FROM (((conunit LEFT JOIN contexts ON
    conunit.musitid=contexts.musitid)
6 LEFT JOIN object ON contexts.musitid=object.musitid)
7 LEFT JOIN inscription ON object.objectid=inscription.altnr)
8 INNER JOIN alltags ON inscription.insid=alltags.insid) AS inter
9 INNER JOIN
10 (SELECT DISTINCT phases.phaseid , contexts.musitid
11 FROM ((phases INNER JOIN conphase ON
    phases.phaseid=conphase.conphase)
12 INNER JOIN contexts ON conphase.musitid=contexts.musitid)) AS
    inbetween
13 ON inter.musitid=inbetween.musitid
14 WHERE inter.insid IN (SELECT DISTINCT insid FROM singleunit);

```

#### Query H.28 Retrieving available coordinates for objects carrying invocation-**idionym** or tagged *prayer/incantation/christian/amulet*

```

1 SELECT insid , oxco/100 AS oxco , oyco/100 AS oyco FROM qgis WHERE
    oxco IS NOT NULL AND oyco IS NOT NULL
2 AND insid IN (SELECT insid FROM datelocatedtags WHERE phaseid LIKE
    "[insert_phase]" AND (ttagname="prayer" OR
    ttagname="incantation" OR ttagname="christian" OR
    ttagname="amulet"))
3 UNION
4 SELECT insid , cxco/100 AS cxco , cyco/100 AS cyco FROM qgis WHERE
    cxco IS NOT NULL AND cyco IS NOT NULL
5 AND insid IN (SELECT insid FROM datelocatedtags WHERE phaseid LIKE
    "[insert_phase]" AND (ttagname="prayer" OR

```

```

        ttagname="incantation" OR ttagname="christian" OR
        ttagname="amulet"))
6 UNION
7 SELECT insid , oxco/100 AS oxco , oyco/100 AS oyco FROM qgis WHERE
    oxco IS NOT NULL AND oyco IS NOT NULL
8 AND insid IN (SELECT insid FROM ippa WHERE invocation=1 AND phaseid
    LIKE "[insert_phase]")
9 UNION
10 SELECT insid , cxco/100 AS cxco , cyco/100 AS cyco FROM qgis WHERE
    cxco IS NOT NULL AND cyco IS NOT NULL
11 AND insid IN (SELECT insid FROM ippa WHERE invocation=1 AND phaseid
    LIKE "[insert_phase]");

```

Query H.29 Retrieving available coordinates for objects carrying invocation-*idionym* or tagged *prayer/incantation/christian/amulet*

```

1 SELECT unitid , COUNT(DISTINCT insid) FROM qgis
2 WHERE (((oxco OR oyco) IS NULL OR (oxco AND oyco) IS NULL) AND
    ((cxco AND cyco) IS NULL OR (cxco AND cyco) IS NULL))
3 AND insid IN (SELECT insid FROM datelocatedtags WHERE phaseid LIKE
    "[insert_phase]" AND (ttagname="prayer" OR
    ttagname="incantation" OR ttagname="christian" OR
    ttagname="amulet")) GROUP BY unitid
4 UNION
5 SELECT unitid , COUNT(DISTINCT insid) FROM qgis
6 WHERE (((oxco OR oyco) IS NULL OR (oxco AND oyco) IS NULL) AND
    ((cxco AND cyco) IS NULL OR (cxco AND cyco) IS NULL))
7 AND insid IN (SELECT insid FROM ippa WHERE invocation=1 AND phaseid
    LIKE "[insert_phase]") GROUP BY unitid;

```

## Additional tables

Table H.1. The 14 **idionyms** appearing on objects dated to more than one **periodbuilding phase**.

<i>insid</i>	<b>Idionym</b>	<b>Period 4</b>	<b>Period 5</b>	<b>Period 6</b>	<b>Period 7</b>
ins223	Halli			x	x
ins256	Hallvarðr			x	x
ins256	Hávarr			x	x
ins304	Heðinn	x	x		
ins173	Ió(h)an/Jó(h)an		x	x	
ins200	Ió(h)an/Jó(h)an		x	x	
ins20	María			x	
ins157	Qgmundr		x	x	
ins200	Þjóðgeirr/Þjóðgeirr		x	x	
ins304	Þóraldi	x	x		
ins304	Þóraldr	x	x		
ins304	Þorbjörg	x	x		
ins200	Þorgils/Þorgisl		x	x	
ins304	Þórir	x	x		
ins220	Þórir			x	
ins200	Þorkell		x	x	

Table H.2. **Idionyms** appearing per **period**, based on **Query H.19**, **H.1**; number of appearances in brackets if more than one.

<b>Period</b>	<b>Idionyms</b>
2	Arnviðr, Benedikt, Bergsveinn, Eiríkr, Eyvindr, Glúmr, Grímr (2), Hallbjörg, Hallkatla, Haraldr, Ingjaldr/Ingialdr, Jón, Ljótr/Liotr, Magnús, Sigurðr (3), Týhvatr/Tivatr, Þjóðarr, Þorgils/Þorgisl
3	Agnbjörg, Andreas/Andrés, Ari (2), Arnbjörg, Arnbjörn, Arni, Ása (3), Auðmundr, Auðr, Björn/Björn, Bubba, Eindriði, Eldjarn/Eldiárn, Erendr, Eysteinn, Finn, Gunnarr (3), Gyrðir, Gyrðr, Hálfðan, Halli, Hallsteinn, Heinrekr, Ingibjörg/Ingibiörg, Ió(h)an/Jó(h)an, Klas, Lúcia, Margrét(a), María, Óðinn, Ólaf (2), Ólvir/Ólvir, Qnundr, Poppe, Rúnolfr, Sessi, Sigriðr, Sigurðr (3), Sveinn, Tonna, Þorgrímr, Þórir, Þorkatla, Þorkell (2), Þórr, Þorsteinn, Þorvaldr, Þorvarðr, Þúfa



Period	Idionyms
4	<p> Án(n) (2), Áni (2), Anna, Anne (2), Arni (6), Ásgeirr, Áslákr, Auðun, Bárðr, Benedikt, Benedikta, Bergþóra, Bergþórr, Bjarni/Biarni, Bótleifr, Brandr, Búi, Búr-Almarr, Einarr (3), Eindriði, Eiríkr (4), Erlendr (2), Erlingr, Eyjolftr/Eyiólfr, Finnrr (3), Gísl, Grímr, Guðmundr, Guðríðr, Guðrún, Gunnarr (4), Gunnhildr, Gyða (2), Gyrid, Halldórr, Hallgísl/Hallgils, Hallkell, Hávarðr, Heðinn, Hrólfr (Rolftr), Ió(h)an-/Jó(h)an (2), Ívarr (3), Johannes, Jón (2), Kárr, Kolbeinn, Kolbjörn, Ljóttr/Liotr, Lúcia, María, Munán, Ólafr (3), Ormr (2), Ormríkr, Ótarr, Ragnarr, Rannveig, Sámrr (2), Samson, Sigbaldr, Sighvatr, Sigríðr (2), Sigurðr (6), Sigvaldi, Sigvaldr (2), Símon, Sölveig, Steinarr, Styrkár, Únás(s), Vébrandr, Þóraldi, Þórldr, Þorbergr, Þorbjörg, Þorbjörn, Þórðr (2), Þorgils/Þorgísl (2), Þorgunna, Þórhallr, Þóri, Þórir (5), Þorkell, Þorleifr, Þormóðr (2), Þórr (2), Þorsteinn </p>
5	<p> Amor, Andreas/Andrés, Arni (4), Ása (2), Auðr (2), Bárðr, Benedikt, Birgir, Bjarni/Biarni, Bóthildr, Christus (2), Constantinus, Didrik, Dionysius (2), Egill, Eindriði, Einri, Eiríkr (3), Erlendr (2), Erlingr, Eygísl/Eygíls, Eyjolftr/Eyiólfr, Eysteinn, Finnrr, Gabriel, Grímnir, Guðmundr (2), Guðsteinn, Guðþormr, Gunnarr (2), Gunnsteinn, Gusir, Gussir, Hafðjarfr, Halli, Hallkatla, Hallvarðr (2), Hávarr, Heðinn, Heinrekr (2), Helgi (2), Heríkr, Holmr, Illugi, Ími (2), Inga, Ingibjörg/Ingibiörg, Ingimundr, Ingiríðr, Ió(h)an-/Jó(h)an (2), Ívarr, Jesus, Johannes (2), Jón (3), Jórunn/Lórunn, Kátr, Kattr, Klémetr (2), Köttr, Lafranz (2), Loðinn, Malchus, Margrét(a), María (2), Maximianus, Michael/Mikiáll (2), Myttar, Narfi, Nikulás/Nikolás, Ólafr (4), Ögmundr, Ölrékr, Pétr, Philomena, Ran, Raphael, Reiðarr, Sámrr, Sægunni, Serapion, Sigríðr, Sigurðr (3), Smíðr, Tást, Tereus, Thomás, Vígdís, Vígi (3), Vilhelmus/Vilhiálmr, Yggjar/Yggr, Þiðríkr, Þjóðgeirr/Þjóðgeirr, Þólftr, Þóra, Þóraldi (3), Þórldr (3), Þorbjörg, Þorbjörn (2), Þórðr (2), Þorfinnr (2), Þorgarðr, Þorgils/Þorgísl (2), Þórhallr, Þórir, Þorkatla, Þorkell (2), Þorlákr, Þorsteinn, Þorviðr </p>
6	<p> Abed-Nego, Bótolfr, Christus (3), Einarr (2), Elisabet(h), Erlendr, Gunnarr (2), Hákon, Helga, Helgi, Ingibjörg/Ingibiörg, Ió(h)an-/Jó(h)an (2), Jesus, Johannes (2), Jón (2), Karl, Kolbeinn (2), Lukas (2), María (8), Markús, Mat(t)heus (2), Mesak, Óðinn (2), Ögmundr (2), Pálmi, Sadrak, Sigurðr, Tobias, Vémundr, Yngvildr, Þjóðgeirr/Þjóðgeirr, Þorgils/Þorgísl, Þórir, Þorkell </p>
7	<p> Gunnarr, Halli, Hallvarðr, Hávarr, Lunaney, Ótto, Þorsteinn </p>

Table H.3. Distribution of **idionyms** dating to **period 2**, see Figures H.7 to H.9. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options. Based on **Query H.24**.

House row	Unit	Inscription	Idionyms
Bugården	K11	ins14	Arnviðr, Glúmr (IL), Haraldr (NH), Jón (PSH), Magnús (PSH), Sigurðr (NH, 3), Þorgils/Þorgísl (NH)
		ins196	Grímr (2)
Søstergården/Gullskoen	N06	ins65	Benedikt (IH)
	O06	ins80	Eiríkr (NH)
	P06	ins88	Eyvindr (NH)
Gullskoen	M04	ins134	Ljótr/Liotr (IH)/ Týhvatr/Tivatr / Þjóðarr
	N05	ins509	Hallkatla (f)
		ins66	Bergsveinn (NL)
	O05	ins103	Ingjaldr/Ingialdr (PSH)
		ins496	Hallbjörg (f, PSL)

Table H.4. Distribution of **idionyms** dating to **period 3**, see Figures H.10 to H.13. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options.

House row	Unit	Inscription	Idionyms
Bugården	I11	ins74	Eindriði (IH)
Engelgården	K09	ins308	Ása (f, NH)
		ins87	Eysteinn (NH)
	L09	ins297	Agnbjörg (f) / Arnbjörg (f, NL), Arnbjörn (IH), Bubba / Poppe, Gunnarr (2), Hallsteinn, Heinrekr (PSH), Íó(h)an/Jó(h)an (PSH), Þórir (NH), Þorkell (NH)
Søstergården	K07	ins413	Þorkatla (f, PSL)/ Þorkell (NH) <sup>1</sup>
		ins89	Finnr (IH)
	K08	ins38	Klas
		ins435	Sigríðr (f, PSH)
	L08	ins100	Hálfðan (IH)
		ins12	Ari (IH), Ólafr (NH)
		ins120	Rúnolfr (IH)
		ins152	Sigurðr (NH), Þorsteinn (NH)
		ins428	Ása (f, NH)

<sup>1</sup>Different opinions by Markali (1983, 65) and SRDB.

House row	Unit	Inscription	Idionyms
Gullskoen		ins429	Gyrðr (NH)/ Gyrðir <sup>2</sup>
		ins437	Qnundr (NH)
		ins438	Ingibjörg/Ingibiörg (f, PSH)
		ins96	Gunnarr
	M08	ins609	Ása (f, NH)
	N06	ins135	Tonna (f)
	K04	ins146	Þorgrímr (IH), Þúfa (f) <sup>3</sup>
	L04	ins64	Auðmundr / Auðr (mf)
	L05	ins424	Ólafr (NH)
		ins477	Ása (f, NH)
	M05	ins507	Ari (IH)
	N05	ins156	Þorvaldr (IH)/ Þorvarðr (IH)
		ins494	Arni (IH)
	O03	ins83	Eldjarn/Eldiárn (IL)
	O05	ins488	Björn/Biörn (PSH)
	P01	ins605	Sigurðr (NH)
	P02	ins543 <sup>4</sup>	Erlendr (IH)
	P04	ins128	Sigurðr (NH)
		ins533	Sessi
		ins539	Halli (PSL), Margrét(a) (f, PSH)
	P05	ins491	Lúcia (f), Sveinn

Table H.5. Distribution of **idionyms** dating to **period 4**, see Figures H.14 to H.16. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	Idionyms
Bugården	K11	ins111	Munán
	K12	ins77	Eiríkr (NH)
	L11	ins147	Þórhallr (IL)
	L12	ins106	Ívarr (NH)
		ins249	Gunnhildr (f)

<sup>2</sup>The first solution offered by both Markali (1983) and SRDB, the second only by SRDB.

<sup>3</sup>Þúfa is potentially Þorgrímr's byname, although it may also be a separate **idionym**, in which case it is feminine.

<sup>4</sup>Coordinates place this object in O03 instead.

House row	Unit	Inscription	Idionyms
Engelgården	N12	ins350	Arni (IH), Áslákr (NH), Bárðr (NH), Bjarni/- Biarni, Einarr (PSL), Erlendr (IH, 2), Finnrr (IH), Hallkell (PSH), Hávarðr (NH), Hrólfr (Rolfrr) (NH), Ívarr (NH), Jón (PSH, 2), Kolbeinn (IH), Kolbjørn (NH), Ólafr (NH, 2), Sigurðr (NH, 3), Styrkár (PSL), Þórðr (NH), Þórir (NH) / Þórr (2), Þormóðr (PSH)
	I09	ins72	Einarr (PSL)
	K09	ins101	Halldórr (NH), Kárr (IH) <sup>5</sup>
		ins110	Grímr <sup>6</sup> , Lúcia (f)
		ins116	Ormríkr
		ins153	Sigurðr (NH), Þorsteinn (NH)
		ins278	Þorgunna (f)
		ins94	Guðmundr (PSH)
		ins97	Gunnarr
	K10	ins114	Ormr
		ins269	Gyða (f)
		ins63	Ásgeirr
		ins92	Gísl (IH)
	L09	ins109	Ljótr/Liotr (IH)
		ins121	Sámr
		ins122	Sámr
		ins273	Án(n) / Anna (f, IL)
		ins283	Þórir (NH)
		ins290	Eindriði (IH)
		ins68	Bótleifr
		ins70	Búi (IL)/ Búr-Almarr
	L10	ins79	Eiríkr (NH)
Søstergården	M09	ins85	Eyjolfrr/Eyjólfr (IH)
	K07	ins115	Ormr
		ins123	Sigbaldr / Sigbaldi / Sigvaldr
		ins369	Símon (NH)
		ins410	Þóri
		ins62	Án(n) / Arni <sup>7</sup> (IH), Arni (IH)
	K08	ins151	Þormóðr (PSH)
		<b>ins304</b>	Heðinn, Þóraldi (NL)/ Þóraldr (NH), Þorbjörg (f, IH), Þórir (NH)
		ins99	Gunnarr
	L07	ins49	Þorkell (NH)

<sup>5</sup>Occurring as a patronym.

<sup>6</sup>Occurring as a patronym.

<sup>7</sup>Markali 1983 notes these two possibilities.

House row	Unit	Inscription	Idionyms
Gullskoen	N07	ins73	Einarr (PSL)
	O06	ins497	Únás(s)
	K05	ins98	Gunnarr
	K06	ins124	Sighvatr (IH)/ Sigvaldr
		ins132	Solveig (f, IH)
		ins373	Þorleifr (PSH)
		ins382	Bergþóra (f)/ Bergþórr (IH), Erlingr (NH)
		ins384	Eiríkr (NH), Guðrún (f, NH), Sigríðr (f, PSH)
		ins388	Þorgils/Þorgisl (NH)
		ins425	Þorbjörn (NH)
		ins426	Ólafr (NH)
		ins58	Arni (IH)
	L05	ins119	Ragnarr (IL)
		ins412	Guðríðr (f, IH)/ Gyrid, Ívarr (NH)
		ins81	Eiríkr (NH)
		ins91	Finnr (IH, 2)
	L06	ins102	Hallgisl/Hallgils
		ins144	Þorgils/Þorgisl (NH)
		ins148	Þórir (NH)
		ins418	Steinarr (NH)
		ins419	María (f)
	M05	ins472	Áni / Anne (f) / Arni (IH), Gyða (f), Rannveig (f), Sigurðr (NH)
	N03	ins512	Áni / Anne (f)/ Arni (IH)
		ins518	Samson
	N04	ins516	Þorbergr (IL)
	N05	ins104	Ió(h)an/Jó(h)an (PSH)
	O03	ins534	Benedikt (IH)/ Benedikta (f)
	O04	ins535	Óttarr
	O05	ins478	Ió(h)an/Jó(h)an (PSH), Sigurðr (NH)
		ins492	Auðun (NH), Þórðr (NH)
	P03	ins126	Sigríðr (f, PSH)
	P05	ins69	Brandr (IH)/ Vébrandr (PSL)

Table H.6. Distribution of **idionyms** dating to **period 5**, see Figures **H.17** to **H.20**. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>
Bugården	G11	<b>ins157</b>	Qgmundr (IH)
		<b>ins200</b>	Ió(h)an/Jó(h)an (PSH), Þjóðgeirr/Þjóðgeirr, Þorgils/Þorgisl (NH)/ Þorkell (NH)
		ins207	Hafðjarfr
		ins209	Egill (IH)/ Eygisl/Eygils
		ins216	Ása (f, NH), Jón (PSH), Sigríðr (f, PSH)
		ins61	Arni (IH)
	H11	ins204	Helgi (NH), Ólafr (NH)
		ins215	Eiríkr (NH)/ Heríkr
		ins60	Arni (IH)
		ins67	Bjarni/Biarni
	I11	ins86	Eyjolfur/Eyjólfur (IH)/ Þólfur (NH)
		ins40	Benedikt (IH), Margrét(a) (f, PSH)
	K11	ins105	Ívarr (NH)
	L12	<b>ins173</b>	Ió(h)an/Jó(h)an (PSH)
Engelgården	K09	ins228	Lafranz (NH)
		ins232	Ólafr (NH, 2)
		ins247	Þorfinnr (IH)
		ins251	Inga (f), Ingiríðr (f, PSH)
	K10	ins234	Auðr (mf)
		ins53	Bárðr (NH), Heinrekr (PSH), Ingimundr (IH), Vígi (3) <sup>8</sup>
	L09	ins150	Þorlákr (IH)
		ins239	Bóthildr (f), Hallkatla (f), Ingibjörg/Ingibjörg (f, PSH), Jörunn/Iórunn (f, NH)
	L10	ins158	Heinrekr (PSH), Qlrekr
		ins231	Illugi (IH)
		ins248	Þóra (f)
	M10	ins566	Arni (IH), Eiríkr (NH)
		ins76	Eindriði (IH)/ Einri
	I09	ins142	Þorbjörg (NH)
	I10	ins16	Vilhelmus/Vilhiálmr (IH)
		ins257	Gunnarr
		ins71	Didrik (IL)/ Þiðrikr
Søstergården	K07	ins339	Þórðr (NH, 2)

<sup>8</sup>If this is indeed an **idionym**, it is likely to refer to only one individual.

House row	Unit	Inscription	Idionyms
Gullskoen	K08	<b>ins304</b>	Heðinn, Þóraldi (NL)/ Þóraldr (NH), Þorbjörg (f, IH), Þórir (NH)
	H05	ins154	Þorsteinn (NH)
	I04	ins454	Guðmundr (PSH), Þorbjörn (NH)
	I05	ins145	Þorgils/Þorgísl (NH)
		ins447	Þóraldi (NL)/ Þóraldr (NH)
		ins448	Sigurðr (NH)
		ins455	Reiðarr
		ins456	Hallvarðr (NH)
		ins50	Eiríkr (NH), Sigurðr (NH)
	K04	ins131	Sægunni (f)
		ins149	Þorkatla (f, PSL)/ Þorkell (NH)
		ins93	Guðmundr (PSH)
	K05	ins325	Erlingr (NH)
		ins331	Auðr (mf), Holmr, Kátr / Kattr / Köttr, Myttar, Tast
		ins335	Eysteinn (NH)
		ins405	Loðinn (NH)
		ins421	Gunnarr
	K06	ins330	Arni (IH)
	L05	ins328	Ími (IL)
	M06	ins141	Þóraldi (NL)/ Þóraldr (NH)/ Þórhallr (IL)
	O04	ins56	Guðsteinn / Gunnsteinn (IL)/ Gusir / Gussir, Sámr
	O05	ins470	Guðþormr (PSH), Jón (2, PSH)
	P05	ins90	Finnr (IH)
	Q02	ins549	Birgir (NH) <sup>9</sup> , Erlendr (IH), Helgi (NH) <sup>10</sup> , Narfi (IH) <sup>11</sup> , Sigurðr (NH), Þorfinnr (IH)/ Þorgarðr (NL)/ Þorviðr

Table H.7. Distribution of **idionyms** dating to **period 6**, see Figures H.21 to H.23. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	Idionyms
Bugården	G11	ins107	Karl (NH)
		<b>ins157</b>	Qgmundr (NH)

<sup>9</sup>Occurring as patronym.

<sup>10</sup>Occurring as patronym.

<sup>11</sup>Occurring as patronym.



House row	Unit	Inscription	Idionyms
		<b>ins200</b>	Ió(h)an/Jó(h)an (PSH), Þjóðgeirr/Þjóðgeirr, Þorgils/Þorgísl (NH)/ Þorkell (NH)
		ins214	Yngvildr (f, IH)
	L12	<b>ins173</b>	Ió(h)an/Jó(h)an (PSH)
Engelgården	K09	ins5	Jón (PSH)
	L09	<b>ins223</b>	Halli (PSL)
	L10	ins117	Pálmi
		ins220	Þórir (NH)
Søstergården	L07	ins404	Gunnarr, Hákon (IH), Jón (PSH)
	L08	<b>ins256</b>	Hallvarður (NH), Hávarr
		ins258	Kolbeinn (IH, 2)
Gullskoen	H05	ins51	Gunnarr, Helga (f, NH)/ Helgi (NH), Ögmundur (NH)
	K04	ins440	Sigurður (NH)
	K06	ins307	Bótolfr (NH)
	L06	ins324	Einarr (PSL, 2)
	M06	ins463	Vémundur (IL)
	N04	ins460	Erlendr (IH)
	P04	ins531	Ingibjörg/Ingibiörg (f, PSH)

Table H.8. Distribution of **idionyms** dating to **period 7**, see Figure H.24. Count of tokens and social status of single **idionyms** noted in brackets. Variations in **idionym**-identification indicated by “ / ” between the options. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text type
Bugården	L11	ins155	Þorsteinn (NH)		<b>owner's tag</b> , trade
Engelgården	L09	<b>ins223</b>	Halli (PSL)	part of wooden vessel	
Søstergården	L08	<b>ins256</b>	Hallvarðr (NH), Hávarr		
Gullskoen	K04	ins47	Lunaney (f), Ótto (NL)		letter, trade
	K05	ins322	Gunnarr		

Table H.9. List of object classifications, including **idionyms** marked invocation and text tags dating to **period 2**, see Figure **H.25**. Where no object classification is provided, it is “rune-stick”.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text tag
Bugården	K11	ins14			prayer, quote
Søstergården/Gullskoen	N06	ins65		owner's tag	owner's tag, trade
	O06	ins80		owner's tag	owner's tag, trade
	P06	ins88		owner's tag	owner's tag, trade
	M04	ins134		owner's tag	owner's tag, trade, not inter- pretable
Gullskoen	N05	ins66		owner's tag	owner's tag, trade
	O05	ins103		owner's tag, tally stick	owner's tag, trade
		ins496		tally stick	

Table H.10. List of object classifications, including **idionyms** marked invocation and text tags dating to **period 3**, see Figure H.25. Where no object classification is provided, it is “rune-stick”. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text tag
Bugården Engelgård Søstergården	I11	ins74			<b>owner's tag, PN</b> , trade
	K09	ins87			<b>owner's tag</b> , trade
	L09	ins297		ceramic shard	
	K07	ins413		bast	
		ins89			<b>owner's tag</b> , trade
	K08	ins38			christian, incantation, list, magic,
					<b>owner's tag</b> , quote
		ins435		wood splinter, needle	
	L08	ins100			<b>owner's tag</b> , trade
		ins12	Ólafr		christian, comment, <b>owner's tag, PN</b>
		ins120			<b>owner's tag, PN</b> , trade
		ins152			<b>owner's tag, PN</b> , trade
Gullskoen		ins429			<b>owner's tag, PN</b> , trade
		ins430	Óðinn, Þórr	key(shaft)	
		ins438			poetry, quote
		ins96			comment, pub environment, smut
	N06	ins135			<b>owner's tag</b> , trade
	K04	ins146			<b>owner's tag, PN</b> , trade
	L04	ins64			<b>owner's tag, PN</b> , trade
	L05	ins424			<b>owner's tag, PN</b> , trade
	L06	ins17	Maria	wax tablet	letter, period context, quote, regular
					amulet, christian, incantation, magic,
					prayer, quote, religious, teaching, writing exercise
	M05	ins507		rowlock pin, nail	
	N05	ins156			<b>owner's tag, PN</b> , trade
		ins494		wooden knife	

House row	Unit	Inscription	Idionyms	Object	Text tag
	O03	ins83			owner's tag, trade
	P04	ins128			owner's tag, PN, trade
		ins533	Andreas/Andrés		

Table H.11. List of object classifications, including **idionyms** marked invocation and text tags dating to **period 4**, see Figure H.25. Where no object classification is provided, it is “rune-stick”. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text tag
Bugården	K11	ins111			owner's tag, <b>PN</b> , trade
	K12	ins77			owner's tag, trade
	L11	ins147			owner's tag, trade
	L12	ins106			owner's tag, trade
Engelgården		ins249			comment, learned, love, mnemo-device,
					poetry, pub environment, quote
	I09	ins72			owner's tag, trade
	K09	ins101			owner's tag, trade
		ins110			owner's tag, trade
		ins116			owner's tag, trade
		ins153			owner's tag, <b>PN</b> , trade
		ins278			owner's tag, <b>PN</b> , trade
		ins94		part of a cross	owner's tag, trade
		ins97			owner's tag, trade
	K10	ins114			owner's tag, trade
		ins269			comment, pub environment
		ins63			owner's tag, trade
		ins92			owner's tag, <b>PN</b> , trade
	L09	ins109			owner's tag, trade
		ins121			owner's tag, trade
		ins122		with hole	owner's tag, trade
		ins68			owner's tag, trade
		ins70			owner's tag, trade
	L10	ins79			owner's tag, trade
Søstergården	M09	ins85			owner's tag, trade
	K07	ins115			owner's tag, <b>PN</b> , trade

House row	Unit	Inscription	Idionyms	Object	Text tag
Gullskoen		ins123		human-like figure, sculpture	owner's tag, trade
		ins410			
		ins45	Johannes		owner's tag, PN, trade
		ins62			owner's tag, PN, trade
	K08	ins151			owner's tag, trade
		ins99			følgeseddel
	L07	ins49			owner's tag, trade
	N07	ins73			owner's tag, trade
	K05	ins98			carver formula, owner's tag, trade
	K06	ins124			owner's tag, trade
		ins132			owner's tag, PN, trade
		ins58			owner's tag, trade
	L05	ins119			owner's tag, trade
		ins81			owner's tag, trade
		ins91			owner's tag, trade
	L06	ins102			owner's tag, trade
		ins144			owner's tag, trade
		ins148			owner's tag, trade
		ins419	Maria	foot of wooden vessel	
	N03	ins512		part of wooden disk, spade	
		ins518	Samson		owner's tag, PN, trade
	N05	ins104			
	O04	ins535		nail?	
	O05	ins478			learned, letter, period context
		ins492		part of a hammer (bløyg?)	
	P03	ins126			owner's tag, trade
	P05	ins69			owner's tag, trade

Table H.12. List of object classifications, including **idionyms** marked invocation and text tags dating to **period 5**, see Figure H.25. Where no object classification is provided, it is “**rune-stick**”. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text tag
Bugården	G11	<b>ins157</b>		<b>owner's tag, tally stick</b>	<b>owner's tag, PN, trade</b>
		ins207		decorated with ships	
		ins209			poetry
		ins61			<b>owner's tag, trade</b>
	H11	ins204	Ólafr		
		ins60			<b>owner's tag, trade</b>
		ins67			<b>owner's tag, trade</b>
Engelgård	I11	ins86			<b>owner's tag, trade</b>
		ins40	Benedikt, Margrét(a)	cross	christian, incantation, magic, not interpretable, quote
		ins105			<b>owner's tag, trade</b>
		ins179	Andreas/Andrés, Johannes, Klémetr, Lafranz, María, Michael/Mikiáll, Nikulás/Nikolás, Ólafr, Pétr, Thomás		amulet, christian, incantation, magic
	L12	<b>ins173</b>		walrus skull	
	K09	ins232		lite kne	bad, love
	K10	ins234			balance sheet, trade
	L09	ins150			<b>owner's tag, trade</b>
	L10	ins158			<b>owner's tag, PN, trade</b>
	M10	ins231		toy boat	
		ins566		runestone	
		ins76			<b>owner's tag, trade</b>



House row	Unit	Inscription	Idionyms	Object	Text tag
	I09	ins142			owner's tag, trade
	I10	ins16	Vilhelmus/Vilhjálmr		amulet, christian, incantation, magic, prayer, quote, religious, teaching, writing exercise
Gullskoen		ins71			owner's tag, PN, trade
	H05	ins154			owner's tag, trade
	I05	ins145			owner's tag, trade
		ins34	Christus, Gabriel, Jesus, María, Michael/Mikiáll, Raphael		incantation, list, magic
		ins448			poetry
		ins458	Ran		poetry
		ins50			comment, trade
K04		ins131			owner's tag, trade
		ins149			owner's tag, trade
		ins93			owner's tag, trade
K05		ins1	Philomena, Tereus		learned, love, poetry, quote, references
		ins25	Christus		christian, liturgy, prayer
		ins331			bad, learned, list, love, mnemonic device, poetry, quote
L05		ins335	Ímí		
		ins328	Constantinus, Di-		
		ins35	onysius, Johannes, Malchus, Maximianus, Serapion	nail or bløyg	bad, incantation, magic, poetry
M06		ins141			
O04		ins56			owner's tag, PN, trade følgeseddel, letter, unfinished

House row	Unit	Inscription	Idionyms	Object	Text tag
	O05	ins470			sex
	P05	ins90			owner's tag, trade
	Q03	ins548	Ása, Grímnir, Ygg-jar/Yggr		love, poetry

Table H.13. List of object classifications, including **idionyms** marked invocation and text tags dating to **period 6**, see Figure H.25. Where no object classification is provided, it is “rune-stick”. Objects dated to more than one **period** in bold-face.

House row	Unit	Inscription	<b>Idionyms</b>	Object	Text tag
Bugården	F11	ins20	María		christian, magic, prayer, quote, religious
		ins32	Christus, Jesus, Johannes, Lukas, María, Markús, Mat(t)heus		ambiguous, christian, incantation
	F12	ins172	María		
	G11	ins107			
Engelgården		<b>ins157</b>			<b>owner's tag, PN, trade</b>
	L12	<b>ins173</b>		walrus skull	<b>owner's tag, PN, trade</b>
	K09	ins5			amulet, incantation, regular
	K10	ins22	María		christian, magic, prayer, quote, religious
		ins29	Christus, Elisabet(h), Johannes, María		amulet, incantation, learned, magic, prayer, quote
	L09	ins19	María		amulet, christian, incantation, magic, prayer, quote, religious, teaching, writing exercise
Søstergården Gullskoen		<b>ins223</b>		part of wooden vessel	<b>owner's tag, trade</b>
	L10	ins117			
		ins220		wooden splinter	
	L07	ins404			letter, period context, unfinished
	H05	ins51			følgeseddel, not interpretable, trade
	K04	ins18	María		amulet, christian, incantation, magic, prayer, quote, religious, teaching, writing exercise

House row	Unit	Inscription	Idionyms	Object	Text tag
		ins320	Óðinn		
		ins440		handle	
K06		ins31	Abed-Nego, Mesak, Sadrak, Tobias		christian, incantation, instruction, magic, regular
K07		ins30	Christus		christian, incantation, magic, quote, regular
M06		ins463			
N05		ins462	María	fløytel, granfløtt	

# Glossary

**alliteration** repetition of the initial letter or sound of a word in a second word/**idionym**. 75, 76

**alphabetic** using an alphabet. 25

**Altbase** **entity type** in the original UMB **DB** storing all information on finds. 158, 159, 171

**alternative hypothesis** hypothesis formulated in opposition to  $H_0$ , usually stating that  $H_0$  is wrong. 91, 92, 350, 351, 354, *see*  $H_0$  & **inferential statistics**

**anthroponym** name given to a human being. 71, 72, 74, *see* **idionym**

**attribute** a particular feature of an object/data item, shared by all **entities** in one **entity type**. 13, 47, 48, 54–56, 58, 60, 62, 64, 66–68, 97, 137, 141, 278, 348, 351, 353

**bibtexkey** refers to the unique **PK** used in .bib-databases to identify a bibliographic reference. 101

**bind-rune** runic ligatures. 29, 30, 40, 41, 64, 67

**Björgvin** medieval name used for Bergen. Within the context of this thesis, its use indicates a reference to the medieval rather than the modern town. 1, 70, 77–81, 83, 97, 112, 114–116, 118–120, 122–124, 126, 130, 131, 133–135, 140, 146–155, 157, 166, 167, 170, 172–174, 177, 178, 180, 182–185, 187, 188, 191, 193, 196–198

**BOOLEAN** 0 or 1, true or false, electronically ON or OFF. 54, 65–68, 97, 102, 104, 137, 168

**bootstrapping** a resampling method during which samples are taken from samples, which are then used for the actual testing. 91

**building phase** building activities taking place during one **period**. 168, 170, 173, 175, 176, 319, 320

**character encoding** in digital systems, characters must be represented numerically. A **character encoding** assigns numbers to characters. Different encoding systems exist. 13, 14, 25, 31, 32, 36, 44, 49, 62, 346, 353, *see* **UTF-8**

**Character Encoding Standard** official guideline, often issued by an association in charge of such norms (e.g. the Unicode consortium) on how a set of characters is to be translated into/represented by means of code. 13, 15, 31–33, 36, 39, 353, 354, *see* **character encoding** & **UTF-8**

**coneval** entity type in the archaeological DB. 166

**confire** JOIN in the archaeological DB, connecting FIRE and CONTEXTS. 168, 169, 171

**conlayer** entity type in the archaeological DB. 165, 168, 318

**conphase** JOIN in the archaeological DB, connecting PHASES and CONTEXTS. 168, 169, 173

**construc** JOIN in the archaeological DB, connecting STRUCTURES and CONTEXTS. 161, 162, 165, 316

**contexts** entity type in the archaeological DB. 161–163, 165, 168, 171, 347

**conunit** JOIN in the archaeological DB, connecting EXCAVUNIT and CONTEXTS. 163, 165, 178, 318

**core database** the absolute minimum of tables required to properly model runological data within this thesis. 2, 97, 107, 199, 350–352, *see* TAKERUN

**.csv** Comma Separated Values, files that contain database fields separated by commas. 13, 14

**data normalisation** a feature of an object or conceptual item, stored in fields in DBs. 16–18, 23, 136, 138, 154, 165, 171

**database** structured collection of related, logically coherent data in digital form, usually accessible, curated and maintained via a DBMS. 1–3, 5–11, 13–25, 27, 33, 34, 39, 40, 42, 44, 46–50, 52–60, 62–66, 68, 69, 96, 105, 107, 109, 136, 138, 141, 142, 155, 158–162, 166, 168, 170–172, 174, 196, 198–200, 211, 346–354

**Database Management System** a collection of computer applications/programmes designed to allow users to define, access and interact with the information contained in a DB. Various DBMS based on different principles on managing data are available, e.g. RDBMS. 5, 9, 10, 12, 13, 18, 19, 33, 48, 54, 58, 347, 351, 354, *see* DB

**decimal** column type in SQL-based DBs, meant to store positive or negative decimal values. 162

**descriptive statistics** blanket term for different methods of describing properties of observed data. 90, 349, 351

**deuterotheme** second element in a dithematic name. 75

**DISTINCT** SQL-clause in SELECT-statements used to narrow down result sets to return only rows containing different entries. All entries where the character sequences are copies of each other are dropped.. 61, 108, 160, 251, 319, 321

**dithematic** consisting of two nouns, or one noun and one adjective. 75, 121, 347

**entity** an object, real or conceptual. 7, 15, 47–50, 54–56, 58, 63, 64, 97, 141–143, 146, 153, 155, 346, 349–351

**entity model** theoretical description of how a DB will be constructed; entity modelling is the process by which all **entity types** and the relationships between them are identified. 16, 19, 21, 47–49, 52, 53, 55, 62, 72, 96, 98, 101, 105, 107, 138, 142, 143, 145, 159, 199, 294

**entity type** groups/sets/classes of entities which share common attributes, for example **transliterations**. 6–8, 15–17, 47–50, 52, 53, 55, 56, 58, 59, 62, 64, 68–70, 100–102, 104, 137, 141–143, 145, 158–160, 162, 165, 167, 171, 172, 319, 346–353

**excavunit** **entity type** in the archaeological DB, designed to contain information about the excavation units used during BRM 0000. 159, 160, 162, 347, 352

**fire** **entity type** in the archaeological DB. 167, 168, 347

**font** also called typeface, the delivery mechanism of the font design. 29–37, 39–41, 100, 348

**foreign key** a **primary key** becomes a foreign key once entered in a relation/table other than the original one. Strictly speaking, a **FK** is an **attribute** in a relation/table whose values are functionally dependent on the values in the **PK** of another relation. They serve as link between different relations in **RDBMS**; most often, it is therefore possible for foreign keys to appear several times in another table, except when there is a **1:1-relationship**. 50, 54, 56, 57, 59, 60, 62, 64–66, 68, 69, 96, 101, 140, 143, 168, 171, 278, 348, 349, 351, 354, *see* **PK**

**.gpx** GPS exchange format files, allows for exchange of GPS data between applications/users. 13

**grapheme** minimal unit of a writing system. 25, 348

**grapheme-phoneme relationship** description of how **grapheme** and **phoneme** relate to each other. 42, 44

**Graphical User Interface** graphical application allowing users to interact with computers, for example the desktop environment. ix, 5, 10, 11, 16, 19, 20, 31, 42, 211, 354

**Gullhornet** **font** created by Odd Einar Haugen für the Norwegian runic inscriptions in Older Futhark. 33, 35

**Gullskoen** **font** created by Odd Einar Haugen für the Norwegian runic inscriptions in Younger Futhark. 30, 33, 35, 37, 39

**hypocorism** short/pet form of a name. 73, 79, 81

**idionym** **personal name** (PN), also a table in **TAKERUN**, and a column in said table. 54, 58, 60, 67, 71, 73–97, 100–104, 107–134, 138, 142, 143, 146–155, 168, 171, 173, 176–190, 192–199, 251–257, 259–268, 280, 282, 283, 285–287, 295–314, 319–346, 349–351

**inferential statistics** blanket term for different methods of analysing a population/sample and inferring properties thereof based on the results, which are often gained by testing different  $H_0$ . 89, 90, 349, 350

**inscription** table in **TAKERUN**, also used to describe all sequences of runes on a particular object, whether or not they consist of more than one textual entity. 50, 60, 62–65, 142, 247, 278, 319, 352

**inscriptionnames** entity type in the onomastic research database of **TAKERUN**, storing all character sequences which can be identified as **idionyms**. 97, 99–101, 104, 105, 107, 109, 319, 350

**integer** column type in **SQL**-based **DBs**, meant to store positive or negative integer values. 162

**JOIN** as a table, it prevents **N:M-relationship** in a **RDBMS** by resolving the **N:M-relationship** to two **1:1-relationships** or **1:N-relationships**. As a **SQL**-clause of **SELECT**-statements, it is used to combine data from two or more relations/tables based on the values of (related) attributes (often in the form of **PKs** and **FKs**). **JOIN** must be further defined by **LEFT**, **RIGHT**, **INNER**, **FULL**, each of which triggers a specific kind of joining operation, leading to different result sets. 16, 55, 56, 58–60, 62, 99–101, 108, 140, 162, 168, 169, 171, 319, 347, 349, 350, 352

**Kieler Runendatenbank** runic **DB**, dating to 1995–1999, Section 2.2.3. 10, 15–18, 20–23, 46, 48, 52, 69, 199, 229–231, 354

**Kontekstbase** entity type in the original **UMB DB** storing all information on contexts. 158, 159, 161–163, 165

$\chi^2$ -test tool from **inferential statistics**, used to determine whether there is statistical dependence between two samples, often of quite different sizes. 83, 89–93, 95, 109, 111, 112, 114, 117, 119, 121, 125, 131, 146, 198, 254–256, 268, 314

**many-to-many relationship** describes relationships in which more than one entity from one relation relates to more than one entity from another. **N:M-relationships** cannot be directly represented in a **RDBMS** – they have to be represented as two **1:N-relationships** or **1:1-relationships**. 55, 97, 101, 349, 354, *see* **JOIN**

**mean** tool from **descriptive statistics**, employed to determine the average value within a sample. 93–95, 254

**median** tool from **descriptive statistics**, employed to determine the value which cuts off the upper 50% of a sample from the lower 50%. 93–95, 116, 118, 120, 126, 129, 254

**Medieval Nordic Text Archive** online repository of manuscripts written in **OWN** and Latin dating to the Middle Ages. 17, 30, 199, 354

**monothematic** consisting of one noun or adjective. 75



**name transfer** giving a child the full name of a family member without varying any part of it. 75, 76, 81, 85, 94, 114, 130, 197

**namejoin** JOIN table ensuring 1:N-relationships between INSCRIPTIONNAMES and idionym. 101, 102, 104, 105, 319

**normalisation** entity type in the core database of TAKERUN. 1, 9–11, 16, 18, 19, 22, 23, 28, 46, 48, 52, 53, 62, 68, 105, 109, 110, 118, 136, 142, 143, 146, 148, 149, 172, 176, 177, 181, 184–189, 279, 314, 322

**NULL** can be used as a default value in RDBMS to indicate that a cell contains nothing. Cannot be expressed or searched for by using 0, which in most systems is considered a numeral. 63–65, 91, 102, 117, 255, 256, 323

**null hypothesis** hypothesis stating that there is no correlation between two measured observations/phenomena. Inferential statistics provide different testing methods to determine whether  $H_0$  can be accepted or rejected, in which latter case the  $H_1$  is generally accepted as the new working hypothesis. 91–93, 111, 113, 117, 121–123, 125, 346, 349, 351, 354, *see*  $H_1$

**object** entity type in the archaeological DB. 171, 172

**objectclassification** entity type in the archaeological DB. 171, 172

**objectextras** entity type in the archaeological DB. 171–173

**objectidentification** entity type in the archaeological DB. 171, 172

**objectmaterial** entity type in the archaeological DB. 171, 173

**Old West Norse** Language spoken in medieval Scandinavia, also a column designation in TAKERUN. 11, 26, 43, 52, 54, 66, 67, 71–74, 77–83, 102, 104, 110, 114, 130, 133–135, 143, 186, 191, 197, 198, 349, 354, *see* patterning

**one-to-many relationship** describes a relationship where one entity from one entity type relates to one or more items from another group. One of two types of relationship required for the smooth functioning of a RDBMS. 55, 60, 61, 349, 350, 354, *see* 1:1-relationship

**one-to-one relationship** describes a relationship where one entity from one relation (table, often an entity type) relates to one item from another. One of two types of relationship required for the smooth functioning of a RDBMS. 56, 348–350, 354, *see* 1:N-relationship

**onomastics** the study of names and naming. 71, 81

**operating system** underlying system software managing hardware and software in a computer and providing services to users; well-known examples are Microsoft Windows or Ubuntu Linux. 10, 17, 353, 354

**owner's tag** wooden object, often in the form of an arrow or with a hole, by which means it could be fastened to wares of different types. 120, 132, 135, 136, 138–140, 147–152, 171, 174, 176, 179, 180, 182, 185–187, 189, 193, 285–287, 335–344

**patterning** **entity type** in the **core database**, in which scholarly considerations of a transrunic-ation/transliteration are stored. 52–54, 60, 62, 66–68, 96, 97, 99, 101, 107, 137, 142–144, 146, 199, 251, 280, *see* **TAKERUN**

**period** time span between two fires/fire layers. 158, 166–170, 173–190, 193–198, 295–314, 317–323, 326–329, 332, 333, 335–337, 339, 341, 344, 346

**personal name** also referred to as “given/Christian/first name” or **idionym**, generally designates the unique identifier of a human being used in interaction. 71–73, 75, 77, 82, 86, 89, 96, 97, 102, 109, 110, 117, 119, 128, 131, 138, 147, 148, 150–152, 177, 180, 194, 196, 198, 252, 285–287, 320, 337–342, 344, 348, 354, *see* **anthroponym**

**phases** **entity type** in the archaeological **DB**. 168, 170, 319, 347, 352

**phoneme** a minimal unit of speech carrying meaning, speech sound. 25, 26, 42, 43, 348

**phonemic** using the distinctive speech elements of a language. 25

**primary key** an **attribute** or combination of attributes whose values uniquely identify each record (**entity**) in a relation/table. 11, 13–17, 50, 54–60, 63–65, 69, 96, 100–102, 104, 108, 137, 143, 144, 146, 159–162, 167, 168, 171, 346, 348, 349, 354, *see* **FK**

**probability value** used to determine how likely test results are to occur provided  $H_0$  is correct and the sample is chosen well, the result therefore statistically significant. Common thresholds for  $p$  are 1% (.01) or 5% (.05). Test results below the chosen threshold confirm  $H_0$ , results above  $p$  confirm  $H_1$ . 90–93, 121, 257, 268–277, 354

**quartile** tool from **descriptive statistics**, employed to split a list of items up into four equal parts (25%, 50%, 75%, 100% of all items). 94–96, 115–126, 129, 131, 150, 182, 192, 197, 254, 268–277, *see* **median**

**R for statistical computing** computer application developed for statistics. 92, 354

**Relational Database Management System** data represented in a collection of relations which resemble tables. The relational model has a more formal mathematical foundation than other models. 4, 5, 7, 8, 10, 14, 16, 17, 21, 24, 44, 46–48, 50, 53–56, 58, 60–64, 68, 71, 96, 97, 105, 107, 109, 130, 137, 138, 146, 154, 195, 196, 198, 199, 257, 347–350, 352–354, *see* **DBMS**

**replacement character** A character used to symbolise another, non-displayable character, for example a rune variation not coded in Unicode. Since Unicode version number, a bespoke replacement character exists at code point U+FFFD. 100, 353, 354

**research database** additional sections building on the **core database** in order to answer specific research questions. 2, 58, 96, 97, 102, 104–107, 141, 143, 146, 166, 172, 199, 349, 352

**.rtf** Rich Text Files, files containing formatted text (like bold, italic, underlined, colours). 13

**Runer fra Bryggen** runic **DB** specifically focused on the Bergen inscriptions, dating to 1993, Section 2.2.4. 10, 18–23, 25, 46, 199, 355

**Runor** online platform based on the new relational version of **SRDB**. 14–17, 50, 199

**Samnordisk Runtextdatabas** first runic **DB**, dating to 1987/1993, Section 2.2.1. ix, 7, 10–19, 21–23, 29, 46, 48, 49, 52, 62, 67, 96, 146, 199, 352, 355

**sequences** **JOIN**-entity type in **TAKERUN**. 60, 99–101, 104

**.shp** Shapefile, file type used in GIS or digital design applications. 13

**strucphase** **JOIN** in the archaeological **DB**, connecting **STRUCTURES** and **PHASES**. 170

**Structured Query Language** computer language used to define and manipulate data and structures in **RDBMS**. 7, 54, 58, 60, 69, 91, 100, 174, 251, 256, 257, 347, 349, 353, 355

**structures** entity type in the archaeological **DB**. 160, 161, 347, 352

**strucunit** **JOIN** in the archaeological **DB**, connecting **STRUCTURES** and **EXCAVUNIT**. 161

**Take Runes** relational **DB** developed over the course of this thesis project, consisting of a **core database** encompassing the most basic and important information required by runologists, and additional **research databases**. 2, 62, 67, 69, 96, 104, 105, 107, 109, 133, 137, 138, 141–143, 146, 153, 154, 159, 167, 171, 172, 194, 198, 199, 212–228, 247, 248, 254, 256, 294, 347–353, 355

**tally stick** wooden stick used to help keep count of items by carving notches. 179, 180, 193, 336, 341

**texts** entity type in **TAKERUN** representing the shift from **inscription** as a physical entity in the form of one object to the abstract entity of a coherent, meaningful text. 140, 142, 143, 146, 153, 352

**texttags** **JOIN**-table in **TAKERUN** connecting **TEXTS** to **TTAGS**. 140–142, 278

**toponym** place name. 71, 72, 82

**transliteration** table in **TAKERUN**, but also result of turning runes into Latin letters. 1, 6, 9–11, 16, 18, 19, 22, 23, 28, 29, 35, 39, 42–44, 46, 48, 52, 53, 56, 60, 62, 65–69, 97, 99, 100, 104, 105, 107, 142, 143, 146, 154, 159, 172, 278, 348, 351

**transrunification** process of transcribing runes as observed on an item into normalised runes, either manually or using a computer. Also a table in **TAKERUN**. 1, 9, 10, 18, 28–30, 36, 40–44, 46, 50, 52, 53, 55, 56, 62, 64–69, 97, 99, 154, 353, *see* **core database**

**ttags** **entity type** in **TAKERUN** storing all labels referring to the type, content, purpose, carver and situational context of a text. 137, 138, 140, 143, 278, 283, 352

**.txt** files storing unformatted generic text contents. 13

**UNION** **SQL**-command used to combine the results of two queries into one result sets; the number of columns and their field types must match up for this to work.. 144, 280

**unirunes** table in **TAKERUN** containing **transrunifications** using a bespoke **CES**. 50, 64, 65, 68, 142, 143

**UTF-8** **character encoding** issued by the Unicode consortium using 1–4 8-bit bytes to encode a total of 1,112,064 characters. Default **character encoding** on most Linux **OS**. 13, 31, 33

**Vagantenlyrik** poetry/songs written by and popular with students and scholars at medieval European universities.. 132–134, 136

**varchar** column type in **SQL**-based **DBs**, meant to store characters of any sort. 162

**variation** using parts of family members' names to create a new name for a child. 75, 76, *see* **dithematic**

**VIEW** virtual table with rows and columns based on the result-set of an **SQL**-statement. 108, 147, 174, 256, 257, 281, 316–319, 321, 324

**Wenderune** a rune turned upside-down or right-to-left compared to its “ideal” orientation. 30, 34, 37, 41, 42, 44, 45

**WHERE** **SQL**-command/query modifier used to narrow down search results based on **attribute** values. 60, 61, 109, 194, 251, 252, 254, 255, 279, 282, 316, 319–321, 323

**wildcard** system-dependant character used as a **RC** in cases where the **DB**-user is uncertain of the actual character in this position. Commonly used wildcard characters in **RDBMS** are **\_**, **%** or **\***. 12, 19, 60, 61, 319, 321

# Acronyms

**1:1-relationship** one-to-one relationship.

**1:N-relationship** one-to-many relationship.

**CES** Character Encoding Standard.

**DB** database.

**DBMS** Database Management System.

**FK** foreign key.

**GUI** Graphical User Interface.

**H<sub>0</sub>** null hypothesis.

**H<sub>1</sub>** alternative hypothesis.

**KDB** Kieler Runendatenbank.

**MENOTA** Medieval Nordic Text Archive.

**N:M-relationship** many-to-many relationship.

**OS** operating system.

**OWN** Old West Norse.

**p-value** probability value.

**PK** primary key.

**PN** personal name.

**R** R for statistical computing.

**RC** replacement character.

**RDBMS** Relational Database Management System.

**RFB** Runer fra Bryggen.

**SQL** Structured Query Language.

**SRDB** Samnordisk Runtexdatabas.

**TAKERUN** Take Runes.