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How do we perceive autistic individuals in a non-social context?

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Abstract

This thesis aimed to investigate how autistic individuals are perceived by non-autistic individuals in the absence of a social context. An experimental paradigm was developed and piloted in order to test retrodictive mindreading (Chapter 2). The paradigm had a target phase, in which behavioural stimuli were created (in a non-social context), and a perceiver phase, in which judgments were made regarding the behavioural stimuli. Findings suggested that people do emit observable behavioural signals, while recalling their memories in response to cue words. The same paradigm was used in Chapter 3 to investigate differences between autistic and neurotypical targets in measures of readability, social favourability, and expressiveness from neurotypical perceivers. Findings revealed that perceivers were able to make accurate inferences about autistic behaviour and, in some cases, were better at inferring autistic behaviour when compared to the neurotypical behaviour. These findings were consistent in perceivers of different age groups. Autistic targets were also judged to be more expressive than the neurotypicals. However, in terms of social favourability ratings, autistic individuals were less liked than the neurotypical individuals by perceivers from three age groups: 10-12 years, adults and older adults. No evidence was found that autistic individuals were less liked by children aged between four to nine years. In Chapter 4, two studies were carried out to investigate a range of aspects of the written narratives of autistic and neurotypical targets while writing about emotional experiences. While the first study focused only on the numbers of words used of different types, the second study aimed to investigate more holistic differences in the quality of autistic and neurotypical writings. Findings suggested that autistic individuals' narratives have many similarities but also some differences from neurotypical individuals' narratives in the quality and the structural aspects of writing. Autistic individuals even seemed to be better on some of the measures. In Chapter

5, the study aimed to investigate whether people can correctly guess autism diagnosis from watching brief samples of behaviour or from reading narratives that describe their emotional experiences. The study also looked at the effect of diagnostic disclosure on social favourability ratings. Findings indicated that although perceivers tended to judge that targets are neurotypical as opposed to autistic, nevertheless to some extent autistic individuals can be distinguished based on their behaviours and also from written excerpts that describe their life experiences. Furthermore, when informed that some targets were autistic, perceivers rated all targets to be less likeable compared to the condition when no diagnostic was used. This suggested that people seem to have a negative (implicit) attitude or stigma towards autistic individuals that influences their judgments. In conclusion, this work suggests people may not find it difficult to accurately perceive autistic individuals when a social context is not involved and using text as a means of communication with the non-autistic individuals may protect autistic individuals from being affected by the negative perceptions of the non-autistic individuals.

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Chapter 1: Autism

1.1 Definition & History

The very first-time autism was regarded as a distinct condition separate from other mental disorders was in the early twentieth century. In the year 1912, Paul Eugen Bleuler, a Swiss psychiatrist was the first person to come up with the word 'autism' which he derived from the Greek word 'autos' which means self. Bleuler described autism as those who were suffering from severe symptoms of schizophrenia, an illness also defined by him. The symptoms included experiencing fantasies and hallucinations by people who are not happy with their current realities of life in which the experiences of hallucinations and fantasies act as an avoidance mechanism to fulfil their wishes. Autism was defined as a person having an 'inner life' that is not seen by others around them (Bleuler, 2010). This definition was used by mental health professionals until child psychology was established as a science in the 1960s (Evans, 2013).

In 1938, Hans Asperger used Bleuler's terminology "autistic" to describe child psychology. He observed four boys who did not mingle with their peers to socialise and did not seem to have esteem for authority of adults. He also reported that the boys were not able to make sense of the words such as 'respect' and 'polite' and they displayed strange stereotypic movement and behaviours. He described the four boys as having "autistic psychopathy", which was later known as Asperger's Syndrome (Asperger, 1944). In 1943, without having the knowledge of Hans Asperger's report, Leo Kanner also used the word 'autism' to describe the behaviours of the children he observed. He wrote reports based on eight boys and three girls describing them as having "an innate inability to form the usual, biologically provided affective contact with people" (Kanner, 1943). He termed this condition as 'infantile autism'. This is the time when the term autism was used to describe the

exact opposite condition to what it was defined by Bleuler. Autism was now defined as a person who had a deficiency in fantasy rather than having excess of it (Rutter, 1972). The two psychologists, Hans Asperger and Leo Kanner are believed to be the first people who described autism in its modern definition.

In 1979, Wing and Gould introduced the notion of a 'triad of impairments.' They carried out a large epidemiological study of children below the age of 15 years who experienced difficulties in communication/imagination and social interaction, language anomalies, and repetitive, restricted stereotypical behaviours (Wing & Gould, 1979). The first triad, social interaction, involved aspects of body language, being aware of social norms, being aware of others' feelings, being able to imitate others. The second triad, communication/imagination involved aspects of non-verbal communication, understanding and use of language, imagination. The third triad, repetitive/restricted behaviour, involved maintenance of sameness, stereotyped movements. The current Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has also adopted this notion of triad of impairments except that it considers atypical language development as a co-occurring condition (American Psychiatric Association, 2013). Autism is currently defined as a spectrum of disorders ranging from mild to severe hence the DSM uses the term Autism Spectrum Disorders (ASD). However, this thesis will use terms such as 'autistic' or 'autism' as this how the majority of the autistic community prefer to call themselves (Botha et al. 2021).

1.2 Prevalence & Demographics

The World Health Organisation (WHO, 2021) estimates that one in 160 children are diagnosed with autism world-wide with some studies reporting an even higher number (see review of Chiarotti & Venerosi, 2020). Autism is also reported to be more prevalent in males than females by a ratio of 3:1 (Loomes et al. 2017). According to Fombonne (2020), the

estimated overall prevalence has increased in the last twenty years, for example, for countries such as Australia (Randall et al. 2016), Canada (Ouellette-Kuntz et al. 2014), Oman (Al-Mendalawi, 2020), USA (Chiarotti & Venerosi, 2020), Sweden (Idring et al. 2015), and Italy (Narzisi et al. 2018). According to Roman-Urrestarazu et al. (2021), an increase in autism prevalence may likely be associated with better recognition and awareness of autistic features by parents as well as schools. However, little is known about its prevalence in middle and low-income countries.

1.3 Clinical features & Diagnosis

Features of autism can usually be detected in the first three years of life (Levy et al. 2009; Szpir, 2006). The core autistic features can be distinguished from the secondary autistic features (American Psychiatric Association, 2013). The core features are those related to the triad of impairments identified by Wing and Gould (1979) which include difficulties associated with social interactions, communication and having repetitive stereotypical behaviours. Meanwhile, the secondary features include destructive behaviours such as self-harm, aggression, hyperactivity and also other psychiatric disorders, such as anxiety and major depressive disorder that may co-occur with autism (Dosreis et al. 2006; Kaat et al. 2013; Kim et al. 2011). Moreover, problems in language and hyperactive behaviour are more apparent during the early years of life but as autistic individuals grow older difficulties in social relationships and mood regulations are more apparent (Nazeer & Ghaziuddin, 2012). As they move into adulthood, a minority of autistic individuals, may experience catatonic behaviour, which is an abnormality in movement and behaviour (Stoppelbein et al. 2006; Wing & Shah, 2000).

Another common (but not core) feature present in autism is alexithymia (Kinnaird et al. 2019) which has a prevalence rate of 55% (Milosavljevic et al. 2016) in the autistic

population. Alexithymia refers to the difficulties in identifying, differentiating and expressing one's own emotions (Sifneos, 1973), and is suggested to be predictive of the difficulties autistic individuals experience with emotion processing (Cook et al. 2013). Individuals that have both autism and alexithymia tend to experience higher levels of anxiety and emotional difficulties when compared to individuals that have autism without alexithymia (Milosavljevic et al. 2016).

Several tools have been developed in order to screen for or diagnose autism based on the behavioural features. The most commonly used assessment tool is the Autism Diagnostic Observation Schedule (ADOS) (Akshoomoff et al. 2006). The ADOS is a standardised method to assess the social and communication difficulties faced by autistic individuals (Akshoomoff et al. 2006; Lord et al. 2000). Individuals assessed by ADOS are given imaginative and social tasks and are then observed by the assessor who records their behaviour during the task (Lord et al. 2000). Different modules can be used with differing tasks dependent on the individual's age and level of language ability, ranging from toddler to adult. The ADOS tool is frequently combined with the Autism Diagnostic Interview-Revised (ADI-R) which involves the parents of the autistic individuals. The parents go through a semi-structured interview in which aspects of language, social, behavioural and cognitive functions of the autistic individuals are being assessed (Akshoomoff et al. 2006; Hu & Steinberg, 2009). The ADOS and ADI-R have been successful in identifying autism and are considered the most useful diagnostic support for autistic individuals (Falkmer et al. 2013; Fusar-Poli et al. 2017).

CARS (Childhood Autism Rating Scale) is another assessment tool used to identify autistic features in children (Chlebowski et al. 2010). Not only has this tool been helpful in differentiating autism from developmental disorders such as intellectual disability and pervasive developmental disorder – not otherwise specified (PDD-NOS) (Chlebowski et al.

2010; Geier et al. 2013) but is also able to identify the severity of the difficulties experienced by the autistic individuals (Geier et al. 2013).

Autism is clinically described by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013). According to the manual, the core features of difficulties in social interactions and communication include the presence of difficulties in social-emotional reciprocity, non-verbal communication and problems with developing social relationships (APA, 2013). And the core features of restricted, repetitive behaviours include presence of stereotypical motor movements, fixated interests, strong observance to routines, and hyper or hypo-reactivity to sensory input (APA, 2013).

It is of the utmost importance that autism diagnosis is carried out with prudence because of the non-specific indicators present that vary depending on the individuals' age group and also their abilities in intelligence and verbal spheres. Some of the first non-specific features that are reported when observing infants are sleep and eating problems, inactivity and getting easily irritated (Park et al. 2016). These features precede language developmental delays and also delays in developing social interactions. During the first 12 months, differences between autistic and typically developing (TD) babies are often not evident. However, some studies suggest the behaviour differences such as lack of eye contact, poor response to parents' voices or communication and experiencing extreme temperaments are present in half of the infants that were observed (Park et al. 2016). After the first year of life, autistic infants may display behaviour anomalies in spheres of visual attention, motor control, and social interaction such as imitating others and responding to social environmental cues (Zwaigenbaum et al. 2005). Anomalies in language development have also been reported in infants, with mild delays after the first year and severe delays after the second year (Zwaigenbaum et al. 2005). The core features as defined by the DSM start to manifest in

infants at the age of three years. In early and pre-school years, autism can often be distinguished from other conditions in the psychosocial domains.

1.4 The Medical Model of Autism

Since Leo Kanner and Hans Asperger were both medical doctors, the medical model of autism emerged as the first attempt to understand autism. This model emphasises that the difficulties faced by autistic individuals may be because of their genetic make-up or other biological factors and therefore the problems autistic people experience are located within the individuals themselves. The cognitive theories that have attempted to explain autism take the medical approach (Rajendran & Mitchell, 2007). Historically, there are three core cognitive theories of autism: The Theory of Mind Deficit, Executive Dysfunction and the Weak Central Coherence. These will be described in turn below.

1.4.1 The Theory of Mind Deficit

The theory of mind refers to a person's ability to think about the thoughts, beliefs and feelings of another person in order to guess the other person's behaviour. It is also commonly known as 'mentalising', or 'mindreading'. The Theory of Mind Deficit proposes that autistic individuals are unable (or have great difficulty) to infer mental states of others and also of themselves (Premack & Woodruff, 1978). The mentalising abilities in autistic children were first investigated by Baron-Cohen et al. (1985). They gave children the Sally-Anne task which involved a storyline of two characters: Sally and Anne. In the storyline, Sally has a marble which she keeps in a basket and leaves the room. Anne removes the marble from the basket and places it in a box nearby before leaving the room. Sally returns to the room and at this point the children are asked where Sally will look for her marble (See Figure 1.1).

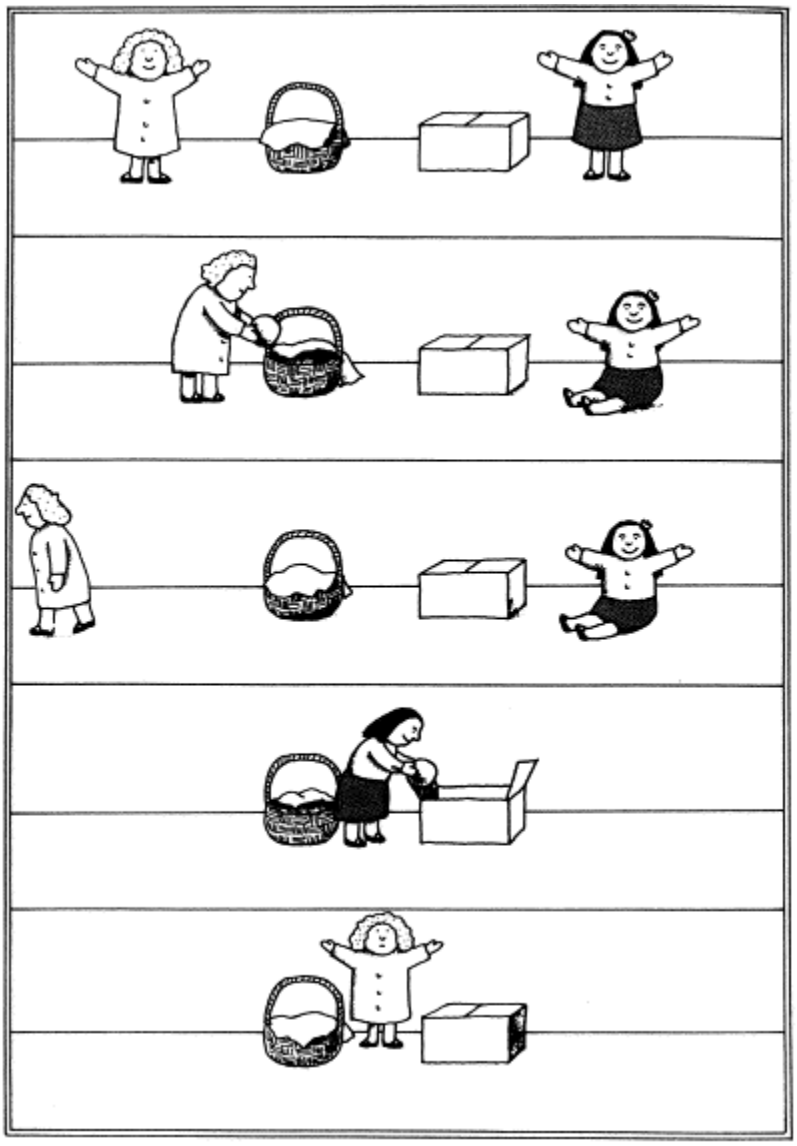

Figure 1.1. The Sally-Anne task (adopted from Frith, 2003)

To make sure that the children understood the storyline, two further questions were asked. They were asked where the marble was first placed (a memory question) and where is its current location (a reality question). To pass the Sally-Anne task, children will have to show that even though they are aware of the current location of the marble (i.e., the box), Sally will look for the marble in the basket as she has a false-belief. Hence in order to pass the task, it is essential to reflect on the mental state of Sally rather than using the child's own knowledge. Results from this study reported that 80% of autistic children were unable to pass the false-belief task, even though their mental age was higher than those in the control group

(non-autistic children and children with Down's Syndrome) suggesting a specific theory of mind deficit in autistic children.

In order to reduce the demands of language skills, Perner et al. (1989) developed a simpler task of false-belief known as the deceptive box task. In this task, instead of a narrative storyline, participants (children) were shown a candy box and were asked to guess what's inside it. After they replied that it contained candies, the experimenter would open the candy box to show that it didn't have candies, but it had pencils inside. The experimenter would then close the box and would ask the child, what they thought another child (who has not seen the contents inside) would think that the candy box contains. Findings revealed that more than 80% of autistic children who were between the ages of three and 13 years were unable to pass this test and instead affirm that the other child will think a pencil is inside the container instead of the candies (See Figure 1.2).

Figure 1.2. An illustration of the candy task (adopted from Happe & Frith, 1999)

The findings from the studies illustrate that, autistic children have difficulties in understanding the concept of false belief. However, it is important to note that findings did not get a 100% fail from the autistic children. Approximately 20% of autistic children who did the task were able to understand the concept of false belief and accurately answered the questions, suggesting that having a theory of mind deficit may not be a universal indicator of autism. At this point, Baron-Cohen (1989) suggested that there might not be a theory of mind deficit in autistic individuals but a presence of a delay in acquiring this ability compared to non-autistic individuals.

To further investigate this issue, advanced measures were developed to test the theory of mind in autistic individuals. One such example is the Strange Stories task developed by Happé (1994). The task consisted of several vignettes describing situations that usually occur in day to day lives and which may include figurative speech. In the Strange Stories task, participants are given vignettes to read and answer questions related to the situation described in the vignette such as why the person in the story behaved the way they did. It was expected to be a challenging task for the autistic individuals as the task required a very good insight into the social context in which the stories were presented. Indeed, findings revealed that autistic individuals were less accurate in the tasks when compared to non- autistic control group. Autistic individuals tended to give different explanations regarding the mental states of the people described in the vignette which was considered inaccurate by the researchers. These findings were replicated in different age groups of autistic individuals, children, adolescents and adults whereby they were observed to perform less accurately than the non-autistic individuals (Jolliffe & Baron-Cohen, 1999; Kaland et al. 2005). Thus, it is suggested that even though autistic people may learn how to pass false-belief tasks, they do not acquire a Theory of Mind equivalent to non-autistic adults.

Another example of an advanced measure of theory of mind task is that developed by Baron-Cohen and colleagues (Baron-Cohen et al. 1997, 2001) known as the 'Reading the Mind in the Eyes' task. Participants in the task were shown a series of static images of the eye region that portray simple and complex mental states (See Figure 1.3 for an illustration). Out of the four choices given, participants were required to select the mental state that they think reflects best on the given image. Findings revealed that autistic individuals were less accurate in judging the correct mental state when compared to the neurotypical control group. The findings suggest that although autistic individuals have the ability to pass the false-belief

task, difficulties emerge when the task is more challenging and the mental states more complex.

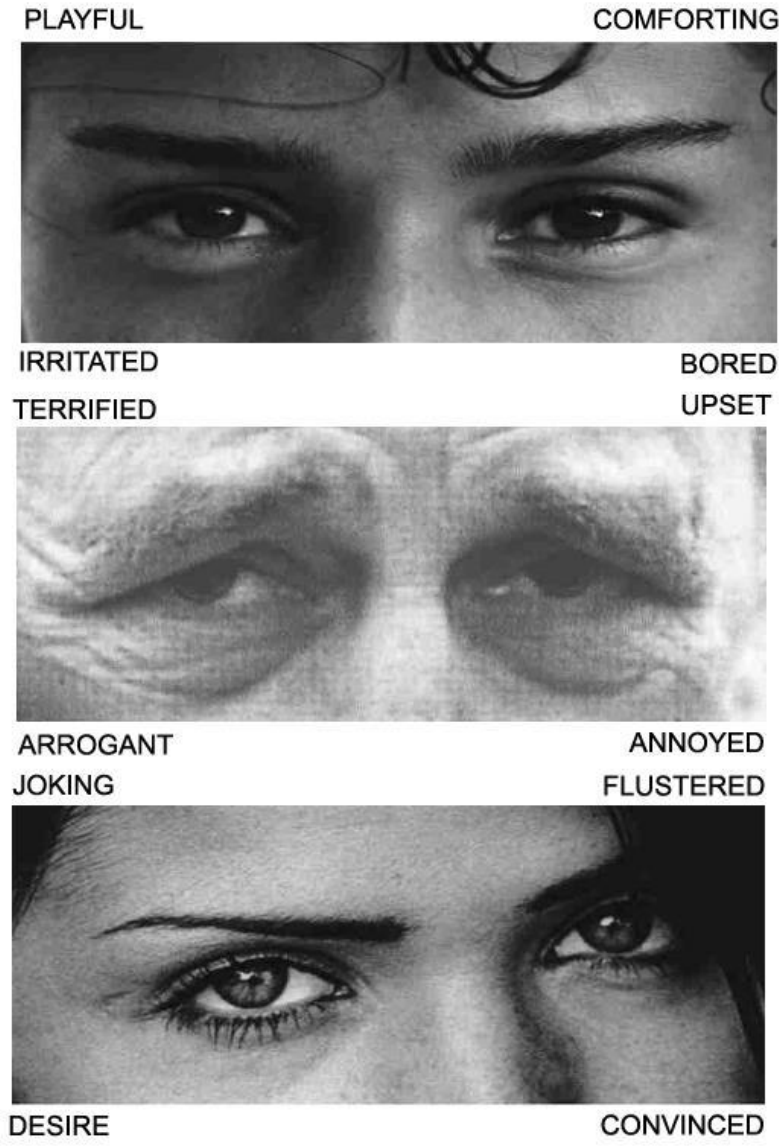

Figure 1.3. A sample of the reading in the minds eye (Adopted from Baron-Cohen et al. 2001)

1.4.2 Executive Dysfunction

This theory was derived from the notion that some symptoms of autism reflected those who have certain brain injuries particularly the Prefrontal Cortex (PFC). According to Ozonoff et al. (1991), executive function is the ability to support functions that help one to achieve future goals. These functions include planning, flexibility of thought and behaviour, controlling impulses, and inhibiting irrelevant information. An example of an executive

function task is the Stroop test (Stroop, 1935). In this test, names of colours appear in colours that are congruent or incongruent to the name (also see Figure 1.4 for illustration) and participants are instructed to focus on only one aspect. If they are told to base answers on colour then they will have to ignore the word and if they are told to focus on the word, they will have to ignore the colour. For example, when the word 'blue' appears in red colour and participants have to ignore the meaning of the word and only respond to its colour. This requires inhibition which is an aspect of executive function.

Figure 1.4. Illustration of Stroop test

Autistic individuals have been reported to perform less well in most of the studies that measure aspects of executive function (e.g., Ozonoff et al. 1991; Pellicano et al. 2006). However, it was observed that the executive function impairments were not found only in autistic individuals but also in other developmental disorders such as Attention Deficit Hyperactivity Disorder (ADHD) and Tourette syndrome (Ozonoff & Jensen, 1999) suggesting that problems in the executive function may not be a specific indicator of autism. Nevertheless, the theory of executive dysfunction may best explain the third core feature of autism which is the presence of restricted, repetitive stereotypical behaviours (Hill, 2004).

1.4.3 Weak Central Coherence

This theory suggests that autistic individuals process information by focusing on the details. In other words, they focus more on the parts than the sum of it (Frith & Happé, 1994).

Neurotypical individuals are more likely to focus on the overall meaning, the sum rather than its parts. An example of a task that measures this ability is the Children's Embedded Figures Test (CEFT) in which children are shown a picture and are asked to identify a small shape in the large drawing (Witkin et al. 1971) (also see Figure 1.5 for illustration).

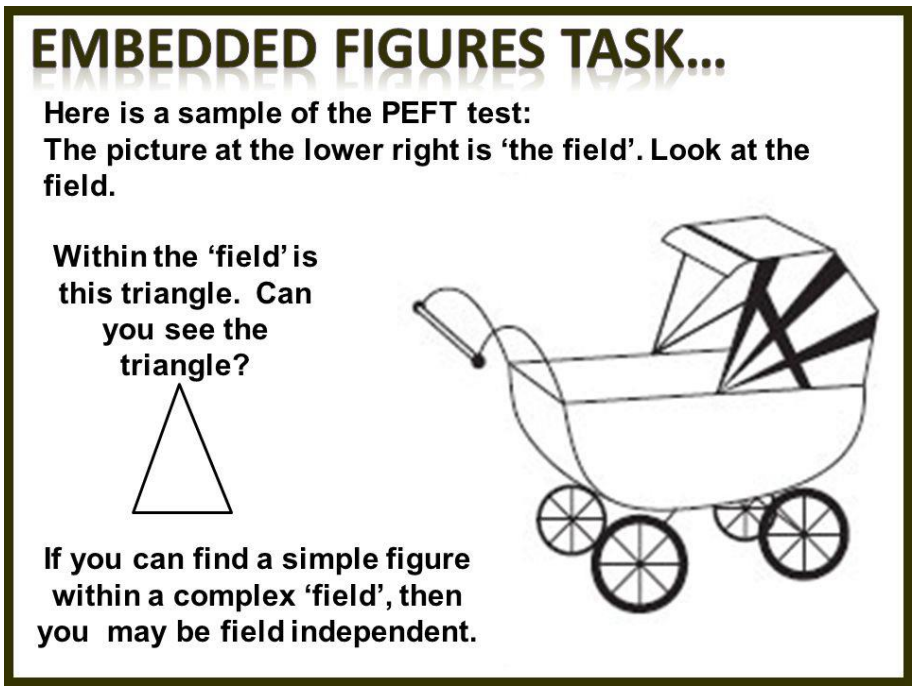

Figure 1.5. Illustration of the CEFT task

According to Happé and Frith (2006) autistic individuals have weak central coherence, whereby they show bias in processing featural and local information which comes at a cost of overlooking the 'big picture' in their daily lives. Autistic children were observed to perform above average in the CEFT task and scored higher than the typically developing children (Shah & Frith, 1983; Witkin et al. 1971). Autistic participants were also reported to perform faster than the neurotypicals in the Block Design test (Shah & Frith, 1993). In the Block Design tests, participants assemble blocks that are painted red and white and that can be put together to form various 2D images. The CEFT and the Block Design test involve figures that are segmented or contain smaller constituent components which do not appear salient to the

neurotypical who have a stronger drive for central coherence. On the other hand, according to Frith (2003;1989), autistic individuals may lack this drive to focus on the global aspects of an image.

Weak Central Coherence has also been reported to apply at a conceptual level. For example, a study conducted by Frith and Snowling (1983), gave participants homographs, which are words that have the same spelling but different meaning and different way of pronunciation. Autistic participants were not able to give accurate pronunciation and arguably, failed to use cues in the preceding sentence that could help them in pronouncing accurately. This finding was replicated in several studies (e.g., Happé, 1997; Jolliffe & Baron-Cohen, 1999; López & Leekam, 2003). This led researchers to conclude that autistic individuals may not be able to read between the lines, and instead, may be reading text without making any connection or association between the words. This further led them to assume that the difficulties faced by autistic individuals in social interactions and communication may be partly explained by the Weak Central Coherence as the social features of autism cannot be explained by WCC. Therefore, it can be said that having WCC may be more of a cognitive style or preference than an actual ability (Happé, 1999).

1.5 What's wrong with the medical account?

The medical model suggests that the issues faced by autistic people are intrinsic to the individual, implying that they are responsible for these difficulties themselves. That is, all the deficit and functional impairments that autistic individuals experience are located within them which then causes the disability (Chown & Beardon, 2017). This model greatly ignores aspects of interpersonal and societal influences that may have a role to play in creating or exacerbating the difficulties faced by autistic individuals.

According to Kapp, (2019), theories that take this approach encourage scientists to use dehumanising rhetoric when explaining autism. For example, the title of the main paper explaining the Theory of Mind Hypothesis (Baron-Cohen et al. 1985), "Does the autistic child have a theory of mind?" was similar to the title of Premack and Woodruff (1978) paper, "Does the chimpanzee have a theory of mind?". Moreover, scientists suggesting that theory of mind ability is one of the key abilities that makes us human (Whiten, 2013) and portraying autistic individuals as lacking empathy and objectifying them as systematic machines (Haslam, 2006), adds to the dehumanising rhetoric towards autistic individuals.

Furthermore, the medical account of autism is a deficit-oriented approach which mostly describes autistic individuals as being full of deficits and pays little attention to the strengths and contributions that autism can bring about (Russell et al. 2019). For example, a study reported differences between autistic and non-autistic laughter, suggesting that autistic individuals laughed only genuinely while the non-autistic individuals laughed genuinely and strategically (Hudenko et al. 2009) which then represented autistic individuals to have a social deficit in this aspect. According to Gross (2011), if laughing out of happiness can be interpreted as a social deficit, this may lead some to consider teaching autistic children to laugh in a fake manner, which according to Gross (2011) is useless and far from being an ethical practice. Another example is the study that found that autistic individuals were less influenced by the presence of an observer when asked to give donations for charity (Izuma et al. 2011). The authors pathologized autistic behaviour due to their apparently not being concerned about their reputation in the presence of others. According to the authors, autistic individuals were not affected by observers due to their impairments in theory of mind abilities. On the other hand, Frith and Frith (2011) argue that the study reveals that autistic individuals are indeed 'transparently trustworthy' and 'free of hypocrisy'. The yearning for good reputation that is reflected in people's altruistic behaviour when they are observed is

also present in selfish behaviour when they are not observed. This may lead to the assumption that autistic individuals will not indulge in cheating even in situations where cheating will be beneficial to them (Frith & Frith, 2011). Therefore, it can be concluded that when autistic individuals behave in a way that is different from the neurotypical behaviour should not, in any way, mean that autistic behaviour is intrinsically bad or that the behaviour originates from some deficit that is caused by their condition. In fact, not only can autistic behaviour be different from neurotypical, it may also, in some instances, be arguably better than neurotypical behaviour.

The medical model views autism as a condition in individuals that is in need of medical treatment or therapeutic intervention in order to 'cure' it and live life as "normal" individuals. Indeed, the prominence of this approach is unsurprising as the individuals who are known to be the first people to describe autism (Kanner & Asperger) were both medical doctors themselves. Moreover, much of the research that is focused on developing medical treatment options such as drugs and cures have been funded by the pharmaceutical industry. Such industries may have a vested interest in considering autism as a 'disease model'. This could make some uneasy at the thought of portraying autism as problem in society that needs a cure and consequently making autism research as a way to get monetary profit (Stevenson, 2015).

However, there is a growing shift away from this approach to a more holistic one that emphasizes the role of the autistic individuals' environment in contributing to the social and communication difficulties faced by them, as described in the following sections.

1.6 The Social-Developmental Account of Autism

Researchers studying typical and atypical development are largely in agreement with the idea that development is a product of influences from both nature (genes) and nurture

(environment)(Karmiloff-Smith, 1998). It has been almost 80 years since autism was first described by Kanner (1943) and researchers continue to investigate it, as the exact nature of the autism condition remains unknown.

According to López (2015) one of the reasons for this could be the fact that autism research has largely focused on the genetic aspect of the condition which regards autism as being a static condition with a stable set of symptoms. Many of the theories of autism that favour the medical approach such as those mentioned earlier focus heavily on the genetic aspect and ignore the interactions that take place between the domains of ability as development occurs. Secondly, even though autism has been described as having difficulties that are social in nature, the medical approach places little emphasis on the social context in which development occurs.

The influence of the social environment in development cannot be ignored. For example, symbolic thought in infants is influenced by the emotional engagement infants have with the attitudes and perspectives of people around them (Hobson, 2002;1993). Children also get influenced by their environments in terms of social and cultural norms and practices to which they are exposed to. The abilities such as those of symbolic play, imitation, and self-awareness which have been considered to be impaired in autistic individuals are said to develop when infants shift from their egocentrism to embracing other people's perspectives of the world which require social engagement (López, 2015). Therefore, the environment, including the social environment, is a crucial factor in the developmental process.

Karmiloff-Smith suggests that the key to understanding developmental disorders is development itself, every aspect of which is dynamic and interactive (Karmiloff-Smith, 1998, 2009a). The very nature of development also suggests the importance of including different age-groups in research in order to understand the dynamics of trajectories in typical and atypical development. Therefore, the social developmental account of autism turns around the

focus and asks how the environment contributes to the difficulties faced by autistic individuals. Thus, the double empathy problem, that will be discussed next, can be considered as branching out of social-developmental account of autism as it focuses less on cognition and more on the ability to connect between people.

1.7 The Double Empathy Problem (DEP)

The double empathy problem is defined as:

"a disjuncture in reciprocity between two differently disposed social actors which becomes more marked the wider the disjuncture in dispositional perceptions of the lifeworld – perceived as a breach in the 'natural attitude' of what constitutes 'social reality' for 'non-autistic spectrum' people and yet an everyday and often traumatic experience for 'autistic people'." (Page 884, Milton, 2012)

In other words, the double empathy problem suggests that when a social interaction between two people is not made effectively, then the problem does not lie with only one person. All those involved in the interaction experience are part of the problem. Such issues can occur wherever individuals bring very different perspectives or world views to an interaction, such as is the case when an autistic person interacts with a non-autistic person. Yet almost all of the research up until this point in time had focused only on the role/difficulties of the autistic person in the interaction and little consideration had been given to the non-autistic person. So, the DEP predicts both that autistic individuals will find it difficult to perceive or empathise with non-autistic individuals, and that non-autistic individuals will find it difficult to perceive or empathise with autistic individuals.

According to Milton (2012), it could be that because most autistic individuals need to survive in societies that follow non-autistic culture and norms (due to non-autistic people being the majority), they may even have better insight into non-autistic ways than non-

autistic people do into autistic behaviours. Hence autistic people might understand non-autistic people better than non-autistic people understand them. Moreover, non-autistic individuals may only need to try and understand autistic perspectives when they have autistic individuals who are closely related socially, and this may further contribute to the double empathy problem.

Chown (2014) further explains, hypothetically, if the majority population (99%) of the world were to be autistic individuals, then the non-autistic individuals, as the minority, will face the same difficulties that autistic individuals experience in the real world. And, just like autistic individuals currently find ways to survive in the non-autistic world (e.g., camouflaging), the non-autistic individuals would need to find ways to survive in the autistic world.

Currently, rather little is known about how autistic individuals are perceived but researchers have begun to look at this question within various contexts and using different methodological approaches to gain further insight in DEP.

1.7.1 How readable are autistic individuals?

There have been several studies that have investigated how autistic individuals are perceived, particularly, by non-autistic individuals whereby most (if not all) of the studies reported that non-autistic individuals were less accurate in reading the mental states of autistic minds and more likely to make incorrect inferences about their behaviour.

One of the earlier studies by Macdonald et al. (1989) found autistic individuals were read differently from non-autistic individuals. The researchers read out short descriptions depicting emotional experiences and then asked 10 autistic and 10 non-autistic target participants to feel the emotions described. They posed for the facial emotional expressions and were photographed. The photographed images were then shown to another group of participants who were asked to identify, from choices given, the expressions targets

portrayed. The results reported that emotions of anger, sad and fear were better recognised in non-autistic individuals, but no differences found in the way neutral and happy expressions were perceived. The findings give support to the DEP in that non-autistic individuals faced difficulties in understanding and reading autistic minds via their facial expressions - albeit those that are posed in nature.

Loveland et al. (1994) investigated how accurately autistic individuals' expressions are perceived compared to individuals with Down's syndrome. The researchers asked 18 autistic individuals and 24 individuals with Down's syndrome to show how they look if they were happy, angry, sad, surprised and neutral. The participants' expressions were video-recorded and coded by three of the researchers who were first asked to identify, from given choices, what emotion does the expression resemble the most. In a second phase, coders judged whether they observed presence of any 'unusual behaviours' in the recordings. Options for the 'unusual behaviours' (such as bizarre, mechanical), were given to coders to select from. Coders were less accurate in perceiving autistic expressions when compared to Down Syndrome expressions and autistic expressions were perceived to be more bizarre and mechanical than Down Syndrome expressions. The findings suggest that autistic individuals are perceived less accurately and less well not only when compared to neurotypical individuals but also other clinical groups, suggesting the DEP may be particularly apparent when interacting with autistic individuals.

In Brewer et al. (2016), 15 autistic individuals and 12 neurotypicals who were matched for age and IQ were asked to pose the emotions of happiness, sadness, fear, surprise, anger, disgust as they were videoed. The study had three posing conditions. The first was that participants (targets) were asked to pose for the 6 emotions. The second condition known as the communicative condition had targets pick (randomly) cards that had the emotions written on them and pose the expression. For each card picked, researchers guessed the emotion

expressed and feedback was given once task was complete. This ensured that expressions produced in the second condition had a communicative value; so that both groups understand the informative nature of facial expressions. The third condition known as the mirror condition had targets posing for the expressions while watching themselves in a camera which acted as a mirror. This ensured that expressions produced in the third condition matched best with targets internal representation of that emotion. The video recordings were then used to create static stimuli of the posed expressions for each of the three conditions which were shown to another group of participants (perceivers) who were neurotypical and autistic. The perceivers were asked to select from choices given, which best describes each of posed expression they viewed. The results revealed significant differences between the target groups and posing conditions. Neurotypical targets were perceived more accurately in all conditions than the autistic targets by neurotypical and autistic perceivers. And both perceiver groups were more accurate in guessing the expressions in communicative and mirror conditions when compared to the posed condition. The findings suggests that not only neurotypical individuals are less accurate in reading autistic minds, but also autistic individuals have difficulty reading autistic minds. The authors argue that autistic emotional expressions may be atypical and idiosyncratic which is why both autistic and neurotypical individuals struggle with correctly identifying the expressions. However, following on Chown's (2014) explanation of autistic being a minority population, the difficulties both autistic and neurotypical individuals face in recognising autistic expressions could be due to them being less exposed to the autistic population and are more likely to have familiarised themselves with the neurotypical majority.

Volker et al. (2009) carried out a study on autistic and typically developing (TD) children (aged between six and 13 years) who were matched for gender, age, ethnicity, and IQ. The target participants were asked to read descriptions that were aimed to evoke a

particular emotion (e.g., happy, sad, fear, surprise, anger, disgust) and then were also directly asked to 'show' the particular emotion or 'think' of that emotion. The children's facial expressions were photographed and then shown to a group of perceivers. The perceivers were six Psychology students from a university who were not aware of the autism diagnosis of the children. Results revealed little significant differences between autistic and typically developing child targets. Only expressions of sadness were perceived significantly more accurately for TD children. There were no significant differences in how other emotions were perceived. However, for the surprise and disgust expressions, the direction of effects was reported to be opposite to what the researchers had hypothesized. Although results were not significant, there seemed to be a trend of autistic expressions of surprise and disgust to be more accurately perceived. The authors suggest that expressions of surprise and disgust produce distinctive facial features (e.g., an O shaped mouth for surprise) and perhaps autistic individuals were better able to portray these expressions whereas TD individuals may have been more subtle in expressing them. However, expressions of autistic children were perceived to be significantly odder, which is consistent with MacDonald (1989) findings carried out on adults. This suggests that idiosyncrasies in autistic expression exist from an early age and, according to the authors, could be a possible reason for autistic expressions to be less readable even though the study found significant differences in just one type of facial expression. The findings support DEP in that perceivers differentiated between autistic and neurotypical expressions in terms of oddness which may become a hindrance to social performance. Nevertheless, the authors noted that images used in the study were posed and static and may not reflect facial expressions that are produced in naturalistic context.

Grossman et al. (2013), created four short stories about a person who had adventures with animals in the wild. Each of the short stories had a sentence or a phrase containing happy, sad, fearful and surprise emotion. These stories were acted out by a protagonist who

was video recorded when telling the four stories. Twenty autistic and 18 TD children and adolescent targets between the ages of eight and 19 years were shown the video clips depicting the protagonist. They were then asked to re-tell the same story in an engaging way as they were video and audio recorded. The targets had a written script of the protagonist story, so they didn't need to tell it in their own words. The target video and audio recordings were then edited to extract those parts in which targets spoke the sentence which had the emotion word.

The extracted video and audio clips were then shown to coders who gave judgements about the expressions on three aspects: expressiveness, naturalness/awkwardness and what emotion the expression was depicting (accuracy). Results from the video clips revealed that coders perceived autistic and TD groups as being equally expressive and were also equally accurate in guessing their expressions. However, autistic individuals were perceived to have significantly more awkward expression than the TD individuals. Results from the audio clips revealed that coders perceived autistic individuals more accurately and rated them as more expressive than TD individuals. With regards to the awkwardness ratings for audio recordings, no significant differences were observed although the data showed a trend towards autistic individuals perceived as being more awkward.

Some of the results reported were contrary to what authors had expected and suggested the higher accuracy for autistic group in the audio condition may be related to the higher expressiveness ratings. They also suggested that results can be explained by the nature of the task itself as it was observed that older TD individuals may have felt embarrassed when doing the task and therefore were not keen on being expressive. Autistic individuals, on the other hand, seemed to be fully engaged in the task. The findings also suggest that the awkwardness that was perceived in autistic individuals was related to visual or nonverbal behaviour and had little to do with how autistic individuals verbally communicated. This

could be further explored using natural expressions to elicit expressions rather than re-telling stories.

Faso et al. (2015) had six autistic and six neurotypical targets matched by age, gender, ethnicity and intellectual abilities. There were two conditions in the target phase: posed and evoked. For the posed condition, targets were instructed to pose for expressions of anger, sad, fear and happy at different intensities as they were photographed by the researchers. For the evoked condition, targets had to write emotional autobiographies which were then summarised by the researchers but not paraphrased. So, the summarised versions retained the targets exact words used. The summaries were read out loud to the targets who listened to their own autobiographical accounts and were coached to re-live their experiences which evoked their emotional states in their facial expressions. While their autobiographical accounts were being narrated to them, participants were instructed to concentrate on the emotional experience and not speak as this would restrict the facial expression of emotions (Kohler et al. 2008). Targets were prompted to return to a neutral or non-emotional state once an emotion was evoked. Targets would then proceed to express the next emotion following the same procedure. After every expression, targets were asked how intensely they felt their experiences. Evoked facial expressions were also photographed at different intensities.

Posed and evoked photos were then shown to a group of 42 perceivers who made judgements for every image. Perceivers were asked to guess what emotion targets were depicting, how intensely they were experiencing, and how natural do they perceive the expressions to be. Results revealed that perceivers were significantly more accurate in judging autistic expressions in both posed and evoked conditions which was largely driven by the anger expressions in both conditions. This suggests that perceivers did not demonstrate difficulties in accurately identifying autistic expressions even when the expressions were naturally provoked. The authors explain that the feature of flat affect in autism (Kanner,

1943) may not be a universal or inherent characteristic of autism. Although this is not consistent with previous studies that support DEP, the authors explain that the inconsistency in findings may be due to the differences in the specific characteristics of autistic participants in the study. While previous studies have looked at autistic children or those who had intellectual disability, the participants in the current study were adults who had mild features of autism. Although these findings do not seem to support DEP, as perceivers in this study were not only able to correctly identify autistic expressions but were even better at it, the method used in eliciting emotional expressions may not reflect an actual social interaction. Therefore, it can be said that the DEP may not be prominent in all contexts of social exchanges.

The study also reported that autistic expressions were perceived to be more intense but less natural than neurotypical expressions. While perceivers were correctly able to identify autistic expressions, they misperceived the degree of emotion being felt by the autistic individuals. According to the authors, when a person perceives another as angrier or sadder, it may result in the person giving an inappropriate or a negative response when socially interacting with that individual. Furthermore, autistic expressions were perceived to be less natural than neurotypical expressions, which, according to previous studies, may affect the quality of a social interaction (Halberstadt et al. 2001; Riggio, 1986). This part of finding lends support to the DEP as the differences spotted by perceivers may contribute to the misunderstandings non-autistic individuals have when communicating with autistic individuals.

Sheppard et al. (2015) informed 20 autistic and 20 neurotypical targets that they will have to pose for certain expressions as they were filmed. However, as they entered the experiment room, the researcher acted out one of four scenarios. Targets were either told a joke by the researcher, complimented, told a story about what had occurred earlier during the

day, or they were told to wait as researcher engaged themselves in irrelevant activities. During the scenarios enacted, targets were video recorded surreptitiously in order to get their natural dynamic reactions. The information regarding posing for expressions was only a cover up for the actual aims of the research. The recorded reactions that targets produced from the four scenarios were then edited and shown to another participant group who were instructed to guess what the scenario the targets were experiencing.

The results revealed that autistic targets the perceivers responded to were identified less accurately than neurotypical targets for all scenarios with the exception of the joke scenario in which perceivers identified the scenario equally well for autistic targets and neurotypical targets. Furthermore, the same video clips were presented to another group of perceivers who judged how expressive the targets were when reacting to the scenarios enacted. Autistic targets were perceived to be equally expressive for all scenarios with the exception of the compliment scenario. The findings suggest that non-autistic individuals do face difficulties in understanding the autistic individuals thereby lending support to the DEP. However, findings of expressiveness suggest that context is an important element in determining whether autistic individuals appear to be expressive or not expressive.

Another follow-up study asked a new group of perceivers to describe the reactions of the targets. The verbal descriptions given by the perceivers were transcribed and categorised into descriptions of internal states, overt behaviour, and event. Results from this study revealed perceivers gave significantly more descriptions of internal states for autistic targets' reaction than for the neurotypical reactions. While initially these results seem surprising, perceivers may have found autistic expressions more ambiguous and therefore engaged more in mentalising to try and make sense of them (Jenkins & Mitchell, 2009), compared to when they perceived neurotypical expressions.

Edey et al. (2016) used a perceptual task similar to the Frith-Happé animation task (Heider & Simmel, 1944) and asked six autistic and six non-autistic individuals to use direct hand-held triangular magnets (a large red and a small blue triangle that were placed on a table) to depict mental states of coaxing, mocking, seducing, and surprising. The movements (animation) participants made with the magnets were video-recorded and analysed. Movements of autistic and non-autistic individuals had similar speed, but autistic targets made more jerky movements, which can be explained by peripheral factors such as atypical muscle tone (Maurer & Damasio, 1982) or aspects to do with the central nervous system (Cattaneo et al. 2007).

The recordings of the animation were then shown to autistic and non-autistic perceivers who guessed the mental states being depicted. The results revealed that non-autistic targets were more accurate in guessing the animations made by the non-autistic targets, but this was not the case for the autistic group. Autistic perceivers were equally accurate for animations depicted by autistic and non-autistic targets. Although, autistic individuals did not have the same advantage from observing animations of their own group, they were not less accurate in perceiving non-autistic animation. The authors explain that throughout their lives, most of the autistic individuals will have been exposed to interactions with other neurotypicals and therefore be familiar with their movements as well as their own. However, neurotypical individuals have more likely been exposed to interactions with other neurotypicals who show movements just like themselves. This explanation is similar to that of Chown (2014) who portrayed the autistic and neurotypical individuals as the minority and the majority of the population. If, hypothetically, autistic individuals were the majority of the population then the neurotypicals will be experiencing the same difficulties that autistic individuals experience in the real world.

In summary, the studies on readability suggest that autistic individuals are perceived differently from non-autistic individuals, with most suggesting that autistic individuals are less accurately perceived by non-autistic individuals. The studies that found autistic individuals are more accurately perceived may have to do with the fact that the tasks did not involve a direct social interaction. Instead, they used the posed expressions or used emotional past events in their lives to elicit an inner state. This further emphasises the role of the environmental context in which autistic individuals are perceived. More research is needed to further investigate the effects of the environmental context on mindreading accuracy - in particular, whether autistic people are universally less readable or only in specific types of contexts. Perhaps, moving forward in this manner has the potential to shed more light on the specific nature of autism. We will now move on to explore the double empathy problem in studies looking at social favourability.

1.7.2 How socially favourable are autistic individuals?

Various studies have looked at how favourably autistic individuals are perceived. If autistic individuals are perceived less favourably to others, it may contribute to the social difficulties they experience in their everyday lives.

Stagg et al. (2014) video recorded four autistic and four typically developing children while they were being asked about their family, interests and daily lives. The questions asked were either focused to get a positive or a neutral response from the children. For example, they were asked if their friend had done something to them that made them laugh (positive) or were asked who is in their family (neutral). Although participants were aware that they were being recorded, they did not know that the filming was specifically being done to record their facial expressions. The video clips were then edited and shown to an adult and a child perceiver group. The adult perceivers were asked to rate the video clips on attractiveness and expressivity. The results revealed that autistic targets were perceived to be less attractive and

less expressive than their TD peers. The children perceivers rated the video clips on various measure of friendship, such as, trustworthiness, friendship, helpfulness, play. Specifically, some of the questions asked to the children when showing the video clips were; "Would you tell him/her a secret? Would you want to be friends with him/her? Do you think this person could help you with a maths problem? Would you play with him/her? Results revealed that autistic targets got significantly lower scores on friendship measures than the TD targets suggesting that autistic targets were perceived as less socially favourable. The authors suggest that the lower scores may have to do with the autistic targets being perceived as less expressive. An inexpressive face may not be able to provide the observer information regarding the persons emotional state and the intentions behind their behaviours (Argyle, 1994; Ekman et al. 1987). However, it is also possible that the topics used to discuss in the target phase (such as friends, family) may not have provoked the same inner states in autistic individuals, therefore leading them to being perceived as less expressive.

Sasson et al. (2017) carried out three studies that investigated first impressions and social favourability judgments about autistic individuals. Autistic and neurotypical targets who were matched by age, gender and IQ performed a 60 second mock audition for a reality show which was being video recorded. The recordings were edited to get five types of stimuli: video and audio, video only, audio only, static image, and transcript of the targets' speech content. These stimuli were used to show perceivers who rated them on various measures. Perceivers were asked questions regarding first impressions which were based on attractiveness, awkwardness, intelligence, likeability, trustworthiness, and submissiveness/dominance. Perceivers were also asked questions regarding their intentions to engage with the target, which were their willingness to live near the target, their likelihood of hanging out with the target, their comfort levels when sitting next to the target and the likelihood of starting a conversation with the target. Results from the study revealed that

autistic individuals were perceived significantly less favourable than the neurotypicals when shown all the stimuli types with the exception of the speech transcripts. Moreover, autistic targets were perceived as less favourable for all the rating questions with the exception of question on trustworthiness and intelligence; autistic targets were perceived to be equally trustworthy and equally intelligent.

In the second study, autistic and neurotypical targets were video recorded during a conversation they had with the researcher. The researcher asked open ended questions (such as if they watched any good movies recently) after which all the targets filled in a loneliness scale. The video recordings were used to extract static images of the targets which were then shown to perceivers. The perceivers answered questions on how socially awkward they thought the target is, how approachable the target is, and whether they were willing to be friends with the target. To investigate the stability of the ratings over repeated exposure, perceivers viewed each target 10 times for each question. The results revealed that autistic targets were perceived as less favourable in all the three questions and scored significantly higher than the neurotypical targets on the loneliness scale. Moreover, findings also demonstrated that the ratings did not significantly vary over repeated exposure making them reliable, and perhaps resistant to change.

Similar to Grossman et al. (2013), the third study had autistic and TD adolescents retell stories that had elements of happiness, surprise, fear and anger while they were being video recorded. The video clips were edited and shown to adult and adolescent perceivers who were asked to rate the video clips on five questions. Adult perceivers were asked whether they think the target had a lot of friends, whether the target gets along with others and whether the target spends a lot of time by themselves. They were also asked to rate on target awkwardness and their likelihood to start a conversation with others. Adolescent perceivers were asked three questions: how awkward do they think the target is, whether they

think target gets along with others and whether they think targets spend more time by themselves. Results from the adult perceivers revealed that autistic adolescents were less favourably perceived on all the five questions asked. Results from the adolescent perceivers revealed that autistic adolescents were also less favourably perceived on two of the three questions. The adolescent ratings on awkwardness did not significantly differ between the autistic and TD targets.

Across all the three studies, the results suggest that autistic children and adults are perceived to be less favourable in most of the selected measures of social behaviour. The results were consistent for both dynamic and static stimuli and for both autistic adults and children. Findings were also consistent across the different stimuli types except for the speech content, suggesting the negative first impressions were associated with their presentation style rather the content of the information given. Findings from the different favourability scales suggest that autistic individuals were perceived less favourable in traits associated with social appeal and approach behaviours (e.g., awkwardness, likeability) and not those traits that were associated with competence (intelligence) and character (trustworthiness). Moreover, the findings from repeated exposure of stimuli produced consistent responses suggesting that there are reliable differences in the social presentation of autistic and neurotypical individuals which lead to negative impressions for the autistic population. Findings from study three revealed that negative first impressions exist even if the perceivers were of the same age as the targets (adolescents). This may have an impact in their ability to create social networks and friendships as during this age peer social networks play a crucial role in identity formation, stress management and general well-being (Cotterell, 2013).

The three studies together provide strong evidence that autistic individuals are perceived less favourably than neurotypical individuals. And this may have to do with the social presentation of autistic individuals, in particular, their non-verbal behaviour which

includes prosody, facial expressions and body posture. The negative first impressions formed further contribute to the unwillingness of the perceivers to socially engage with the autistic individuals. This negatively impacts the autistic individuals, which can be seen in their self-reported feelings of loneliness.

Using a similar approach to that of study 1, Sasson and Morrison (2019) further investigated the effect of disclosing diagnostic information to the perceivers. They used the target stimuli developed by Sasson et al. (2017) using the mock audition task and divided the perceiver phase into four versions. The perceivers in the first version were presented with the video clips with no additional information. The second version disclosed the diagnostic information of the targets such that perceivers knew whether each target was autistic or non-autistic. The perceivers in the third version were presented with the video clips with the wrong diagnostic information. That is, some autistic targets were labelled as non-autistic while some non-autistic targets were labelled as autistic. The fourth version had some of the targets mislabelled as being schizophrenic. Perceivers rated the video clips based on the 10 social favourability measures used in Sasson et al. (2017) and also completed an Autism Knowledge Scale (Gillespie-Lynch et al. 2015). The results revealed that autistic targets were rated more favourably when the accurate diagnosis was disclosed when compared to the other three versions. Moreover, those who had higher scores in the autism knowledge scale also tended to give more favourable ratings to autistic targets when correct diagnosis was revealed. In particular, disclosing target diagnosis is most helpful in increasing ratings of likeability, trustworthiness and likelihood of starting a conversation with the target. This suggests that disclosing autism diagnosis might actually help autistic individuals when interacting with non-autistic individuals especially those who are aware of what autism really is. Moreover, the non-autistic targets who were wrongly labelled to be autistic were rated more favourably than when no information was provided regarding diagnosis and when

autistic targets were mislabelled as schizophrenics, they were perceived significantly less favourably than when the autistic targets were accurately diagnosed. This seems to indicate a presence of stigma for schizophrenic individuals which autistic targets do not experience even though both groups display similar social behaviours such as having occupational challenges (Marwaha & Johnson, 2004; Taylor et al. 2015) and experiencing interpersonal difficulties (Horan et al. 2006; Howlin et al. 2004). However, it is important to note that even though disclosing diagnosis had a positive impact on favourability ratings, autistic targets were still perceived less favourable than neurotypical targets indicating a clear preference for neurotypical targets. The authors suggest that increasing autism knowledge in non-autistic individuals may greatly impact the way autistic targets are perceived socially, were they to disclose their diagnosis.

To investigate if there is an association between readability and social favourability, Alkhaldi et al. (2019) used target videos of autistic and neurotypical individuals that were created by Sheppard et al. (2016) and showed them to a group of non-autistic perceivers. The video clips were recordings of target reactions to four scenarios (as explained in 1.7.1). The perceivers were asked to rate the video clips based on seven social favourability measures adapted from Sasson et al. (2017) with an additional two questions which were on targets' self-esteem and empathic ability. Perceivers were not aware of target diagnosis nor were they aware of what the targets were reacting to while they were doing the task. Like Sasson et al. (2017), the results suggested that autistic targets were perceived less socially favourable than the neurotypicals in story, joke, and compliment scenarios but were perceived equally negatively in the waiting scenario. This suggests that target behaviour had an influence in the way perceivers rated them and their behaviour was as a result of the scenario created for them. It also suggests that autistic individuals are not always perceived to be less socially favourable than non-autistic individuals. Furthermore, results revealed that readability

positively correlated with social favourability for the story, joke and compliment scenario. This association was also present when the diagnostic status of the target was controlled for.

In a follow up study, non-autistic perceivers watched target video clips while knowing what scenarios the targets were reacting to. This was to investigate whether knowledge of the context to which the reaction takes place has an effect on how favourably they are perceived. The results revealed that autistic individuals were perceived less socially favourable than non-autistic individuals across all the four scenarios. Moreover, in the waiting scenario, although still negatively rated, non-autistic targets were perceived more positively than the autistic individuals. This suggests that disclosing contextual information only benefitted the non-autistic targets. Furthermore, similar to the results in study 1, there was a significant association between readability and social favourability even when the diagnostic status was controlled for. This suggests that contextual information has no effect on the association between the two variables.

The association between readability and social favourability, according to the authors, could be explained in various ways. One possibility is that differences in readability *cause* differences in social favourability. The reward explanation suggests that when an individual engages in a social interaction in which the individual understands the other well, a reward association is formed with the other that produces greater feelings of interpersonal attraction towards the other. This explanation is supported by Anders et al. (2016) study which found a significant association between perceivers' attraction towards targets and their self-reported confidence levels of their accuracy in judging the targets emotions. Therefore, it can be said that individuals who are less readable have lower reward value and will be consequently less liked. Alternatively, the trait explanation suggests that an individual's personality traits may be linked to how readable they are. An individual who is easy to read may be regarded as

more transparent and therefore more likely to be predictable, trusted, and understood. Whereas if a person is difficult to read then it would be the other way round.

On the other hand, it could be that differences in social favourability *cause* differences in readability. Since motivation has been seen to play a role in accurately understanding other minds (Thomas & Maio, 2008), it might be that perceivers who judged individuals negatively may not be motivated to further understand the individuals' intentions and behaviours and therefore making individuals less readable. Finally, perhaps, the relationship between readability and social favourability may not be one way but two-ways whereby readability and social favourability are influenced by each other (Alkhaldi et al. 2019). Alkhaldi et al. (2021) further investigated the relationship between how socially favourable autistic individuals are perceived and how much are they liked or disliked. Using the target video clips of scenario reactions developed by Sheppard et al. (2016), the researchers asked perceivers whether they liked or disliked the target. The perceivers then rated the video clips on the nine dimensions of social favourability (Alkhaldi et al. 2019) and were asked an additional question in which they had to indicate which of the nine dimensions were most influential in determining whether they liked or disliked a target. The results revealed that autistic targets received fewer likes than neurotypical targets in the compliment, joke, and story scenarios. Autistic and neurotypical targets were equally liked in the waiting scenario. The results also revealed a significantly high correlation between likeability and social favourability. Those who had higher social favourability ratings were more likely to be liked. This suggests that asking a likeability question may be adequate to determine people's first impressions of autistic and non-autistic individuals. It also suggests that lower social favourability of a person implies that this person is disliked which could therefore result in particularly harmful social outcomes such as social exclusion. Furthermore, out of the 9 dimensions of social favourability, perceivers were more likely to choose dimensions of

awkwardness, likelihood to start a conversation, likeability, and targets' perceived ability to empathize. This suggests that the perceivers considered these traits to be significant when deciding to like or dislike a person. Although further research is needed into investigating why these dimensions were chosen instead of others, this study gives considerable insight into the type of traits in an individual that are associated with them being liked or disliked.

In conclusion the studies presented on social favourability clearly suggest that autistic individuals are perceived less favourably than neurotypicals, at least by neurotypical others. The difficulties autistic individuals face during social interactions may not be due to an individual impairment but also a relational one. Therefore, it is important to consider both the role of the individual and society to gain a fuller understanding of the social difficulties experienced by the autistic population. Negative experiences faced by autistic individuals may result in serious consequences for their development and their mental health.

1.8 Consequences of being misperceived by non-autistic individuals on development and on mental health.

According to Mitchell et al. (2021), when non-autistic individuals misperceive autistic individuals' behaviour, it may affect how they behave towards the autistic individuals. The autistic individuals may then interpret the behaviour and attitudes of others which then impacts how they feel about themselves and in turn, may influence their behaviour. For example, in line with previous studies, non-autistic individuals perceive autistic individuals as less likeable. This perception leads to the non-autistic individuals behaving negatively towards autistic individuals. The autistic individuals then interpret the negativity received from others which leads them to feel negative about themselves (e.g., low esteem, suicidal ideation, etc) which then reflects in their behaviour (see Figure 1.6 for an illustration).

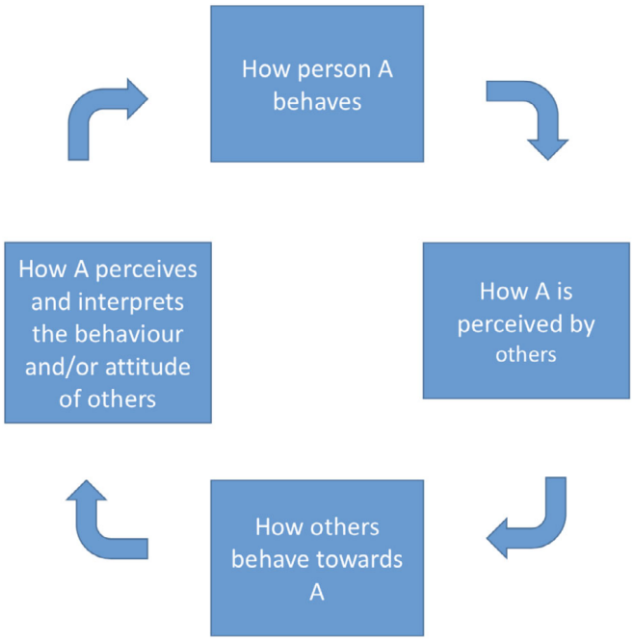

Figure 1.6. Example of the social transactional model of development (Mitchell et al. 2021)

As discussed in the literature, some of the possible reasons that non-autistic individuals might be inclined to perceive autistic individuals as less socially favourable is that, either they find it difficult to understand and interpret their behaviour or they lack empathy and are not motivated enough to understand the perspectives of autistic individuals. This makes it more difficult for autistic individuals and adds to the struggles they face socially in their daily lives. According to Mitchell et al. (2021) this transactional developmental process starts with differences in the way autistic and non-autistic individuals interact socially which then gives rise to two independent groups of people with contrasting styles of social interaction and who have difficulty understanding and empathising with each other. This might be especially true for non-autistic individuals who are the majority (Chown, 2014) and do not put in enough effort to understand and empathise with the autistic group. The groups are then deprived of learning from each other's skills and abilities.

Therefore, in order to fit in to the majority neurotypical society, autistic individuals often tend to mask or camouflage their autistic traits in social situations, and this can be exhausting and stressful (Hull et al. 2017). The process of masking can be likened to the process of rock formation whereby strategies (such as making eye contact, imitating facial expressions) are used to build the layers of the mask under intense pressure to form what can be considered as the rock face (Pearson & Rose, 2021). This puts autistic individuals (the minority) in a compromised situation which has detrimental consequences on their mental health and well-being. Being negatively perceived is linked to lower level of self-esteem (Henriksen et al. 2017) which, in turn, is linked to suicidality (McGee et al. 2001; Orbach, 2007). Indeed, suicide has been reported as being one of the most common causes of death in the autistic population (Cassidy, 2020), making the risk of dying by suicide higher in this population. Camouflaging in social situations has been observed to be a significant predictor of suicidal thoughts and behaviours (Cassidy et al. 2018).

As can be seen, the consequences of being misperceived by non-autistic individuals are grave which is why a lot of attention needs to be given to exploring this phenomenon further. The double empathy problem which takes on a social developmental approach needs to be further investigated in order to progress towards a holistic understanding of the nature and dynamics of autism. Research should aim to reduce the gap that exists between autistic and non-autistic in their interaction and understanding.

So far, research has provided some evidence in support of the DEP. However, it is not known whether this problem is present in all contexts or in only certain kinds of context, especially in the case where autistic individuals describe or think about their own experiences (e.g., Faso et al. 2015). Therefore, a sensible future research direction will be to investigate the content in which autistic people are perceived, and how this impacts on both measures of readability and social favourability. Furthermore, it is not known whether DEP exists when

autistic individuals engage in behaviour in the absence of a social context. Further exploring in this direction may be helpful in understanding the extent of the double empathy problem or possible ways to lessen it.

1.9 Aims of the thesis.

The overall aim of the research described in this thesis was to further our understanding of how autistic individuals are perceived by the non-autistic population when thinking and writing about their emotional experiences. This was conducted by using a new experimental paradigm and a different environmental context. As can be seen from the literature, past studies have investigated the DEP in a social context. Therefore, one of the aims of the research was to create an experimental paradigm that investigates the DEP in the absence of a social context. The absence of a social context refers to an environment which does not have a presence of any kind of human interaction. In this case, no person was present with the participant during the task. This was conducted in order to investigate whether autistic individuals produce readable signals in the presence and in the absence of a social context. If it is the case that the signals produced are difficult to perceive only in a social context then it might be that these signals are secondary to a state provoked by the social context. For instance, it could be the case that social anxiety that may be provoked by the social situation which could, in turn, make autistic people's behaviour difficult for non-autistic others to read.

The paradigm created was first piloted (Chapter 2) and consisted of a target phase and a perceiver phase. One of the aims of the target phase was to capture dynamic, natural and spontaneous samples of behaviours that would have more ecological validity. Secondly, it aimed to replicate previous findings (Valanides et al. 2017) that was able to evoke readable cues when people thought about their past emotional experiences. The pilot study was also carried out in order to test the effectiveness of the methodology before using it to investigate

differences in how readable autistic and neurotypical individuals are by the neurotypical individuals.

Chapter 3 used the same paradigm to investigate how autistic individuals were perceived when they were thinking about their emotional experiences in the absence of a social context. As Karmiloff-Smith (1998, 2009) emphasizes the importance of including different age groups in research to understand the dynamic trajectories in development, the study in Chapter 3 included five different age groups; three age-groups in children, adults and the elderly. It aimed to compare how readable autistic individuals were perceived to be by different age groups. Moreover, since previous research found a high association between social favourability ratings and how likeable individuals are perceived to be (Alkhaldi et al. 2021), the study aimed to investigate likeability ratings for autistic and neurotypical individuals in different perceiver age-groups to get an idea of how socially favourable autistic individuals are perceived across different age-groups. It also investigated how expressive the neurotypes were perceived. Finally, the study aimed to look into the relationship of readability, likeability and expressiveness ratings of autistic and neurotypical individuals.

Chapter 4 aimed at investigating how autistic individuals' written emotional experiences are perceived by non-autistic individuals. It compared the content of the past positive and negative emotional experiences that autistic and neurotypical perceivers wrote about. The study used computer software known as the Linguistic Inquiry and Word Count (LIWC) to compare differences between the texts at a structural level (e.g., word count, number of emotional words used, etc). The study also recruited a group of non-autistic perceivers who were asked to judge the overall quality of the autistic and neurotypical written texts when describing their emotional experiences.

Chapter 5 investigated whether non-autistic individuals can accurately guess the diagnosis of autistic targets by looking at brief samples of their behaviour. Although, past studies have

shown that autistic and non-autistic behaviour are systematically differentiated (e.g., Sheppard et al. 2016; Sasson et al. 2017), the study directly asks perceivers whether they think a target is autistic or not based on their behaviour and also based on their emotional narratives. Moreover, as previous research suggests that disclosing autistic diagnosis has had an effect on reducing negative impression towards autistic individuals (Sasson et al. 2017), the study explored the impact on likeability ratings when perceivers were told that some targets were autistic compared to when this information was withheld. This methodology allowed us to measure the impact of diagnostic disclosure under conditions where socially desirable responding would be less apparent.

Chapter 2: Can people guess a person's inner states when they are thinking about past experiences?

2.1 Introduction

The theory of mind or 'mindreading' or 'mentalizing' is the term used to describe the ability to attribute mental states to self and to others. These states are manifested both verbally and non-verbally through emotions, attitudes and perceptions (Goldman, 2013). Mental states are also reflected on people's faces in the form of facial expressions and other aspects of behaviour (Ekman, 2003; Parkinson, 2005) which can be effectively interpreted by people and facilitate communication between individuals (Frith, 2009).

One focus of mindreading research has been to explore how this ability is developed (Premack & Woodruff, 1978) and the cognitive processes (Apperly, 2010) involved in it while another focus has been to create different methodologies that explore how accurate individuals are in mindreading (Ickes, 2009). The current research is an attempt to merge these two focuses (Zaki & Ochsner, 2011), to explore measuring a particular type of mindreading ability which is known as 'retrodictive mindreading' (Gallese & Goldman, 1998; Teoh et al. 2017).

Retrodictive mindreading is the ability to understand others' behaviour through observing their mental states and the incident that led to the mental states. It is a form of mentalising that refers to the notion that when we observe behaviour, we make backwards inferences about its causes which may be either proximal (a mental state) or more distal (an event in the world that triggered the mental state). This can be contrasted with mindreading for purposes of prediction, such as in the classic "Maxi" false belief task (Ferner & Lang, 1999), where the participant is required to make a predictive inference about where a person will look for an object, based on their belief about its location.

In order to measure this ability, the current study uses a technique similar to that devised by Valanides et al. (2017). They surreptitiously recorded people (targets) while they were thinking about positive and negative autobiographical memories. Targets were asked to think about a time when they felt proud, excited, guilty and ashamed. Cue words (for each mental state) were presented sequentially on a screen and targets were simply asked to think of the event while being left entirely alone in the room during the task. The targets were made to believe that it was a memory task and that they would be asked how difficult it was to retrieve the memories for each word upon task completion. The recorded clips of the targets thinking about these different experiences were then shown to another set of participants (perceivers) who guessed what the person is thinking about. Although perceivers were not able to guess the exact inner state, they were able to judge whether a person was thinking about a positive life event or a negative one at above chance levels. Therefore, this provides evidence that targets produce readable signals even in an entirely non-social context. Within this task, perceivers were able to engage in retrodictive mindreading (Gallese & Goldman, 1998). In Valanides et al. (2017) by observing the readable signals the target produced, perceivers were able to infer something about the distal cause (i.e., whether the cue word was positive or negative).

The technique used in Valanides et al's. (2017) study also has the important property that it appears to satisfy the truth condition explained by West and Kenny (2011), who have addressed this challenge in mindreading research. According to West and Kenny, one limitation of much of mindreading research is that it is not possible to know with any certainty what another person is thinking or feeling. Therefore, in many mindreading tasks, where the participant is required to infer the inner state of others, there is no objective "truth" against which to compare their answers. Valanides et al. (2017) attempted to overcome this issue by asking perceivers not to infer the targets' inner state, but rather to infer the cue word

that the target was reading, so that participants' judgments could be compared against an objectively known fact (as the experimenter always knows what word was presented).

While Valanides et al.'s (2017) method overcame a number of limitations of previous studies, one limitation was that targets were merely asked to think about a time when they felt a particular mental state. Therefore, the study entirely relied on the compliance of the participants with this instruction and there was no way to independently verify whether targets were actually thinking about an event with the appropriate emotional content. While we can infer from the fact that targets were somewhat readable that at least some of the targets were probably thinking about the required emotional experiences, this method does not give an accurate measure of readability due to doubt over compliance.

Therefore, the current study aimed to develop and test a similar method but with an important modification. Targets were not only asked to think about life experiences but also to write them down, thus obtaining a written record of their thought/memory content. This method allowed us to verify that the targets were actually thinking about the required experience and gives some indication of the time course of their thinking. Also, targets were asked to rate how intensely they felt each experience at the time of the event, and also at the time of recall. To a degree this also served as a manipulation check insofar as it enabled us to check that the target did have some level of emotional experience not only at the time that the event took place but also during the experiment itself. However, this also allowed us to investigate whether targets are more readable if their experiences were felt more intensely.

Hence, the main aim of this study was to test a new method of measuring one's ability to read others' inner states, with a view to this method being used in future studies with autistic participants. If perceivers are able to judge accurately whether targets are thinking about a positive or a negative experience, then this new method will be at least somewhat successful in measuring one's ability to read others. Another aim of this study was to investigate

whether perceivers show bias in their judgments when guessing what the target is thinking about. In other words, do perceivers have a tendency to judge that targets are thinking of something positive too much or something negative too much, or are their responses equally distributed between these two response options? Based on findings of Valanides et al. (2017) it was predicted that perceivers would perform at above chance levels in determining whether the target was thinking of something positive or negative. Likewise based on Valanides et al. (2017) it was predicted that targets would show an overall bias towards judging that the target was thinking of a negative experience.

The study also aimed at investigating whether targets are more readable if they felt their experiences more intensely and whether perceivers judgments of the intensity of targets' expressions are associated with how intensely targets report they felt their experiences. Based on previous research, we expected to find an increase in accuracy for experiences that were felt more intensely (Wells et al. 2016) and we also expected to find a positive linear relationship between perceivers judgement of intensity ratings and target self-ratings (Hess et al. 1997).

2.2 Methods

2.2.1 Target phase

The overall aim of the target phase was to produce video stimuli to be used in the perceiver phase, which was the main part of the experiment. However, the target phase also gave the opportunity to carry out some exploratory analyses of aspects of the targets' responses to the procedure, and in particular their ratings of intensity of the experiences they felt. Hence, we aimed to determine whether intensity ratings differed between positive and negative experiences and whether they differed when rating at the time of the experience versus at the time of recall. Moreover, we investigated whether targets' intensity ratings

correlated for positive and negative experiences, and whether they correlated for experiences at the time versus as recalled. The entire procedure was approved by the ethics committee, School of Psychology, University of Nottingham, S1057.

2.2.1.1 Participants (Targets)

Twenty individuals aged between 19 and 24 (M=20.85, SD=1.79) were recruited through the University of Nottingham. There were 10 males and 10 females, and all were native English speakers. All participants gave informed consent before the study. The sample sizes were based on the numbers recruited by Alkhaldi et al. (2019), which used similar methodology.

2.2.1.2 Materials

Camtasia 1.9 software was used to record the computer screen and targets' facial expressions captured by the computer's webcam. The software allowed simultaneous recordings; both recordings could be replayed together, synchronised in time. The images below are examples of recordings, blurred in this example to preserve the target's anonymity.

An on-screen questionnaire was developed using Qualtrics software (Qualtrics, Provo, UT). This asked targets to write about a time they felt proud, in love, excited, guilty, ashamed and stressed. The list included the same four terms used by Valanides et al. (2019) with the addition of one positive (in love) and one negative (stress) state. These states were selected as being mental states that are likely to be particularly relevant and salient to the study participants, who were mainly undergraduate students. These specified emotional experiences were presented in random order. A text box appeared below every question (as shown in Fig 2.1), in which targets typed in their experiences. After writing about each experience, targets rated how intensely they felt at the time of the experience and how they felt at the present time as they recalled it. They rated these experiences on a scale of 1-10 (as shown in Fig 2.2).

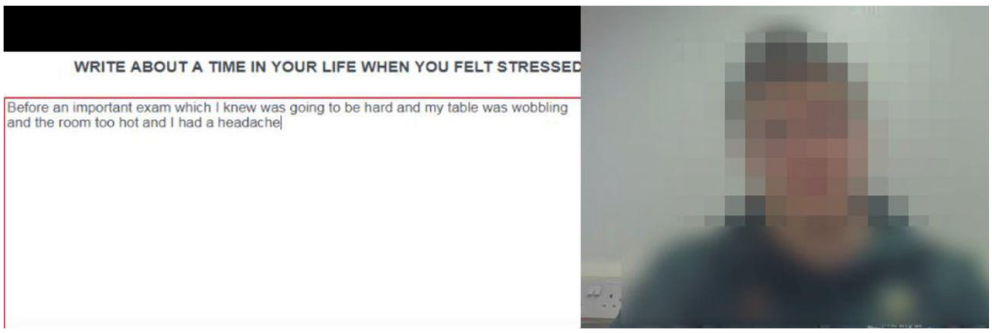

Figure 2.1. Illustration of text question, text generated by the target and the target's facial expression synchronised in time

Figure 2.2. Illustration of application for targets to rate their intensity of feelings

2.2.1.3 Procedure

An X24 Lenovo laptop was used in the study. Targets were informed that they would be asked to use the laptop to write about certain life experiences and rate the intensity of the experiences felt. They were given no explanation about the purpose of the study and no indication was given that they would be video recorded at any point. Once the target was ready, the experimenter discretely pressed the record button to start the video and screen recording and excused herself from the room, leaving the participant alone. Participants were allowed to form the impression that the experimenter's action in this respect was to set the procedure in motion; there was no reason for them to suppose she was setting the webcam to record mode. Participants then wrote about a time in their life when they felt proud, in love,

excited, guilty, ashamed and stressed. There was no word or time limit given to participants; therefore, they were free to do the task in their own pace and were allowed to write as much as they wanted to. After writing about each experience, participants rated how intensely they felt the experience at the time it occurred and as they recalled it on a scale ranging from 0 to 10. Once finished, they left the room to notify the experimenter who then entered the room, discretely stopped the recording and debriefed the target. The experimenter explained the reason for not disclosing that they were being recorded was in order to capture natural and spontaneous expressions of the target. The experimenter then asked for their consent to use their recordings in the next stage of investigation. If any of the participants did not consent to their recordings being used, then the videos were immediately deleted together with all the data related to the participant.

2.2.2 Results

Targets' written texts were examined by the researcher to verify whether the content of the text appeared to match with the cue word that the target had read. This was done by reading each text carefully and ensuring that it described the experience related to the cue word given.

2.2.2.1 Target intensity ratings

Targets rated how intensely they felt at the time of the experience and as they recalled it during the current study. Following Valanides et al. (2017), the ratings were grouped according to their valence (positive or negative) whereby experiences of excited, love and proud were grouped as positive experiences and guilty, shame and stress are grouped as negative experiences. Although only positive and negative experiences were compared in the analysis, the reason for including different kinds of positive and negative experiences was to ensure that different variations of positive and negative experiences were obtained. Mean ratings are displayed in Figure 2.3.

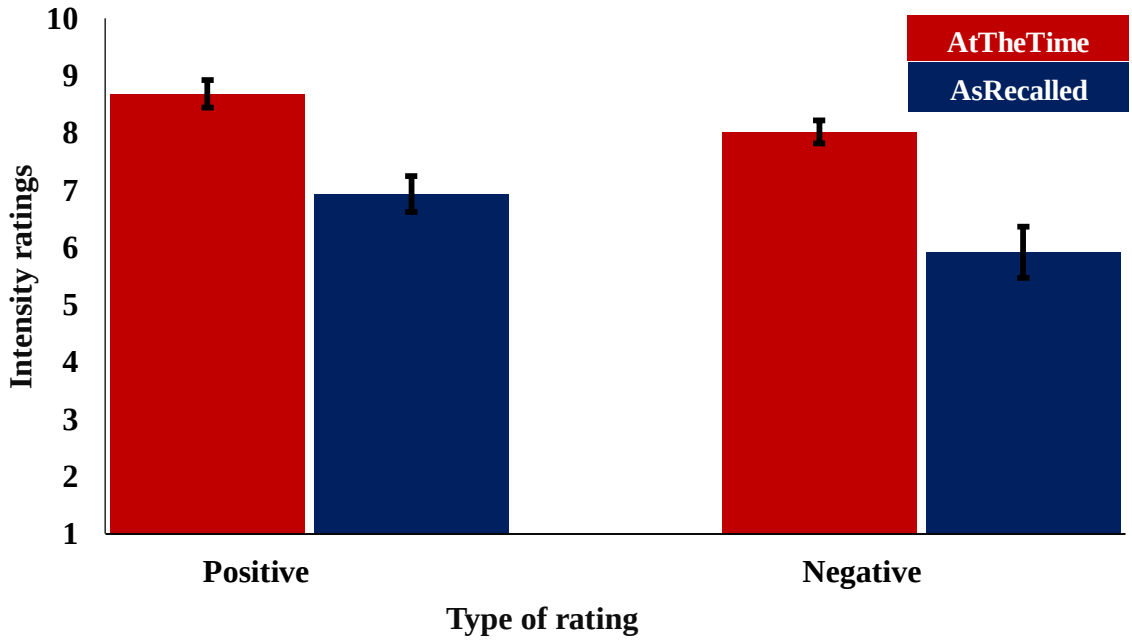

Figure 2.3. Average intensity ratings for positive & negative experiences at the time and as recalled

According to Figure 2.3, ratings of positive experiences seem higher than scores of negative experiences and at the time ratings seem higher than as recalled ratings. A 2 (at the time versus as recalled rating) x2 (positive versus negative experience) repeated measures ANOVA was performed on the intensity ratings. A main effect was found for type of rating ($F(1,19) = 36.82$, $p < .001$, $\eta^2p = .66$), suggesting that targets felt the experience significantly more intensely at the time of the experience than when they recalled the same experience during the task. A main effect of valence was also found ($F(1,19) = 13.95$, $p < .005$, $\eta^2p = .42$), suggesting that positive experiences were felt more intensely than the negative experiences. There was no significant interaction ($p > .05$).

To investigate the relationship between intensity ratings for positive and negative experiences, two Pearson's correlations were performed (one for ratings at the time of the experience, and one for at the time of recall). The results revealed that there was a significant

positive relationship between the intensity of positive and negative experiences as they were recalled (r= .64 p <.005; see Figure 2.4 for an illustration) but no such relationship was found for intensity ratings for positive and negative experiences at the time of the experience. This suggests that if a target recalled a positive experience more intensely then the same target also recalled their negative experiences more intensely. This was not the case for intensity experienced at the time of the event.

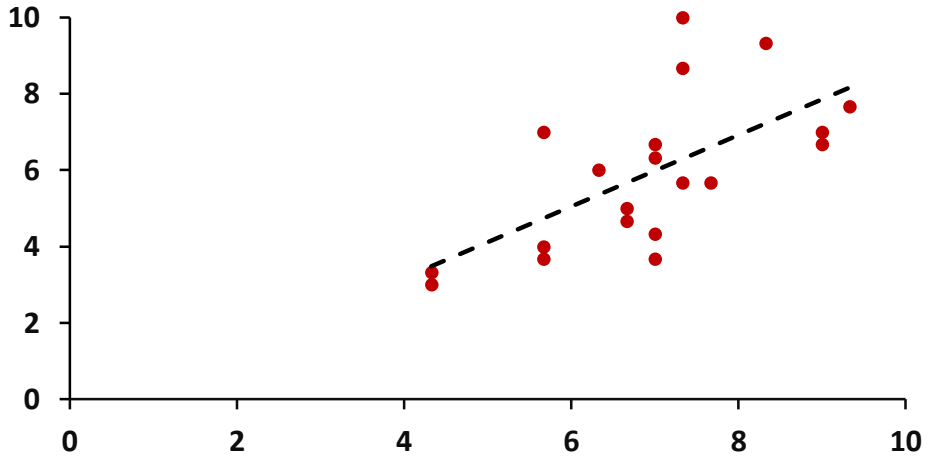

Figure 2.4. Correlation between positive and negative as recalled ratings

A second pair of correlations examined the relationship between ratings of intensity at the time of the experience taking place and as they were recalled (one for positive and one for negative experiences). These revealed a significant positive correlation for positive experiences (r = .45, p < .05, see Figure 2.5 for an illustration) but a weaker, non-significant trend for negative experiences (r = .28, p > .05)

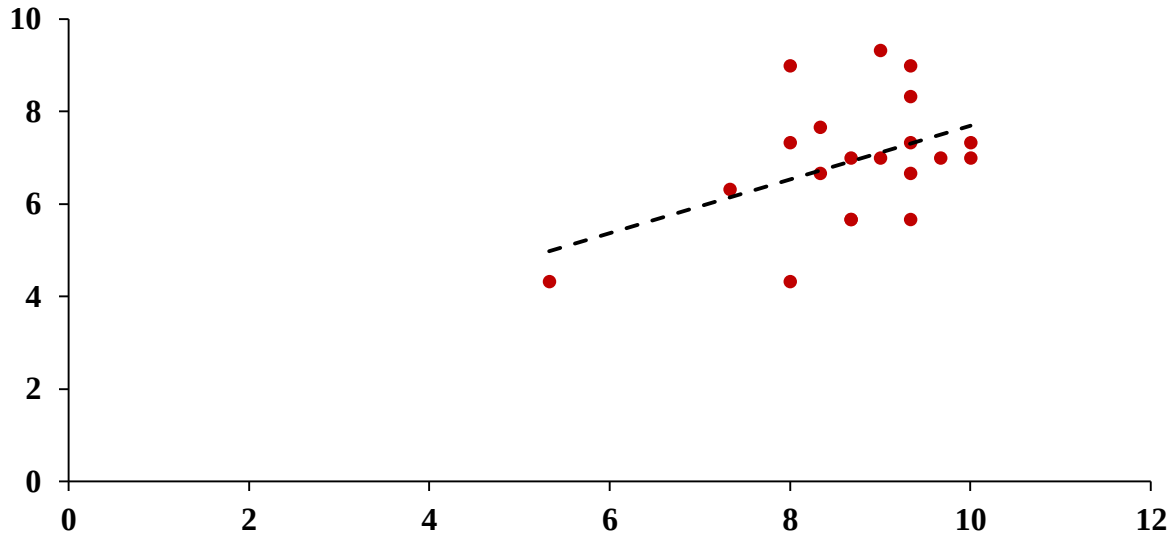

Figure 2.5. Correlation between positive at the time and as recalled ratings

2.2.3 Discussion

Results of exploratory analyses from the target phase revealed that higher intensity ratings were given for mental states at the time of the experience that provoked them in comparison to at the time of recall. This is consistent with the idea that as autobiographical memories are vulnerable to decay and interference and tend to gradually diminish over time (Bauer, 2015). Hence the memory of an experience seems likely to generate less intense associated emotions than the original lived experience itself.

Targets also gave higher intensity ratings for their positive than their negative experiences at the time of experience. This suggests that targets felt their positive experiences more intensely than their negative life experiences. A possible explanation for this could be the type of negative mental states used in this study. Specifically, for ethical reasons we did not ask participants to recall extremely negative mental states which might have been felt very strongly. Therefore, a potential area of future work could be to explore other mental states such as fear, grief and anger that might have produced more intense memories.

Targets also gave higher intensity ratings for their positive than their negative experiences as they recalled the experiences. This suggests when targets recalled their

experiences, positive experiences were more intensely recalled than their negative experiences. This is supported by previous research that suggests that there is a bias towards retrieval of positive life experiences which makes them easier to recall (Berntsen et al. 2011; Walker et al. 2003). People are more likely to perceive events in their lives as being more pleasant than unpleasant (e.g., Chwalisz et al. 1988; Thompson et al. 2013) as this helps people to uphold a coherent, positive sense of self and also help to create positive social relationships (Holland & Kensinger, 2010). However, it could also be explained by the fact that participants reported experiencing the positive life experiences more intensely at the time. This is consistent with the observation that the targets that rated positive experiences as more intensely felt during the time of the experience also rated their positive experiences to be more intensely felt when they recalled them. However, notably no such correlation was found for negative experiences. This can potentially be explained by the fading affect bias (FAB) which suggests that unpleasant life experiences fade more quickly than pleasant life experiences (Gibbons et al. 2011). The FAB may be regarded as a coping mechanism, which some researchers refer to as "the psychological immune system" (e.g., Gilbert et al. 1998) and acts as a regulatory mechanism to reduce the effects of negativity. People usually tend to misjudge the influence negative events can have on their emotional well-being in the long run (Gilbert et al. 1998; Wilson et al. 2000). The FAB acts as coping mechanism whereby a depletion in recall of negative events increases the sense of positivity in individuals when they recall experiences from their past. The correlations also suggested that targets that recalled their positive experiences more intensely also recalled their negative experiences more intensely. Similar findings were reported by Diener et al. (1985) who proposed that the intensity dimension of affective experiences is a meaningful and reliable component that has cognitive, physiological and behavioural significance. However, it is also possible that this

correlation reflects reporting tendencies of participants i.e., some participants may be just more inclined to give more extreme ratings on the scales provided.

More fundamentally, checks of the written texts revealed that the written descriptions matched the experiences targets were asked to write, suggesting that targets did understand and comply with the task and that, at the very least, they did think about an experience relevant to the cue word at some point after being presented with it. This goes some way towards validating the methodology used for eliciting mental states within the targets.
As the main purpose of the target phase was to create a set of stimuli to be used in the perceiver phase, the next part of this chapter reports the perceiver phase of the experiment.

2.2.4 Perceiver Phase

2.2.4.1 Participants

Thirty-three participants (perceivers; nine males and 24 females) aged between 18 and 42 (M = 26.5, SD=4.93) were recruited from the University of Nottingham.

2.2.4.2 Materials

The video recordings created during the Stimulus Development phase were edited using Windows Live Movie Maker and Camtasia software. For each target, the total time of the video recording was made up of a period (of varying length) of reading and thinking time during which the target read the question on the screen and then searched their memory for a relevant experience (which we will refer to as 'thinking time'), followed by a period of time during which the target typed his/her answer (sometimes interspersed with pauses; which we will refer to as 'writing time'). As the total length of these videos (thinking time) was on average 93 seconds (ranging between 74 and 110 seconds), it would not be feasible to show entire videos to perceivers. Therefore, we devised a system for editing the videos to a manageable length to present to perceivers while retaining the most relevant part of the target's behaviour that could signal what they were thinking. We propose that the most

relevant part of the recording was the time directly before targets started writing. It is not possible to know exactly when the target recalled the experience which they subsequently wrote about, but we do know for certain that they had thoughts about the event at the point of starting to write. Consequently, there is a high probability that the target is thinking about the event in the segment of the video immediately prior to writing. The target may also be thinking about the event while engaged in writing but given the motor requirements of typing we believed the signal would possibly be clearer prior to starting to type.

There are two aspects of the thinking times in the videos that we took into account during the editing. First is the effect on thinking time associated with the different kind of experience: guilty, stress, shame, excited, love, and proud experiences occupied 18.55, 11.4, 21.55, 10.05, 19.30 and 9.1 seconds on average, respectively. In order to avoid the possibility of perceivers using the length of the video clip as a cue for identifying the experience, our editing aimed to ensure that the mean length of video clip did not differ for the four experience types. Second, there were individual differences in thinking time: some targets had longer thinking times than others (range = 2 to 83 seconds). It seemed appropriate to preserve this natural variability between targets in thinking time within the edited clips, such that the targets who originally had spent longer thinking generated edited clips also with longer thinking times. To address both these principles, the videos were edited in relation to the experience which took the shortest average time to think about. In this case, proud experiences occupied the shortest thinking time (average = 9.1 seconds). Consequently, the thinking times for the videos of proud experiences were not edited, while the videos for the remaining three experiences were reduced in length such that their mean length was also 9.1 seconds (see illustration in supplementary materials B). In other words, the proportions of video clips for each experience of a target was calculated in the following way;

(9.1/average thinking time of a given experience) X (thinking time of that particular experience)

This ensures that videos for every experience are shown for the same amount of time on average while retaining individual differences of targets when they thought about the experiences. The videos thus created were then used as stimuli in the Perceiver phase.

2.2.4.3 Procedure

Participants completed the study using Psychopy software (Peirce et al. 2019) on a Lenovo X240 laptop. Participants were first presented with an instruction screen and were also verbally instructed about the task. They were then presented with the 120 video clips (20 targets x 6 experiences) in random order of targets thinking of a time when they felt excited, guilty, in love, proud, shame or stress. Every video clip was followed by a question asking participants what they thought the person is thinking about, with the six possible experience labels presented on the screen (Fig 2.6). Participants responded by clicking their chosen answer. This was immediately followed by a question asking participants to rate how intensely they thought the person is experiencing the chosen emotion on rating scale of 1 to 10 (Fig 2.7). Participants responded by clicking the appropriate number on the scale.

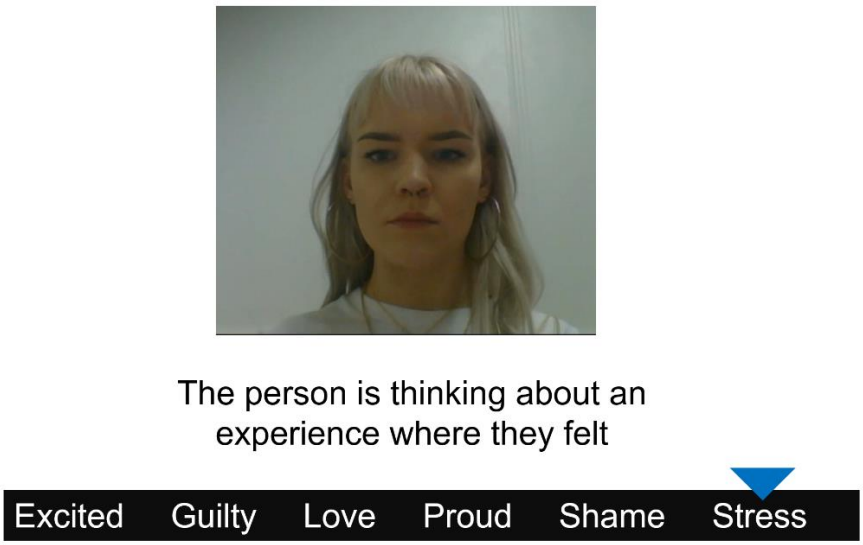

Figure 2.6. Illustration of perceiver phase to guess target's mental states

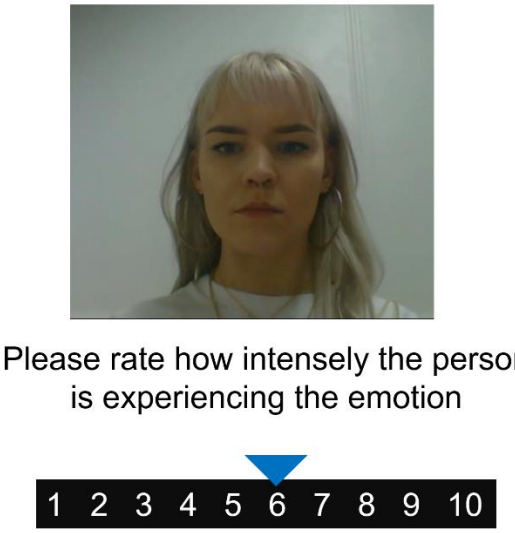

Figure 2.7. Illustration of perceiver phase to rate target's intensity of feelings

2.2.5 Results

In this section we first start with analyses addressing how accurate perceivers are at recognising positive and negative expressions of the targets. Then we go on to address bias in perceivers' judgements of expression. Lastly, we look at how accurate perceivers are at recognising how intensely targets felt their positive and negative experiences.

2.2.5.1 Perceiver accuracy for expressions

The responses were grouped according to their valence (positive or negative) whereby experiences of excited, love and proud were grouped as positive experiences and guilty, shame and stress are grouped as negative experiences. The reason for including different kinds of positive and negative experiences was to ensure that different variations of positive and negative experiences are obtained. Confusion matrices were created to code participants' responses. The number of positive hits (choosing a positive experience when the target was truly thinking about something positive) and the number of negative hits (choosing a negative experience when the target was truly thinking about something negative) were calculated and averaged to get an accuracy score for each participant, which were then converted into proportions for ease of interpretation. Figure 2.8 shows the accuracy score for each individual perceiver from most to least accurate, with the solid horizontal line indicating chance performance. It can be seen that the majority of perceivers were numerically at or above chance in their performance, although two fell numerically below chance. A one sample t-test showed that accuracy scores (M=0.56, SD= 0.42) were significantly higher that chance level of 0.5 (t(32)=7.95, p<.001). This suggested that overall participants were able to judge whether targets were thinking of something positive or negative, at least to some degree.

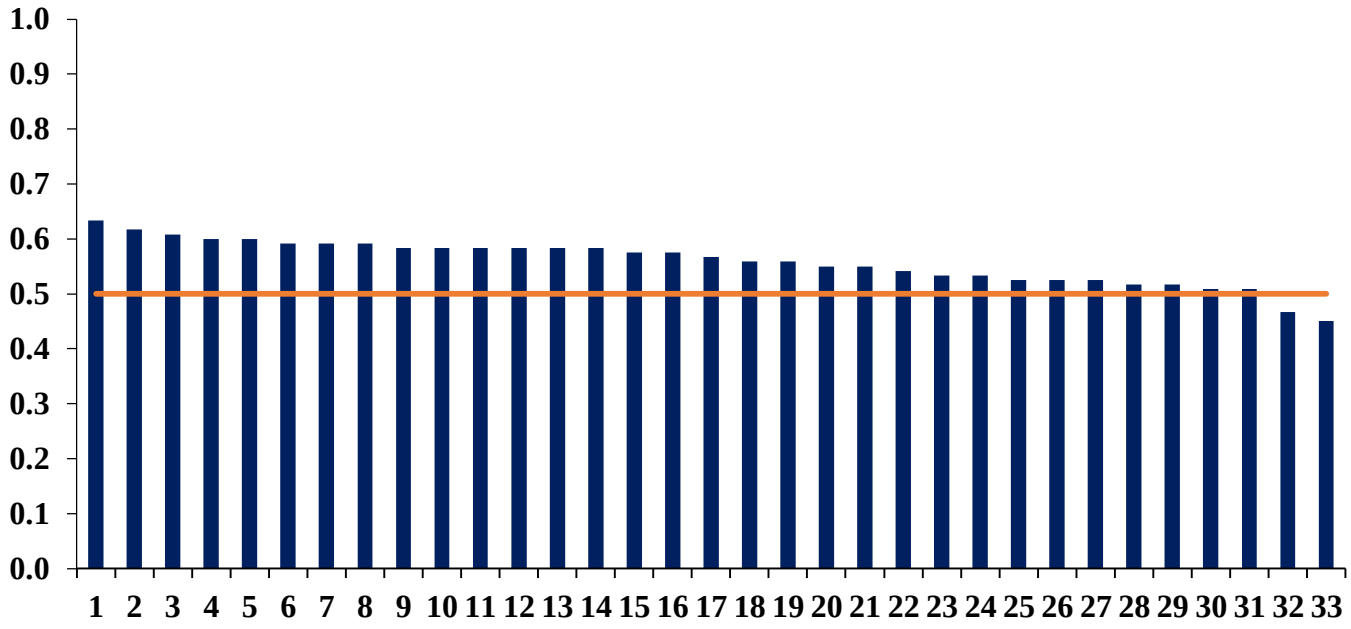

Figure 2.8. Accuracy scores (hits) of perceivers

2.2.5.2 Bias

Perceiver bias was calculated to give an indication of whether perceivers were biased towards judging that targets were thinking about a positive experience or a negative experience, or whether perceivers chose the two experience types in a balanced way. In order to gain an indication of bias the total number of positive responses and the total number of negative responses were added up for each perceiver. The positive responses were then divided by the negative responses; 1 was then subtracted from the resulting value. This yielded a figure between +1 and -1, where a positive value would indicate a perceiver bias to say 'positive' too much. If the value is below 0 then perceiver's bias was to say 'negative' too much. If the value was around 0 this would indicate no bias. Figure 2.9 illustrates the bias of all perceivers.

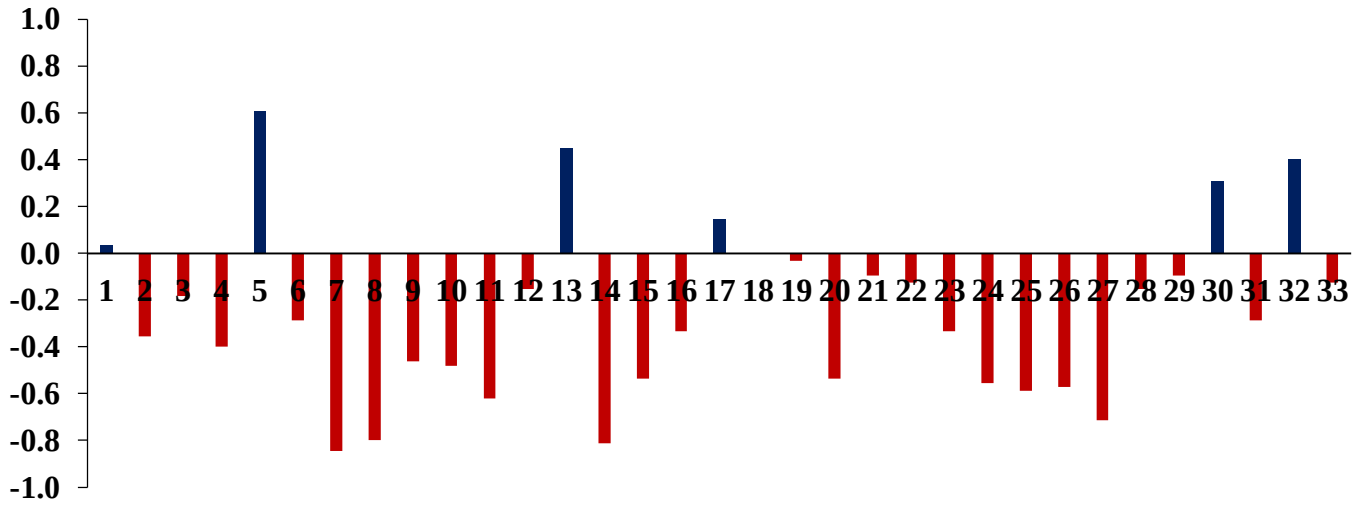

Figure 2.9. Perceiver bias in judgments of target expression

Figure 2.9 illustrates that 26 of the perceivers were numerically negatively biased in their judgements. One sample t-tests reported that overall perceiver responses (M= -0.26, SD= 0.37) were significantly biased negatively ($t(32)$=-4.03, p<.001). This means that perceivers were overall likely to suggest that a target is thinking of something negative, even if they were thinking of something positive.

2.2.5.3 Perceiver accuracy for intensity ratings

Perceivers also judged how intensely targets were experiencing each mental state, on a rating scale ranging from 1 to 10. Perceiver scores were averaged at the target level such that every target has one associated mean perceiver score for each of the 6 experiences. Like the target scores, perceiver scores for excited, love and proud expressions were averaged as positive intensity ratings and perceiver scores for guilt, shame and stress expressions were averaged as negative intensity ratings. In order to make a comparison between target self-ratings and perceivers' ratings of intensity, the scores were converted to proportions. Since the scales used by both groups were different due to error (target scale, 0 to 10; perceiver scale 1-10), an adjustment had to be made in order to equate the scores fairly as the target scale was essentially an 11-point scale while the perceiver scale was a 10-point scale. One

point was added to the positive and negative intensity ratings made by each target (self-ratings). These new scores were then divided by 11 to get a proportion. With regards to perceiver scores, these were divided by 10 to obtain a proportion without any adjustments made. Figure 2.10 below illustrates the mean positive and negative self-ratings of targets and perceiver ratings of the targets expressed as these adjusted proportions.

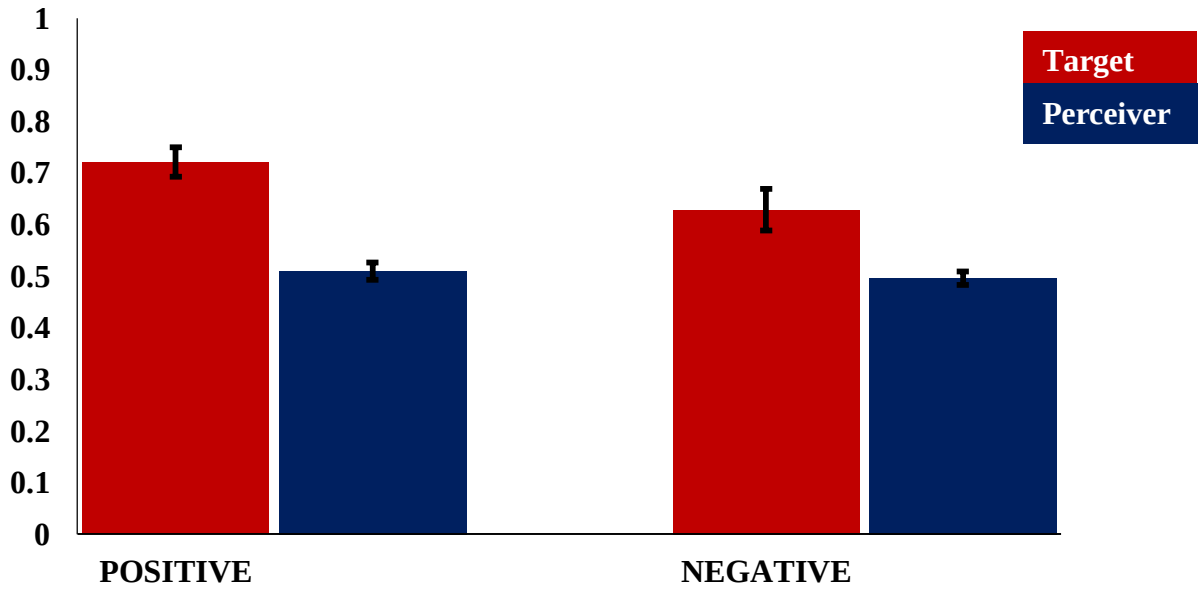

Figure 2.10. Positive & negative intensity ratings of targets & perceivers

Target self-ratings appear to be higher than perceiver ratings, for both positive and negative experiences, and positive experiences have higher intensity scores than negative experiences, although less clearly so for perceivers than for self-ratings. A 2 (positive versus negative) X 2 (target versus perceiver) repeated measures ANOVA reported a main effect of valence ($F(1,19) = 6.62$, $p < .05$, $\eta^2p = .26$), main effect of group ($F(1,19) = 19.48$, $p < .001$, $\eta^2p = .51$) and a significant interaction (($F(1,19) = 8.25$, $p < .05$, $\eta^2p = .30$). The results suggest that positive experiences were rated significantly higher than negative experiences and target self-ratings were significantly higher than perceiver ratings. A significant interaction suggests that the effect of valence differed for the two groups. Post hoc paired samples t-tests revealed that the differences between positive experiences were only rated as

more intense by the targets themselves ($t(19)=2.94$, $p<.05$) and not by the perceiver group. However, group differences (whereby targets gave higher self-ratings than perceivers gave) were found in both positive ($t(19)=5.89$, $p<.001$) and negative ($t(19)=2.88$, $p<.05$) experiences.

To investigate whether overall perceiver ratings correlated with overall target self-report ratings, a Pearson's correlation was used. Overall ratings were calculated at the level of the target by averaging the positive and negative intensity ratings. This yielded two mean intensity scores for each target, one of which was their mean self-rating and the other of which was their mean perceiver intensity rating across. Findings revealed a significant negative correlation between overall ratings of intensity for targets and perceivers, ($r=-.458$, $p<.005$). This suggests that targets who reported higher scores of intensity of their experiences tended to be judged with lower scores of intensity by the perceivers (see Fig. 2.11).

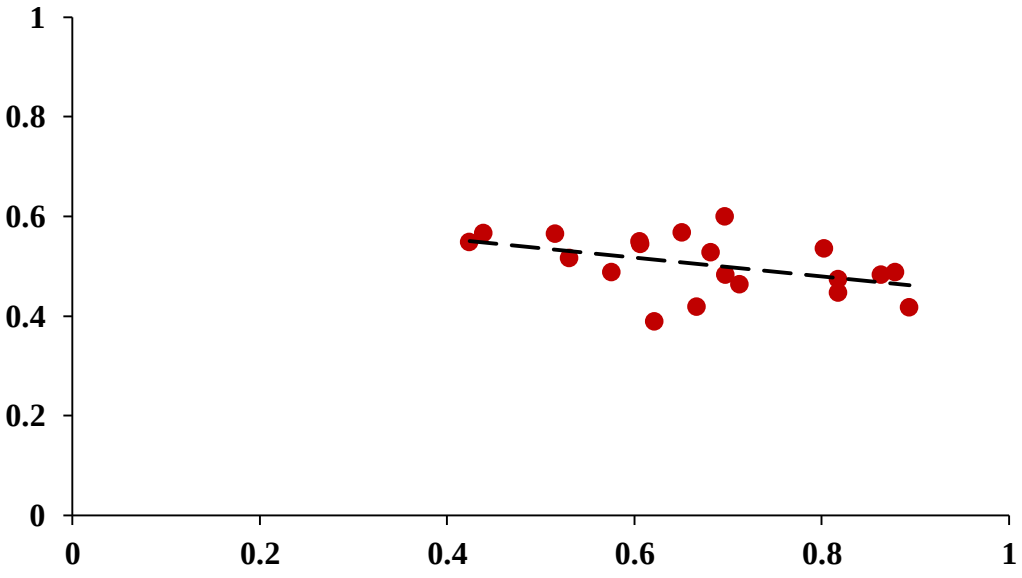

Figure 2.11. Correlation between overall target and perceiver ratings

2.2.5.4 Readability and Intensity Ratings

Perceiver responses to target expressions were used to calculate readability values for each target. The number of hits and misses of the 33 perceivers were calculated for each target and then grouped into positive and negative experiences. The hits were then added up and divided by 198 (33 perceivers multiplied by six target expressions) to get a readability value for each target, which fell between 0 and 1. These were then correlated with their mean intensity ratings as they recalled their experiences (across the six experiences). Findings revealed no significant association between readability of targets and how intensely they felt when recalling their experiences, $p>.05$. However, there was a significant negative correlation between their at the time intensity ratings and mean readability scores, $r = -.53$, $p < .05$, such that those targets who reported feeling most intensely at the time of the experience were found to be the least readable.

2.3 General Discussion

The main aim of this study was to develop and trial a new methodology that aimed at determining whether people emit readable cues when thinking about events in their lives where they had experienced particular mental states. First of all, based on the content of their written text, we found that targets complied with the task and thought about the experiences related to the cue words. Furthermore, when perceivers were then shown target video clips, the number of hits was significantly greater than chance. This suggests that perceivers were making their judgments based on observable behavioural cues emitted by the targets whilst they were thinking about their experiences in an isolated room. Therefore, this gives support to Valanides et al. (2017) study and seems to suggest that this methodology elicited readable cues in the targets' behaviour.

However, perceivers were biased towards giving a negative response overall, including when targets were thinking about their positive experiences. This is in line with

studies that suggest that people are often biased to give a negative judgement in the face of ambiguity (e.g., Ito et al. 2017) and more specifically is consistent with the findings of Valanides et al. (2017) which also found an overall tendency for perceivers to judge that targets were thinking of something negative. One possible explanation for this may be that while some targets clearly made expressive (and interpretable) behavioural responses to the cue words, others retained a relatively neutral expression throughout the task. It may be that these neutral expressions appear rather sad, and that this results in an increased tendency for perceivers to judge that the target is thinking of something negative overall. Perhaps, further research can investigate how expressive the targets are perceived and whether that relates to perceiver's ability to correctly identify an expression.

Perceivers' judgments of how intensely targets felt their positive and negative experiences did not correlate positively with targets' self-reported ratings of intensity. In fact, surprisingly, the more intensely the targets reported to feel about their experience the less intensely the emotion was perceived by the perceivers. One possibility is that targets themselves are not reliable judges of how intensely they are feeling a particular mental state: different individuals may have very different views on how intense it is possible to feel and might potentially use the Likert scale they were provided with in different ways. However, while this might account for the lack of positive relationship between target and perceiver ratings, it is less clear how this explanation could yield a significant negative relationship. Perhaps, for those targets who gave high self-ratings of intensity, the mental states experienced were so intense that the faces appeared to become blank as if lost in deep thought. Indeed, the state of (apparent) alertness is reduced as one thinks inwardly about something intense (Vago & Zeidan, 2016) and perceivers may have mistaken this for the target daydreaming or being disengaged from the task in some way. Future research can look

into asking perceivers an additional question on whether they think a target is daydreaming or actually thinking about a specific experience.

Overall, targets gave significantly higher ratings of intensity than perceivers. Along with the correlations, these findings strongly imply that the full extent and intensity of the experience of remembering did not reflect on the targets' faces. Having said this, it is important to note a limitation which was that the target and perceiver scales were different by one point and therefore an adjustment was made in order to make as fair as possible a comparison. Nevertheless, it is not possible to know exactly how the differing points on the 10 versus 11 point scales were interpreted by the participants concerned. Therefore, comparisons between the absolute values on the scales given by targets and perceivers should be approached with caution.

There was no association between target's intensity ratings as they recalled an experience and how readable they were suggesting that just because a target reported feeling a mental state more intensely, this did not correspond to the mental state being more apparent on their face. Perhaps this is linked to the earlier findings that found that perceiver judgments of how intensely the targets felt when they looked at their facial expressions did not concur with targets' self-report. This further gives strength to the idea that facial expressions may not be the way to know how intensely individuals feel a particular experience. Alternatively, it could be that people are unable to accurately report how intensely they are feeling in such scenarios.

Moreover, there was a surprising negative association between target readability and how intensely targets reported they felt their experience at the time of the event. This finding was unexpected and there is no obvious explanation for it. One possibility is that given that some of the experiences were negative, those targets who experienced particularly intense feelings during those experiences may have made more effort to conceal or mask their

negative affect arising from the experience resulting in expressions that were less readable. However, further research will be needed to determine whether this finding can be replicated and if so, to explore the reasons why.

In conclusion, these findings suggest that people do emit observable behavioural signals, while recalling their memories in response to cue words, but in the absence of a social context. This is in line with Valanides et al. (2017) who also found that targets produce readable cues in a non-social situation, although only to be able to make broad distinctions between positive and negative experiences. The findings also suggest that perceivers are able to accurately judge when an individual is thinking about positive or a negative experience that is not caused by a reaction to an external incident but is caused by the individual's internal state of mind which produced observable signals. The findings of this study thus demonstrate the presence of retrodictive mindreading in situations where no social context is involved and in the context where observable behavioural signals are produced from individuals' internal musings.

Having established that overall typical adults appear to be readable within this task the following chapter aimed at investigating whether differences in readability would be observed for autistic targets, and specifically to test the hypothesis that autistic targets may be less readable when thinking about their emotional experiences.

Chapter 3: Do non-autistic individuals find it difficult to read autistic people in non-social contexts?

3.1 Introduction

Previous research in the area of social cognition in autism has concentrated mainly on cognitive, emotional or motivation difficulties or deficits experienced by autistic individuals (e.g., Rajendran & Mitchell, 2007). However, there is growing interest in an alternative explanation for the social and interpersonal difficulties that confront autistic people, one that focuses on autistic people being misunderstood and misperceived by the neurotypical majority (Chown, 2014; Milton, 2012). This idea was termed the 'double-empathy problem' by Milton (2012) and Chown (2014). It suggests that when an interaction takes place between an autistic and a non-autistic person, the problem in communication is not located in a singular individual but rather, the problem exists in both persons. Neurotypical (NT) individuals lack insight into the minds and behaviour of autistic individuals in much the same way as autistic individuals may appear to lack insight into the minds and behaviour of typically developing individuals (Milton, 2012).

Relatively few studies have investigated how autistic people are perceived and understood by others; however, those that have been conducted have generally reported findings in line with the problems being two-way. When autistic and typically developing individuals were asked to pose for certain facial expressions, non-autistic people were less accurate in identifying expressions of autistic individuals (Macdonald et al. 1989). Further, they considered autistic expressions to be more bizarre and mechanical (Loveland et al. 1994b). Indeed, according to the recent clinical definition, individuals with autistic spectrum disorder (ASD) have been identified as having "deficits in nonverbal communicative behaviours used for social interaction and having "a total lack of facial expressions" (APA, 2013). It has been widely assumed, then, that the difficulty non-autistic people have in

reading autistic individuals may be due to their lack of expressiveness, especially in facial expressions (Stagg et al. 2014).

However, not all studies have found support for there being a general lack of expressiveness in autism. For instance, Faso et al. (2015) asked autistic and neurotypical individuals (NT) to not only pose for certain emotional expressions but also evoked in them the emotional experiences. They did this by reading out loud participants' autobiographical memories where they had said that they felt certain emotions, and the participants were asked to re-live them. The results showed that anger expressions of autistic individuals were more accurately identified but happy expressions were less accurately identified by non-autistic perceivers, when compared to NT expressions. Autistic expressions were also perceived to be more intense but less natural than those of NT individuals. Moreover, in Sheppard et al. (2016) participants (targets) experienced a variety of social scenarios (such as being told a joke or being paid compliments) and their reactions were surreptitiously recorded. Some of these targets were autistic and some were typically developing. Another group of individuals (perceivers) were shown these recorded reactions and were asked to guess what the targets were reacting to. Reactions of autistic individuals were identified less accurately than the reactions of NT individuals. However, both groups were perceived to be equally expressive. Findings from these studies imply that "a total lack of facial expressions" may not be a universal indicator of autism, and consequently that inexpressiveness may not be the sole explanation for non-autistic people's difficulty in interpreting the expressions of autistic people.

Another line of research has examined non-autistic people's social evaluations of autistic people and found that autistic individuals are perceived as less socially favourable than NT individuals (Sasson et al. 2017). Autistic and NT individuals participated in a mock audition for a reality show and their performance was recorded. Typically developing

perceivers rated the autistic participants as less favourable on a number of characteristics when viewed in static images, video and audio recordings. The transcripts for the audition were also judged, however, no such differences were found when making judgments from these. Moreover, autistic individuals in the study who were perceived to be less favourable than neurotypical individuals also reported experiencing greater levels of loneliness. These findings are consistent with the double empathy phenomenon, suggesting that the social environment of autistic people contributes to their difficulty in social interactions.

More recently, it has been found that in fact these two strands of research may be closely linked in that the perceived social favourability of a person may relate to how readable they are by non-autistic others (Alkhaldi et al. 2019). Alkhaldi et al. used the target videos from the study by Sheppard et al. (2016) and found that non-autistic individuals perceived autistic targets to be less socially favourable than they perceived neurotypical targets to be. Moreover, the perceived social favourability ratings of targets correlated with the previously observed target readability in Sheppard et al. (2016), both across and within groups. In other words, those individuals who are the least readable are also perceived as the least socially favourable, irrespective of diagnosis.

Although work cited above provides clear evidence that autistic people are difficult for non-autistic others to read, there remain a number of questions in relation to the nature and extent of the issue. Firstly, all the studies reported so far involved photograph or video stimuli that were created within a social context, often involving interactions with a non-autistic experimenter or audience. It is therefore not clear whether autistic people are difficult for non-autistic people to read universally – making it, in essence, a primary feature of autism – or whether this is limited to when they are interacting with or self-presenting to non-autistic others. Previous research (with non-autistic individuals) suggests people do behave differently in the presence of others, even when other aspects of the context are unchanged

(e.g., Beaman et al. 1979; Nettle et al. 2012). In line with this, Teoh et al. (2017) found that people were able to differentiate facial expressions produced when a person (a target) is alone and when accompanied by others. This suggests that targets emit significantly different signals in a social context than when alone, even when performing the same task. If it is the case that autistic people only produce signals that are difficult for non-autistic others to interpret when in a social context, then perhaps these signals are secondary to a state that is provoked by the social context. Indeed, following a systematic review, Spain et al. (2018) concluded that the core characteristics of autistic individuals are linked with social anxiety. They found that self-ratings of social anxiety symptoms and self-ratings of autistic features positively correlated. Thus, it could be the case that social anxiety is the primary reason that autistic people's behaviour is difficult for non-autistic others to read in social contexts, rather than autism itself.

Secondly, it is not known how universal the difficulty non-autistic people have in reading autistic individuals is across the lifespan, as previous studies have only recruited adolescents or young adults as perceivers (e.g., Sasson et al. 2017). In studies with non-autistic targets, the ability to interpret signals in other people's behaviour has been observed in children as young as seven years old (Kang et al. 2017) although they were less accurate than adults for some kinds of expression (shocked and disgusted expressions). Meanwhile, some studies suggest that the ability to read and recognize non-verbal behaviours decreases in the older age (Isaacowitz et al. 2007). Older adults are particularly less accurate in recognizing negative expressions such as anger and sadness and to some extent, fear. It is suggested that this decrease is due to both attentional and perceptual changes experienced as aging takes place (Birmingham et al. 2018). Therefore, if autistic individuals are more difficult to read in general, we might expect young children and older adults to find it

particularly difficult to read and recognize non-verbal behaviours of autistic individuals, although this may vary according to the expression.

The current study primarily aimed to address these two questions by exploring whether signals emitted by autistic individuals were universally difficult to interpret by neurotypical individuals forming different age groups in a non-social context. Facial expressions of autistic and neurotypical individuals were surreptitiously recorded and shown to another group of people (perceivers) who are asked to guess what the person is thinking about. The expressions were not posed nor were they static, but rather they were natural and spontaneous. Unlike in previous research, the expressions were captured in a non-social context. The perceivers were children of ages four-six, seven-nine, and 10-12 years and adults, and the elderly. Perceivers were also asked about other measurable individual differences such as likeability and expressivity.

3.2 Methods

The procedure followed principles developed by Sheppard et al. (2016) and Valanides et al. (2017). The method section is divided in two phases: target and perceiver phase. The target phase will be covered first as detailed below. The procedure was approved by the ethics committee, School of Psychology, University of Nottingham.

3.2.1 Target phase

The materials used and procedure followed was similar to that used in Chapter 2. Please refer to the materials and procedure of the target phase in Chapter 2 (2.2.1.2 and 2.2.1.3) for more details.

3.2.1.1 Participants (Targets)

Twenty individuals aged between 19 and 36 years (M=22.95, SD= 3.93) were recruited through the University of Nottingham, Nottingham Trent University and a local support group affiliated with the University of Nottingham. All had English as their first

language. Ten of the participants were autistic (AUT) and 10 were neurotypical (NT) (six males and four females in each group). The autistic group gave verbal confirmation that they had been diagnosed with autism. We asked participants to complete the Autism Spectrum Quotient (AQ; Simon Baron-Cohen et al. 2001) questionnaire, to help identify the degree to which the participant has 'autistic traits' (See supplementary materials A). The groups differed in Autism Quotient (AQ) scores, $t(18) = 3.62$, $p < .005$), see Table 3.1. We also administered the Wechsler Abbreviated Scale of Intelligence (WASI; Weschler 1999), as measure of IQ. There was no evidence to suggest the groups differed either in age, $t(18) = .62$, $p > .05$; or Full scale IQ, $t(18) = 1.63$, $p > .05$, see Table 3.1. All participants gave informed consent before the study.

Table 3.1. Mean values of age, IQ & AQ of target participants. The figures in brackets are the associated standard deviation values

	AUT	NT
Age	23.5 (4.8)	22.4 (2.9)
FSIQ	117.3 (10.4)	111.1 (6.0)
AQ	30 (6.8)	20.1 (5.4)

3.2.2 Results

3.2.2.1 Target intensity ratings

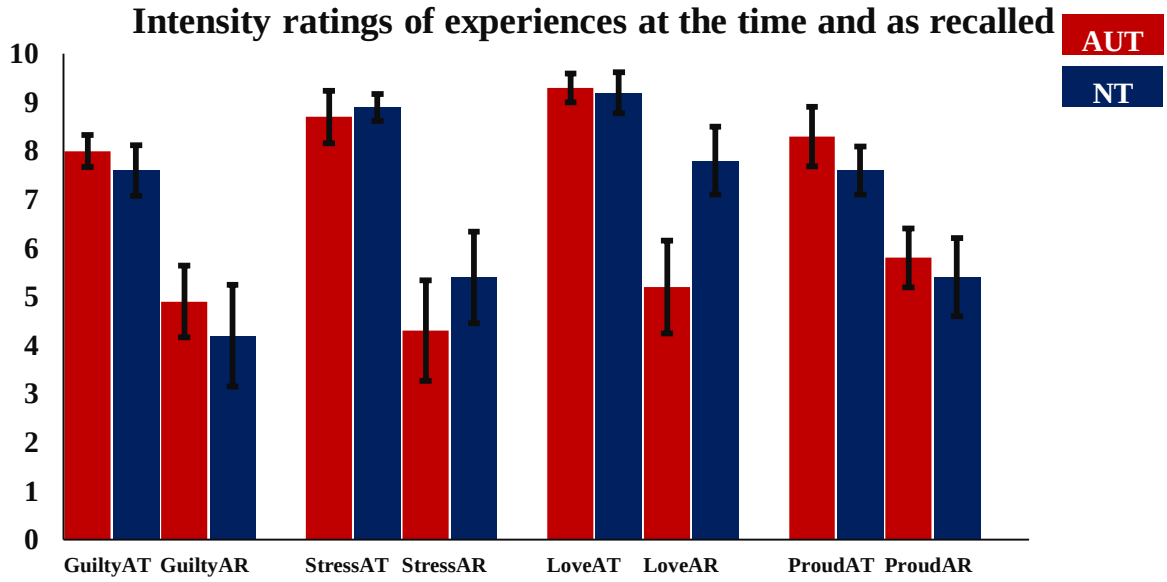

Figure 3.1. Ratings of intensity at the time of experiences and as recalled by autistic and neurotypical targets

A 2 (targetgroup) X 2 (time) X 4 (experience) repeated measures ANOVA found no differences between intensity ratings of the autistic and neurotypical groups. Ratings of intensity at the time of the experience were higher than ratings of intensity as the experience was recalled, $F(1, 18) = 87.65$, $p<.001$, $\eta^2p = .83$, suggesting that targets felt their experience less intensely as they recalled from memory. Results also revealed significant differences between the type of experience, $F(3,54) = 4.08$, $p<.05$, $\eta^2p = .19$, with pairwise comparisons revealing that love experiences were rated as significantly more intense than guilty experiences ($p<.005$). All other effects and interactions were non-significant.

3.2.3 Perceiver Phase – Study 1

The way the materials were used and processed was identical to that used in Chapter 2. Please refer to the materials in the perceiver phase in Chapter 2 (2.2.4.2) for more details.

3.2.3.1 Participants (Perceivers)

Participants from 5 different age groups were recruited. These were twenty-five children aged between four and six years (M=5.63, *SD*= 0.83), 37 children aged between seven and nine years (M=8.54, *SD*= 0.80), 27 children aged between 10 and 12 years (M=11.17, *SD*= 0.69), 31 adults aged between 20 and 49 years (M=29.3, *SD*= 6.73), and 36 elderly aged between 60 and 88 years (M=71.7, *SD*= 6.41). Children were recruited from Summer Scientist Week organised by the School of Psychology at the University of Nottingham. Summer Scientist Week is a public engagement event held by the University for children aged 4-12 years who are introduced to the research process by participating in on-going research studies. The two groups of adults were recruited from the University of Nottingham and from the local Nottingham community.

3.2.3.2 Procedure

Looped video clips of each target's expressions when thinking about the four experiences were shown in a random order on a computer screen, one in each quadrant of a single screen, to perceivers using PsychoPy3 (Peirce et al. 2019)(see Fig. 3.2). Perceivers were told that in two of the video-clips the target was thinking about something good and in two of the video clips the target was thinking about something bad. This was done to make the study easy for the children to understand, as children might not be familiar with concepts such as guilt and pride. They were asked to guess what the target is thinking (something good or something bad) in each clip. After responding, the four video clips reappeared side by side and perceivers were asked whether they liked the person (see Fig. 3.3). There was no time limit for participants and thus they were allowed to spend time as long as they wished and they could also change their answers for each clip until they were happy with their answers, at which point they could choose to move to the next screen.

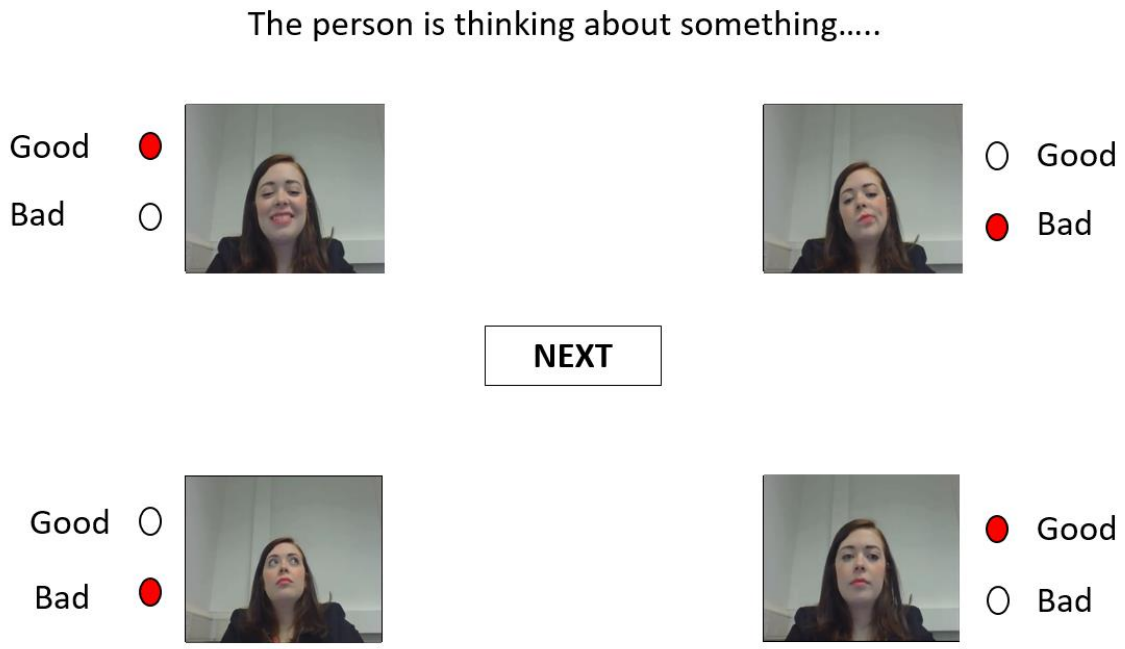

Figure 3.2. Illustration of videos in perceiver phase

Figure 3.3. Illustration of likeability question in perceiver phase

3.2.4 Results

In this section we first start with analyses addressing how accurate perceivers are in recognising positive and negative expressions of autistic and neurotypical groups. Then we

go on to calculate readability values for each target. Lastly, we compare how likeable autistic and neurotypical targets were perceived.

3.2.4.1 Perceiver Accuracy

Each perceiver response was coded '0' if incorrect and '1' if correct. Figure 3.4 shows the mean values of perceiver hit rates (i.e., perceiver accuracy) of all age groups for each target experience and for each target group. As perceivers were given explicit instruction that of the four target expressions, two were good and two were bad, this removes response bias, such that the value of chance is 0.5. To examine responses against chance (0.5), one-sample t-tests were conducted for each perceiver age group in relation to each target experience (see table 3.2).

Table 3.2. One sample t-tests for each perceiver age group

Age-Group (years)	**Type of Experience**							
	Guilty		**Stress**		**Love**		**Proud**	
	AUT	***NT***	***AUT***	***NT***	***AUT***	***NT***	***AUT***	***NT***
4 to 6	*t*(24)=1.98, *p*=.06 *d*=.40	*t*(24)=-1.29, *p*=.21 *d*=-.26	*t*(24)=1.88, *p*=.07 *d*=.38	*t*(24)=.53, *p*=.60 *d*=.11	***t*(24)=4.80, *p*<.001 *d*=.96**	*t*(24)=.23, *p*=.82 *d*=.05	*t*(24)=-.33, *p*=.75 *d*=-.07	*t*(24)=-.58, *p*=.57 *d*=-.12
7 to 9	***t*(36)=3.48, *p*=.001 *d*=.57**	***t*(36)=3.50, *p*=.001 *d*=.58**	*t*(36)=1.5, *p*=.14 *d*=.25	***t*(36)=-2.99, *p*=.005 *d*=-.49**	***t*(36)=5.43, *p*<.001 *d*=.89**	*t*(36)=.38, *p*=.71 *d*=.06	*t*(36)=.64, *p*=.53 *d*=.11	*t*(36)=.56, *p*=.58 *d*=.09
10 to 12	*t*(26)=1.25, *p*=.22 *d*=.24	***t*(26)=2.50, *p*=.019 *d*=.48**	***t*(26)=3.02, *p*=.006 *d*=.58**	*t*(26)=-1.02, *p*=.32 *d*=-.20	***t*(26)=3.36, *p*=.002 *d*=.65**	*t*(26)=-86, *p*=.40 *d*=-.17	*t*(26)=.60, *p*=.55 *d*=.12	*t*(26)=1.67, *p*=.11 *d*=.32
Adults	***t*(30)=3.76, *p*=.001 *d*=.68**	***t*(30)=3.85, *p*=.001 *d*=.69**	***t*(30)=2.51, *p*=.018 *d*=.45**	*t*(30)=-1.49, *p*=.15 *d*=-.27	***t*(30)=5.97, *p*<.001 *d*=1.07**	*t*(30)=.83, *p*=.41 *d*=.15	*t*(30)=-.29, *p*=.78 *d*=-.05	*t*(30)=1.35, *p*=.19 *d*=.24
Elderly	***t*(35)=2.72, *p*=.010 *d*=.45**	***t*(35)=3.06, *p*=.004 *d*=.51**	***t*(35)=2.46, *p*=.019 *d*=.41**	*t*(35)=-.19, *p*=.85 *d*=-.03	***t*(35)=5.18, *p*<.001 *d*=.86**	*t*(35)=1.63, *p*=.11 *d*=.27	*t*(35)=-1.27, *p*=.21 *d*=-.21	*t*(35)=.51, *p*=.61 *d*=.09

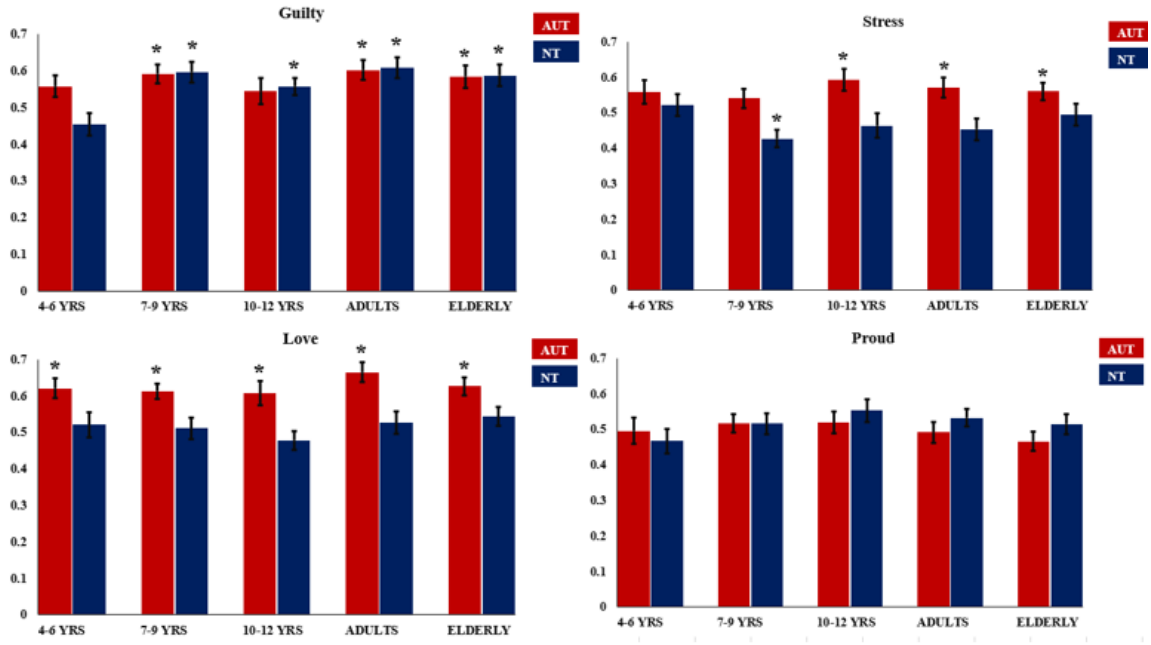

Figure 3.4. Hit rates for autistic and neurotypical targets for guilty, stress, love & proud. (The asterisk (*) in the figures indicates where hit rates were significantly different from 0.5 ($p < 0.05$)).

The graphs suggest that for some experiences, autistic targets were more readable than neurotypical targets. A 5 (age groups) X 4 (target experience) X 2 (target group) mixed measures ANOVA was performed in order to detect differences in the way the five perceiver age groups interpreted the behaviour of target groups (AUT and NT) across target experiences (guilty, stress, love, proud). No main effect of age group was found ($p > .05$), offering no evidence to suggest that perceivers differed in their accuracy across the age groups. A main effect of target group was found, ($F(1,151) = 23.47$, $p < .001$, $\eta^2p = .14$), with perceivers being more accurate in inferring what targets were thinking when viewing autistic targets than when viewing neurotypical targets. A main effect of type of experience was also found, ($F(3,453) = 15.83$, $p < .001$, $\eta^2p = .10$). Post hoc tests with Bonferroni correction

revealed that perceivers were better at identifying targets' guilty and love experiences as positive or negative, compared to stress and proud experiences ($p < .005$).

A significant interaction effect between the target experiences and target groups ($F(3,453) = 13.18$, $p<.001$, $\eta^2p = .80$) suggested that perceivers made more accurate inferences for one or other target group depending on the type of target experience. Paired-samples *t* tests were carried out to establish which target experience perceivers inferred more accurately depending on the target group in question. Perceivers were more accurate in identifying the experiences of stress ($t(155) = 5.12$, $p<.001$, $d = .58$) and love ($t(155) = 6.42$, $p<.001$, $d = .73$) as being negative or positive in autistic targets than neurotypical targets, but no differences between autistic and neurotypical targets were found for guilty and proud experiences (See Fig. 3.5).

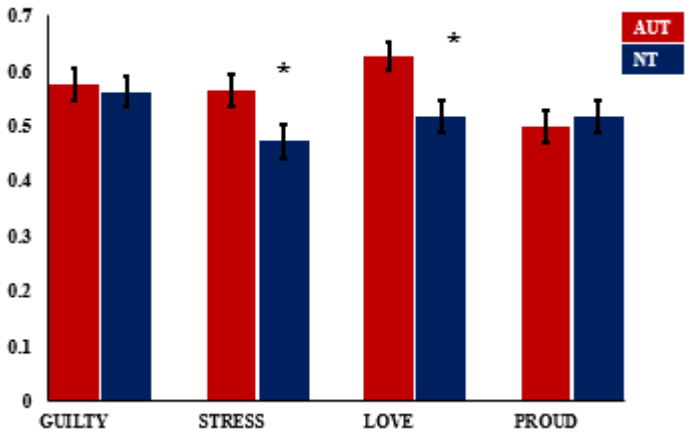

Figure 3.5. Perceiver accuracy of each experience of each target group

A significant interaction effect between the target experience and perceiver age groups ($F(12,453) = 2.18$, $p<.05$, $\eta^2p = .06$) suggested that perceivers of one or more age-groups performed more accurately than other age-groups depending on the type of target experience being viewed. Repeated measures ANOVAs revealed that four- to six-year-olds ($F(3,72) = 3.68$, $p<.05$), seven to nine year olds ($F(3,108) = 8.42$, $p<.001$), adults ($F(3,90) = 7.12$, $p<.001$) and the elderly ($F(3,105) = 7.53$, $p<.001$) performed more accurately in detecting some target experiences than others, while 10 to 12 year olds did not. Post hoc

Bonferroni correction revealed that seven to nine year-olds, adults and the elderly performed more accurately when judging guilt experiences as positive or negative than proud experiences, $p < .005$. Seven- to nine-year-olds and adults also performed more accurately for love experiences when compared to stress experiences, $p < .005$. Only seven–nine-year-olds performed more accurately for guilty experiences when compared to stress, $p < .005$. Only elderly performed more accurately for love experiences compared to proud, $p < .005$. None of the post-hoc pairwise comparisons were significant for the four- to six-year-olds with Bonferroni correction (See Fig. 3.6).

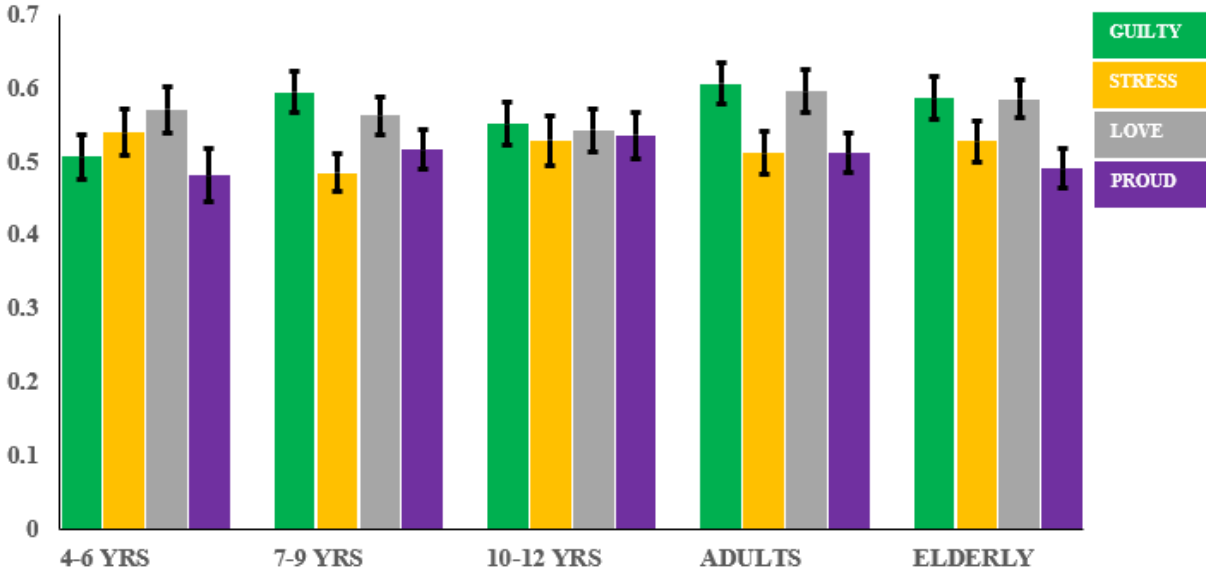

Figure 3.6. Perceiver accuracy of each experience of each age group

3.2.4.2 Target Readability

Having analysed differences between groups of perceivers in their accuracy in inferring target inner experiences, we now focus on individual differences in the readability of targets. We assumed it would be legitimate to estimate a target's readability based on judgments from perceivers in all groups, so long as it is demonstrable that perceivers were united across age groups in the way in which they made their judgments. To determine this, we calculated five readability values for each target, one associated with each perceiver group. We then investigated whether these readability values inter-correlated, and Table 3.3

suggests that they do. Hence, it seems fair to assume that perceiver groups were making judgments in a fairly consistent way, and it therefore seems legitimate to combine data across perceiver groups.

Table 3.3. Pearson correlations between readability values generated from five age-groups of perceivers

Readability	4-6 yrs	7-9 yrs	10-12 yrs	Adults	Elderly
4-6 yrs	-	.48*	.45*	.48*	.24
7-9 yrs	-	-	.83**	.77**	.75**
10-12 yrs	-	-	-	.82**	.79**
Adults	-	-	-	-	.87**
Elderly	-	-	-	-	-

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Did target readability relate to the reported intensity of the emotion at the time of recalling the event? Target readability for each experience (as calculated across all perceivers) was correlated with the target's intensity rating for that particular experience as they recalled it. There were no significant correlations between intensity ratings and readability for any of the four experiences.

3.2.4.3 Likeability

Perceivers' likeability ratings of each target group were also calculated. When perceivers liked a target, a score of '1' was given, while a score of '0' was given when they disliked a target. The number of likes given to AUT and NT targets were then summed and expressed as a proportion for every perceiver. In other words, the data yielded values that demonstrated how much each perceiver liked each target group. The perceiver scores were

then averaged for each age group. Figure 3.7 illustrates mean likeability scores associated with each perceiver age-group for both target groups (AUT and NT).

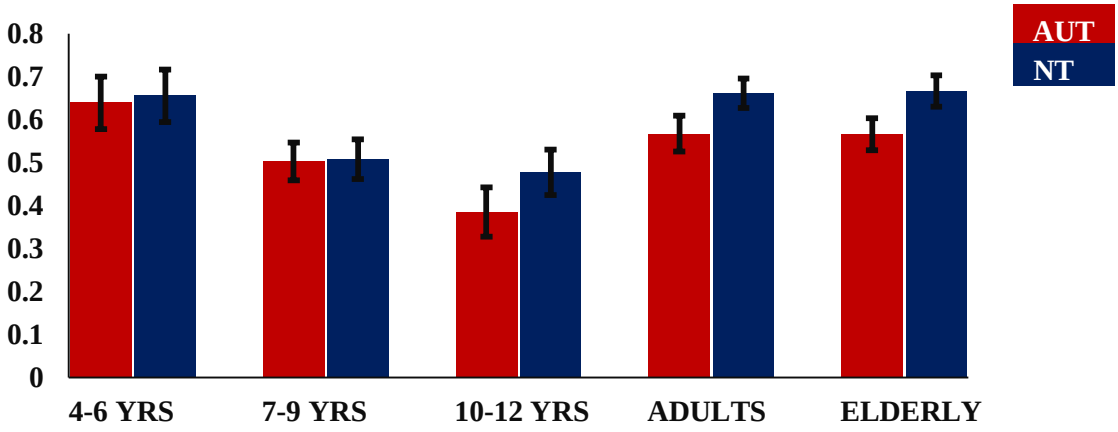

Figure 3.7. Proportion of likes for each group of targets for each perceiver age group

A 2 (target groups) X 5 (perceiver age-groups) mixed measures ANOVA was performed in order to investigate differences in perceivers' liking of targets depending on the age of the perceivers. A main effect of target group was found, ($F(1,151) = 16.15$, $p<.001$, $\eta^2p = .10$), suggesting perceivers liked NT targets more than AUT targets. A main effect of perceiver age group was also found, ($F(4,151) = 4.14$, $p<.005$, $\eta^2p = .10$. Post hoc tests with Bonferroni correction revealed that 10- to 12-year-old perceivers liked the targets significantly less than four- to six-year-olds, adults and the elderly.

There was also a significant interaction between target group and perceiver age group, ($F(4,151) = 1.96$, $p= 0.049$, $\eta^2p = .05$) suggesting that the extent to which one target group was better liked than the other depended on the perceiver age group. Paired sample t-tests revealed that 10–12-year-olds, ($t(26) = -2.56$, $p<.05$), adults ($t(30) = -2.95$, $p<.005$) and elderly ($t(35) = -3.00$, $p<.01$) liked neurotypical targets more than autistic targets.

Were perceivers in the different age groups making similar kinds of judgment when judging whether or not they like targets? To find out, we calculated five mean likeability values for each target, with each value representing a particular perceiver group. If these

values inter-correlate it would suggest that perceiver groups do indeed employ similar criteria in their judgments of whether or not they like particular targets. Table 3.4 shows that with the exception of ratings between the elderly and the youngest group of perceivers, correlations were significant and large in many cases. Hence, there was a consensus across perceiver groups (in most cases) on which targets were likeable, suggesting the different groups of perceivers employed similar criteria in making their judgments.

It is thus legitimate to combine scores across perceiver groups pertaining to each target, to generate a highly stable likeability value for each target. To determine whether likeability is negatively correlated with severity of autistic features, we performed a correlation between each target's likeability value and their AQ score. Those with the highest AQ scores tended to receive the fewest 'likes' from perceivers (r= -0.65, p< .005). The correlation between readability and likeability scores was calculated at target level using Pearson's correlation coefficient. No significant correlation was found between readability and likeability (r= -0.16, p>.05).

Table 3.4. Pearson correlations between target likeability across age-groups

Likeability	4-6 yrs	7-9 yrs	10-12 yrs	Adults	Elderly
4-6 yrs	-	.56*	.55*	.56**	.43
7-9 yrs	-	-	.80**	.84**	.74**
10-12 yrs	-	-	-	.91**	.81**
Adults	-	-	-	-	.86**
Elderly	-	-	-	-	-

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

In order to explore whether the expressivity of the targets influenced how readable they were and how many likes they received; a new group of perceivers was recruited to rate the targets on their expressivity.

3.2.5 Perceiver Phase – Study 2

3.2.5.1 Participants

Thirty individuals aged between 18 and 34 (M=22.83, SD= 5.65) were recruited through the University of Nottingham and Nottingham Trent University.

3.2.5.2 Procedure

Closely following the procedure of Study 1, looped videos of targets' expressions when thinking about four experiences were shown in a random order. The video clips appeared side by side (as in Fig. 4) and perceivers were asked to rate how expressive they thought the target is on a scale of 1 (not expressive) and 7 (very expressive).

3.2.6 Results

Autistic targets (M=3.93, SD=0.93) were rated as significantly more expressive than typically developing targets (M=3.21, SD=0.75) (t=6.30, p<.001 d=1.15). Relationships between readability, likeability and expressiveness ratings (averaged across perceivers) were compared at the target level using Pearson's correlation coefficient. No significant correlations were found between readability and expressiveness (r= 0.11, p>.05), or between likeability and expressiveness (r= -0.13, p>.05).

3.3 Discussion

The main purpose of this research was to determine if autistic targets are less readable than neurotypical targets in contexts different from those investigated previously. Previous research (e.g., Sheppard et al. 2016) suggests they are less readable in social contexts and here we investigated the replicability of this finding in a non-social context. Perhaps surprisingly, in some cases autistic targets were on average more and not less readable than

neurotypical targets. Specifically, autistic targets were more readable than neurotypical targets when thinking of a time they felt stressed and when thinking of a time they were in love. This raises the possibility that when in a non-social context, autistic targets sometimes emit signals that are particularly easy for neurotypical perceivers to read, suggesting their inner states are sometimes especially transparent. Interestingly, autistic targets were adjudged to be more expressive than neurotypical targets, raising the possibility that autistic targets emitted especially strong (and interpretable) signals in this non-social context. However, there was no evidence of a correlation between target readability and target expressiveness, which is consistent with previous research suggesting that expressiveness differences are not the main reason that non-autistic people find it difficult to read autistic targets (Sheppard et al. 2016), although these results should be treated with caution given the relatively small sample size for correlation.

A further purpose of the research was to compare different age-groups of perceivers in their accuracy when inferring target inner states. Specifically, we explored whether perceivers were more or less accurate in inferring target inner states depending on the clinical status of the target and the age of the perceiver. The results did not identify differences in overall accuracy of inferences across perceiver age groups, although there were some differences in the pattern of accuracy between the groups. All groups apart from the 10–12-year-olds showed variability in accuracy for different experiences, with most groups showing better accuracy for guilty than proud experiences, and seven–nine-year-olds and adults being more accurate for love than stress experiences.

We also analysed perceivers' ratings of whether they liked the targets. In this respect, we focus on two questions: 1) Were perceiver ratings higher for neurotypical targets than for autistic targets, as found in previous research (e.g., Alkhaldi et al. 2019; Sasson et al. 2017)? 2) Did the various age groups of perceivers give different ratings in their likeability of

targets? Overall, more perceivers rated neurotypical targets positively than they rated autistic targets. Moreover, a negative correlation emerged between how many perceivers liked each target and that target's AQ score: Those targets who self-reported stronger autistic features tended to receive the fewest 'likes.' In answer to the second question, perceivers aged 10-12 years, young adults and elderly adults tended to register more 'likes' for neurotypical targets than for autistic targets; there was no evidence to suggest the two younger groups of perceivers rated the two target groups differently.

Finally, based on Alkhaldi et al. (2019), we would have expected to find a correlation between target readability and likeability, but there was no such evidence. While this may suggest that readability and likeability are unrelated in this context, again this result should not be over-interpreted given the small number of data points entering the correlation.

That autistic targets are sometimes more readable than neurotypical targets is perhaps the most surprising finding of the present study, given that it is contrary to the findings of some previous research using social scenarios (Sheppard et al. 2016), although more similar to the findings of Faso et al. (2016) who found that autistic expressions of anger were easier to read than neurotypical expressions. This seems to suggest that non-autistic people do not always find autistic people difficult to read, and that this may be confined to their behaviour in certain social scenarios. This may be consistent with the Double Empathy problem account for social disability in autism, which proposes that social/communication difficulties arise during cross-neurological social interactions (there was no social interaction at the time of targets being video recorded in this study). Another possible explanation is that autistic people experience high levels of social anxiety in social contexts and that it is the social anxiety rather than autism that makes autistic people sometimes difficult for non-autistic others to read (Spain et al. 2018). Future research could administer measures of anxiety

(including state anxiety) to targets during the experimental session to determine how anxiety in a given situation may influence readability.

However, there are some alternative explanations for the findings that should also be considered. Firstly, because the context was non-social, it was necessary to contrive a different way of eliciting a reaction from the targets; that is, it would not be possible to have non-social versions scenarios in which the experimenter greets the target, as in Sheppard et al. (2016). Instead, targets were asked to think of a past event which caused them to feel a particular emotion. Hence, not only is the task different in being non-social but it is also different (by necessity) in the content of the scenario. This gives rise to at least two possible interpretations.

One difference between the methodology of the current study and Sheppard et al. (2016) is that in the current study, targets were asked to think about a time when they had specific emotional experiences, so assuming that the target was able and willing to obey the task instructions then all targets in each experience category should have been having broadly similar emotional states during the task. In contrast, in Sheppard et al. (2016) the social context itself that was manipulated, but targets were not led to experience a particular emotion or mental state. So, it could be that autistic targets' facial expressions were less readable in that previous study because autistic people actually experienced different emotions/mental states in the same scenarios, as opposed to having less readable expressions of the same emotional states.

Alternatively, it could be the case that autistic people are highly readable specifically when thinking of past events. One possible interpretation could be that the cue words stimulated more intense emotions in the autistic targets; however, this can probably be ruled out insofar as there were no differences between the groups in the ratings of intensity of their emotions both at the time of the experience and as they recalled it. In addition, these ratings

of intensity did not correlate with targets' readability, suggesting that variability in emotional intensity does not have a direct impact on target readability. However, there could still be differences between autistic and neurotypical targets in the actual content of recalled emotional events, which might in turn give rise to different associated mental states. In this study perhaps autistic targets tended to have rather uncomplicated emotions, such as positive feelings about a time when they were in love but negative feelings about a time when they were stressed. In contrast, perhaps neurotypical targets recall mixed emotions, for example that their experience of being in love was bitter-sweet or that their experience of being stressed was unpleasant but also exhilarating. In short, perhaps autistic targets recalled emotional experiences as unequivocally positive or negative while neurotypical targets recalled experiences that were mixed. Even if it were the case that autistic and neurotypical targets recalled similar kinds of emotions, it could nevertheless be that neurotypical people have become accustomed to hiding their feelings, especially feelings of stress and love. In contrast, perhaps autistic targets tend to exert less control over their expressions and are more likely to display their true feelings.

Moving on to perceiver ratings of whether they liked each target, previous studies have found autistic targets were rated less positively by young adults and by adolescents aged between 10 and 16 (Sasson et al. 2017). However, the current study is the first to systematically investigate whether autistic targets are universally viewed negatively across a wide range of population ages. It was found that while typically developing children aged 10-12 years, young adults and older adults were more likely to rate that they liked typically developing targets than autistic targets, there was no evidence to suggest typically developing children aged four-six and seven-nine years rated autistic and typically developing targets differently. It is highly unlikely that this was due to a failure to understand the task instructions as it is implausible that seven–nine-year-olds at the very least would not

understand the question. Moreover, the correlations suggested a good degree of similarity in the nature of the ratings across all age groups, implying that four-six- and seven–nine-year-olds were making judgments in systematic ways. Instead, the results imply that, unlike older individuals, children aged between four and nine years may not view autistic targets negatively. This is consistent with previous research that has reported that attitudes to disability tend to be positive during childhood up until adolescence, but drop off at this stage (e.g., De Boer et al. 2012; Rosenbaum et al. 1988), suggesting that younger participants are tolerant of diversity while older participants are more judgmental. Perhaps the kind of features (concerning aspects of appearance or aspects of behaviour) that might distinguish autistic targets are ones that younger participants either do not perceive or do not view negatively. If so, then it raises the possibility that the tendency to perceive autistic people negatively is not inevitable but rather is the product of development and all that it entails (in terms of exposure to prevailing attitudes, intolerance of diversity, social norms etc.)

The results of previous research (Alkhaldi et al. 2019; Sheppard et al. 2016) revealed a robust positive relationship between target readability and target likeability. This relationship maintained even when the diagnostic status of the targets was statistically controlled, suggesting a primary connection between being readable and being liked that was independent of whether the target was autistic or typically developing. In the current research, autistic targets were significantly more readable than typically developing targets, at least in some instances. One might predict, then, that autistic targets in this case would be more likeable than typically developing targets, if there is indeed a primary connection between readability and likeability. However, despite autistic targets being more readable than neurotypicals, they were still more likely to be perceived negatively. Hence, the results in the current research imply that readability and likeability are not primarily and directly connected with each other.

More broadly, the results raise the possibility that whether an individual is more or less readable depends on the context: Perhaps a person who is more readable in one kind of context is less readable in another. In contrast, it seems that ratings of likeability might transcend context to a degree (though not entirely – consider the 'waiting' scenario in Sheppard et al. 2016, in which targets were much more likely to be viewed negatively than in other scenarios), as it seems autistic targets might be liked less than neurotypical targets across a variety of different contexts.

In summary, the research reported here provides novel and unexpected findings on how autistic individuals are perceived by neurotypical people. Surprisingly, in some cases the signals in the behaviour of autistic targets were much easier for neurotypical perceivers to interpret than the signals in the behaviour of neurotypical targets. Nevertheless, neurotypical perceivers, particularly those above age 10 years, tended to rate autistic targets negatively, suggesting this is a pervasive phenomenon, at least among perceivers in late childhood and beyond.

The next chapter investigated the content of emotional experiences that autistic and neurotypical targets wrote about during the task. Specifically, it compared global (quality) aspects of the text excerpts using perceiver judgments and structural (quantity) aspects using computer software.

Chapter 4: Analysing autistic and neurotypical written texts using computer software and perceiver impressions

4.1 Introduction

Chapters 2 and 3 focused on people's perceptions of video recordings of targets while they were thinking about different emotional experiences. In Chapter 3 it was found that not only were perceivers significantly accurate in detecting whether targets were thinking about a positive or negative experience, they were also more accurate when the target was autistic. These results were surprising not only because previous research has found that autistic targets were less readable than neurotypical targets (Edey et al. 2016; Sheppard et al. 2016), but also because it has previously been found that autistic people have difficulties with episodic autobiographical memory which the task draws upon (Crane et al. 2012a; Lind & Bowler, 2010). Moreover, much existing literature suggests that autistic people may have poorer understanding of emotion or difficulty recognising their own emotional states (Downs & Smith, 2004; Erbas et al. 2013b). These observations seem to suggest that autistic people would produce expressions that would be less easily readable, perhaps due to having memories that are less vivid or with less clear emotional content.

This raises the question whether there were differences in the nature of the memories that targets recalled while doing the writing task (and being video recorded). While it is not possible to ever know for certain what another person is thinking about (West & Kenny, 2011), in the research reported in this thesis, targets were required to write down details of each emotional experience they recalled, which gives some indication of the nature and content of the memories recalled during the target phase of the study. Therefore, the

experiments reported in this chapter focused on the written text produced by the targets in order to determine whether there were differences between the autistic and neurotypical targets in their written narratives about emotional experiences.

In theory there are many ways in which written narratives could vary between different writers. For instance, there could be differences in the overall amount that is written or in the type of content that is written about. A meta-analysis of writing ability in autistic individuals carried out by Finnegan and Accardo (2018), suggested that autistic individuals wrote in less legible handwriting, used fewer words and wrote slower than neurotypicals. However, relying on handwritten assessments may pose as a limitation to the research in autistic writing as difficulties with handwriting may hinder one's ability to express ideas (Berninger & Amtmann, 2003). In Brown and Klein's (2011) study, participants were asked to type out excerpts on interpersonal conflict experiences and there was no time limit given to complete the task. The resulting texts were analysed by the principal investigator and two raters who were naïve to participants' diagnosis and rated independently. Findings revealed no differences in spelling, syntax and use of emotional terms. However, autistic individuals produced shorter excerpts than the neurotypicals. When it came to the content of the writing, autistic individuals were more likely to switch between ideas, found it hard to stay on topic, and were likely to give less background information regarding the topic. In another study, when asked to write about moral dilemmas, autistic individuals tended to use fewer mental state words and had shorter texts when compared to neurotypicals (Barnes et al. 2009), but these differences were absent when participants wrote about their interests. This suggest that differences in autistic and neurotypical writing may be dependent on the topic they write about.

Alternatively, there could be differences relating to the overall narrative that is provided. For example, there have been studies that suggest that autistic writers find it hard to

understand the perspective of their audience and therefore lack contextual information and connections in their writing (Colle et al. 2008; Diehl et al. 2006; King et al. 2014). In King et al.'s (2014) study, participants (children) were presented with a story stem and were told to continue the story. The narratives retrieved from the participants were then coded at a local (structural) level and a global level. For processing the structural aspects of the narratives, the study used a computer software called Systematic Analysis of Language Transcripts (SALT) to measure aspects such as word length, references to thoughts and emotions, use of direct speech, negative comments. For processing the global aspects of the narratives, an assessment tool, Narrative Scoring Scheme (NSS) was used and coded by two trained researchers on aspects of narratives in several categories such as conflict/resolution, character development, mental states, and cohesion. The study revealed significant differences between autistic and neurotypical groups. At a local level, autistic narratives were shorter in length, used shorter sentences, had fewer references to thoughts and emotions and were grammatically less complex. However, there were no group differences in use of mental states and evaluative devices (e.g., emphatic markers, hedges). At a global level, autistic narratives had less enrichment in their introductions, character development, references to mental states, references to conflict or resolutions. Narratives of the autistic group also seemed less coherent. The researchers attributed these differences using cognitive theories of theory of mind (Baron-Cohen et al. 1985) and executive function (Craig & Baron-Cohen, 1999). At a structural level, the results revealed no differences in use of mental states and other enrichment devices, but looked at globally, autistic narratives were significantly impoverished. They argue that this suggests that autistic individuals found no difficulties in using mental state references but found it difficult to connect them together in a coherent way.

However, in Brown et al.'s (2014) study, writing quality was not related to theory of mind difficulties in autistic participants and no differences were observed in spelling, grammar and cohesiveness of texts. Albeit autistic texts were given poorer overall quality ratings and were shorter in length. This contradicts a more recent study that compared writings of autistic and neurotypical university students (Gillespie-Lynch et al. 2020). They found that autistic writing had greater structural quality than the writings of neurotypicals when they used PaperRater (a computer website) to assess the frequency of aspects such as grammatical and spelling errors, vocabulary, and cohesion. No differences in the overall quality of the writing of the two groups were found when a selected team of autistic and neurotypical 'coders' were asked to judge the writing.

In summary, previous research is fairly mixed in relation to the written narratives of autistic people with some finding differences in both the structure and content of writing, but others finding few differences. Therefore, we carried out two studies to investigate a range of aspects of the written narratives of autistic and neurotypical targets while writing about emotional experiences. The first study used a computer software, Linguistic Inquiry Word Count (LIWC; Pennebaker et al. 2015), to compare the autistic and neurotypical texts. Specifically, this study aimed to investigate differences in content of the texts in three aspects that were previously indicated as being potentially different for autistic and neurotypical individuals: the number of words used, the number of words used to describe affective processes, and the number of words used to describe personal concerns such as work, leisure, money.

The number of words used is thought to reflect the competence to achieve what is required to create a narrative and difficulties in doing so may be linked to issues with theory of mind (King et al. 2014). Based on Brown and Klein's (2011) study where autistic individuals tended to produce shorter texts, and Brown et al.'s (2014) study where autistic

texts were also shorter in length, it was predicted that autistic participants would produce texts that were on average shorter in length than those produced by neurotypical participants. Due to the fact that existing literature suggests that autistic people may have poorer understanding of emotion or difficulty recognising their own emotional states (Downs & Smith, 2004; Erbas et al. 2013b) as well as the findings of Barnes et al. (2009) that autistic participants included fewer mental state words in their written narratives in some contexts, it was predicted that the autistic participants would include fewer words to describe affective processes. Finally, we focused on personal concerns because previous research conducted by Nguyen et al. (2014) found significant differences between autistic and neurotypical individuals in the number of words they used to describe personal concerns in social media and other online platforms. Particularly, they found that autistic individuals are more likely to write about issues related to work in their blogs and were less likely to write about issues related to leisure, religion, home and money. Therefore, we predicted that when writing about their emotional life experiences, autistic people would be more likely to write about issues related to their work and less about other aspects of personal concerns.

While the first study focused only on the numbers of words used of different types, the second study aimed to investigate more holistic differences in the quality of autistic and neurotypical writings. Neurotypical participants who were blind to the diagnostic status of the targets read and judged texts of autistic and neurotypical individuals on three aspects; coherence, example selected, and conveyance. Coherence referred to how clear and coherent the texts were perceived to be. Example Selected required a judgment of how good the example chosen by the target was in reflecting that particular emotional experience. The Conveyance judgment was about how well the sense of the experience selected was perceived to be conveyed by the target. Previous research on autistic writing has, by and large, produced lower quality ratings for autistic texts from both software analysis and also

from independent raters. Autistic texts have been judged to lack background information (Brown & Klein, 2011) and be significantly impoverished and less coherent (King et al. 2014). Therefore, based on previous studies, this study also expected to find that autistic texts will be rated lower on all of the three aspects: coherence, example selected and conveyance.

4.2 Study 1

4.2.1 Methods

4.2.1.1 Materials and procedure

The texts used were retrieved during the stimulus development phase of Chapter 3. Autistic and neurotypical targets were asked to write about when they felt excited, guilty, in love, proud, ashamed and stressed. Three of these were classified as positive experiences (excitement, pride and love) and three were classified as negative experiences (guilt, shame and stress) for both autistic and neurotypical individuals. Please refer to target phase in Chapter 3 for more details about the participants and procedure for acquiring the text stimuli. Figure 4.1 is an example of the text used.

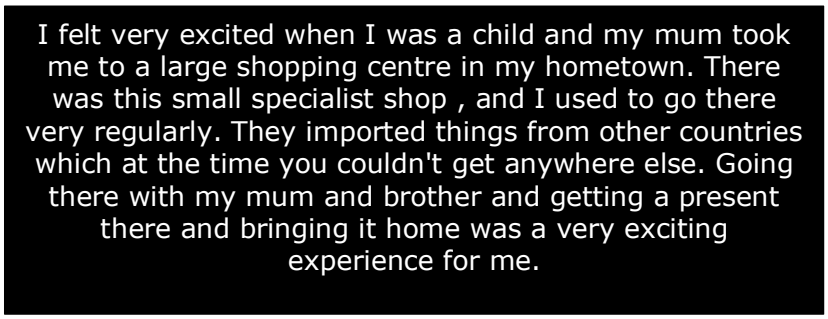

Figure 4.1. Example of text (excited) used

Linguistic Inquiry and Word Count (LIWC, Pennebaker et al. 2015) is a software program that reads texts and calculates percentages of words used that indicate aspects such as thinking styles, emotions, social concerns and parts of speech. LIWC organises words in different categories (e.g., psychological processes, personal concerns, etc.) by comparing

every word in the text against an in-built user defined dictionary and then calculates their percentages (Pennebaker et al. 2015a). For example, a mean value of 10.8 in "positive emotions" category indicated that a 10.8% of words used by the participant related to "positive emotions" (e.g., love, nice, sweet).

Autistic and neurotypical texts were corrected for spellings to ensure the LIWC dictionary captured most of the words of the text and was not affected by spelling mistakes. For example, 'i' was changed to 'I', 'Im' was changed to 'I'm', 'uni' was changed to 'university', 'beared' was changed to 'bore', 'weared' was changed to 'wore'. The LIWC dictionary captured an average of 93.4% of words used by the targets to describe their experiences. There were no significant differences in the percentage of words captured by the dictionary between autistic and neurotypical texts that were generated in relation to positive or negative experiences (p>.05, see Table 4.1).

Table 4.1. Percentage of words captured by LIWC dictionary for texts of both target groups

Dictionary	**AUTISTIC**	**NEUROTYPICAL**
Positive	93.2(3.72)	93.7(2.62)
Negative	92.9(3.82)	93.7(3.39)

The LIWC produces an output of 92 word categories. However, for this study, we focused on a limited number of these to avoid familywise error associated with carrying out large numbers of exploratory comparisons. Instead, out of the output given by LIWC, three categories derived from previous research were looked at: word count, affective processes, and personal concerns. Word count was simply the number of words written by every target for positive and negative experiences. Affective processes included five more variables: positive emotions, negative emotions, anxiety, anger, sadness. Personal concerns included work, leisure, home, money, religion and death. LIWC calculated the percentage use of

words that are related to the categories mentioned in proportion to the word count of every target.

4.2.2 Results

4.2.2.1 Linguistic Inquiry and Word Count (LIWC)

Table 4.2 shows the mean and standard deviation values retrieved for each variable and for each category. It also shows examples of words that describe each variable.

Table 4.2. Mean and standard deviation values of LIWC variables

			Experiences											
			Positive						**Negative**					
			AUT		**NT**		**Total**		**AUT**		**NT**		**Total**	
Broad Category	**Word type**	**Examples**	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Word Count			89.1	44.94	66.23	43.97	77.67	44.83	99.67	43.81	84.80	64.12	92.23	53.99
Affective Processes	affect	happy, cried	5.89	1.81	4.73	1.65	5.31	1.79	6.35	2.19	5.54	2.33	5.95	2.24
	positive emotions	love, nice, sweet	4.62	1.20	3.76	1.64	4.19	1.47	1.85	1.25	1.23	0.84	1.54	1.08
	negative emotions	hurt, ugly, nasty	1.25	1.10	0.92	1.16	1.09	1.11	4.43	1.57	4.05	2.78	4.24	2.2
	anxiety	worried, fearful	0.44	0.53	0.21	0.37	0.33	0.46	1.89	1.43	2.30	1.99	2.09	1.7
	anger	hate, kill, annoyed	0.24	0.42	0.19	0.37	0.22	0.39	0.61	0.57	0.43	0.54	0.52	0.55
	sadness	crying, grief, sad	0.36	0.44	0.13	0.41	0.25	0.43	1.09	0.97	0.32	0.36	0.7	0.81
Personal Concerns	work	job, majors, Xerox	3.15	1.64	4.27	3.37	3.71	2.64	3.62	2.56	4.29	3.33	3.95	2.91
	leisure	cook, chat, movie	2.35	2.48	2.46	2.53	2.4	2.44	0.72	0.980	0.76	0.62	0.74	0.8
	home	kitchen, landlord	0.74	0.69	0.52	0.68	0.63	0.67	0.42	0.44	0.44	0.58	0.43	0.5
	money	audit, cash, owe	0.20	0.29	1.29	0.93	0.75	0.87	0.50	0.66	0.35	0.69	0.42	0.66
	religion	altar, church	0.07	0.14	0.02	0.06	0.43	0.11	0.09	0.20	0.01	0.03	0.52	0.15
	death	bury, coffin, kill	0.05	0.10	0.02	0.06	0.03	0.083	0.15	0.32	0.02	0.07	0.87	0.24

4.2.2.2 Word Count

The total number of words used by autistic and neurotypical targets when describing positive and negative experiences were compared. A 2 (positive versus negative) X 2 (Autistic versus neurotypical) mixed measures ANOVA reported a main effect for valence, ($F(1,18) = 5.89$, $p < .05$, $\eta^2p = .25$), suggesting that targets used significantly more words to explain their negative than positive experiences. No main effect of target group was found, suggesting that both groups wrote about their experiences using similar number of words. No interaction was found.

4.2.2.3 Affective Processes

This category contained six variables: affective processes, positive emotions, negative emotions, anxiety, anger and sadness. Some of these variables are nested within one another i.e., affective processes includes both positive and negative emotions, and anxiety, anger and sadness are all subsumed within the negative emotions variable. A 2 (positive experiences versus negative experiences) X 2 (autistic versus neurotypical) mixed measures ANOVA was performed for each variable.

There were no main effects and no interactions for affective processes, suggesting targets did not differ in the total number of words they wrote that had affective content for positive and negative experiences and that both target groups used equal numbers of words relating to affective processes.

For the ANOVA relating to positive emotions, a main effect of valence ($F(1,18) = 34.16$, $p < .001$, $\eta^2p = .66$) was found suggesting that words related to positive emotions were used more for positive experiences than for negative experiences. There was also a main effect of target group ($F(1,18) = 4.81$, $p < .05$, $\eta^2p = .21$) whereby autistic individuals used

more words related to positive emotions than the neurotypical group. No significant interaction was found.

For negative emotions, a main effect of valence was found, ($F(1,18) = 34.82$, $p < .001$, $\eta^2p = .66$),) suggesting that words related to negative emotions were used significantly more in texts describing negative experiences than positive experiences. No differences were found between target groups and there were no significant interaction.

For the anxiety variable, a main effect of valence was found ($F(1,18) = 22.16$, $p < .001$, $\eta^2p = .55$), where words related to anxiety were used significantly more in texts describing negative experiences than positive experiences. There was no effect of target group and no significant interaction.

For the anger variable, a main effect of valence was again found, ($F(1,18) = 4.63$, $p < .05$, $\eta^2p = .21$ whereby words related to anger were used significantly more in texts describing negative experiences than positive experiences. No differences were found between target groups and there were no significant interaction.

Finally for the sadness variable, a main effect of valence was found, ($F(1,18) = 7.42$, $p < .05$, $\eta^2p = .29$), suggesting that words related to sadness were used more for negative experiences than positive experiences. There was also a main effect of target group, ($F(1,18) = 5.66$, $p < .05$, $\eta^2p = .24$) whereby autistic individuals used more words related to sadness than the neurotypical group. No significant interaction was found.

4.2.2.4 Personal Concerns

This category also contained six categories: work, leisure, home, money, religion, and death. A 2 (positive experiences versus negative experiences) X 2 (autistic versus neurotypical) mixed measures ANOVA was performed for each variable (six in total). There were no main effects and no interactions for the ANOVAs for work, home, religion and death variables.

A main effect of valence was found for the Leisure variable, ($F(1,18) = 9.25$, $p < .005$, $\eta^2p = .34$) suggesting that words related to leisure were used significantly more when describing positive experiences than negative experiences. No differences were found between target groups in their use of words pertaining to leisure and there was no significant interaction.

For the Money variable there were no main effects but there was a significant interaction between valence and target group ($F(1,18) = 9.07$, $p < .005$, $\eta^2p = .34$). Post-hoc independent samples t-tests revealed that neurotypical targets used significantly more words related to money when writing about positive experiences compared to autistic targets, ($t(18) = -3.52$, $p < .005$), while there was no difference between the target groups in their use of words relating to money for negative experiences.

4.2.3 Discussion

Findings from LIWC reported that autistic and neurotypical targets used similar number of words to describe their positive and negative experiences suggesting that both target groups were equally able to create a narrative about their life experiences. In fact, both groups used more words to describe their negative experiences compared to their positive experiences suggesting that both target groups had a more expansive narrative to write for their negative experiences. This is consistent with previous research which also found a tendency for individuals to write long narratives when writing about negative experiences (e.g., Bohanek et al. 2005; Gray & Lombardo, 2001).

For the words describing affective processes, both target groups used similar number of words describing anxiety, anger and negative emotions. Moreover, words related to negative emotions, anger, anxiety and sadness were used significantly more by both target groups when they wrote about their negative experiences and words related to positive emotions were used significantly more by both groups when they wrote about their positive

experiences. This goes some way towards validating the LIWC software in that it appears to be sensitive the emotional content of the different narratives that were produced. It also makes evident that targets from both groups complied with the instructions given for the study and produced narratives that reflected the appropriate emotional content.

Furthermore, significant differences between target groups were found for number of words used to describe positive experiences and also those used to describe sadness. Autistic individuals used more words related to positive experiences and sadness compared to neurotypicals. This appears to go against the notion that autistic individuals have difficulty processing emotional content and/or have difficulty identifying their own emotions (e.g., King et al. 2014). Instead, it suggests their narratives were particularly rich in some kinds of emotional content.

With regards to the personal-concerns category, the target groups used similar numbers of words relating to work, home, religion, death, and money and no differences were found in these categories between positive and negative experiences. Perhaps, this suggests that work, home, religion, death and money concerns can be equally demonstrated in positive as well as negative life experiences. However, a significant interaction was reported in the money category and revealed that the neurotypicals used more words relating to money when they wrote about their positive experiences compared to autistic targets. This seems to suggest that money features more prominently in positive experiences for neurotypical than autistic individuals. However, for the leisure category, both autistic and neurotypical targets used more words concerned with leisure to describe their positive experiences. This indicates that leisure concerns were more associated with positive than negative experiences for both autistic and neurotypical individuals.

Study 2 compared the same texts used in study 1, but instead of using software, other people judged various global qualities of the text excerpts of autistic and neurotypical

individuals. Specifically, it looked at differences in how clear and coherent the texts are perceived to be, how good of an example the target selected to describe their experiences, and how well targets were able to convey the emotional content of the experiences.

4.3 Study 2

4.3.1 Methods

4.3.1.1 Participants

Forty individuals (F=37, M=3) aged between 18 and 32 (*M*=20.73, *SD*=4.22) were recruited through the University of Nottingham. Participants gave their informed consent prior to the study. This study was approved by the School of Psychology ethics committee.

4.3.1.2 Materials

The stimuli used in this study were the same texts as in study 1. One hundred and twenty texts in total were produced from 20 targets for their six experiences. As the number of words used in texts ranged from eight to 318 (M=84.95, SD=58.56), it was not feasible for participants to view all 120 texts in the study, due to the length of time it would take to read each text, and the possibility of fatigue effects or even withdrawal.

To overcome this, every perceiver viewed 60 texts of which 30 came from autistic targets and 30 came from neurotypical targets. An algorithm was created to determine which texts each perceiver viewed such that every text was viewed 20 times in total. In order to do this, a random number generator was used to assign each text a number between 1 and 120. If an odd number was generated, it was assigned to a neurotypical target and if an even number was generated, it was assigned to an autistic target until all texts had been assigned. This ensured that every text had a specific number. The algorithm then was used to create 40 unique sets of texts by selecting different sections of the 120 (See Table 4.3).

Table 4.3. Assignment of texts created by the algorithm

Ptpt No.	**Set of texts**	**Ptpt No.**	**Set of texts**	**Ptpt No.**	**Set of texts**	**Ptpt No.**	**Set of texts**
1	1-60	2	61-120	3	4-63	4	64-3
5	7-66	6	67-6	7	10-69	8	70-9
9	13-72	10	73-12	11	16-75	12	76-15
13	19-78	14	79-18	15	22-81	16	82-21
17	25-84	18	85-24	19	28-87	20	88-27
21	31-90	22	91-30	23	34-93	24	94-33
25	37-96	26	97-36	27	40-99	28	100-39
29	43-102	30	103-42	31	46-105	32	106-45
33	49-108	34	109-48	35	52-111	36	112-51
37	55-114	38	115-54	39	58-117	40	118-57

Participants rated each text they viewed on three questions. The first asked perceivers how clear and coherent they thought the piece of writing was. Then they were asked to what extent they thought the writer has selected a good experience to illustrate the mental state. Finally, perceivers were asked how well they thought the text conveyed the sense of the mental state. Figures 4.2- 4.4 illustrate how the questions appeared to participants.

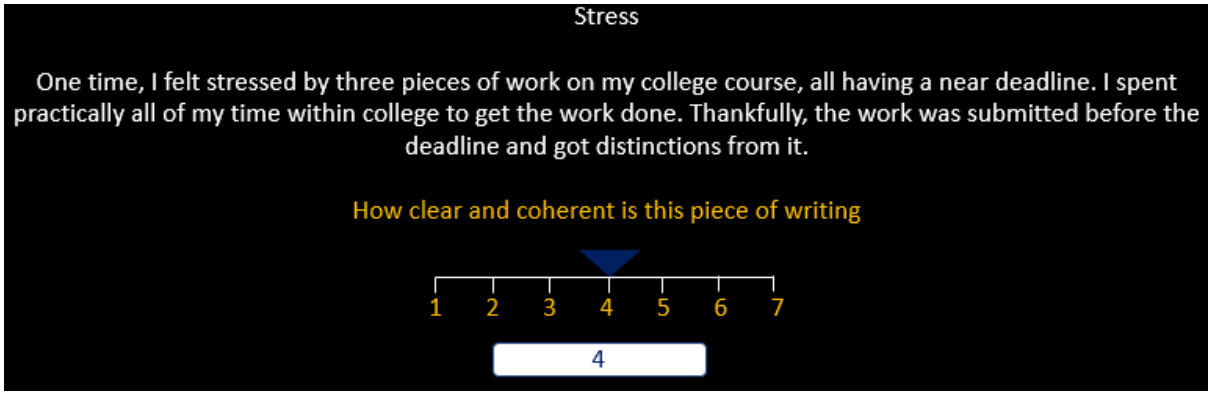

Figure 4.2. Illustration of coherence question

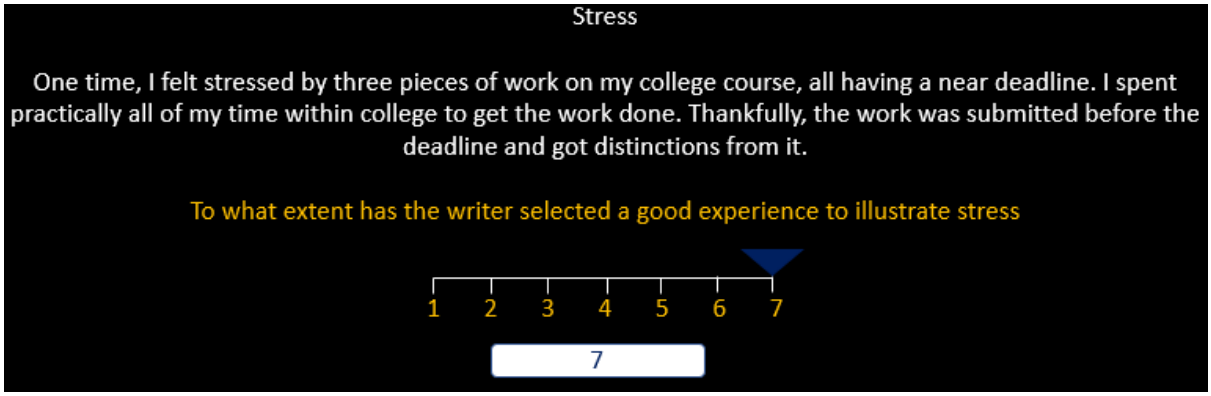

Figure 4.3. Illustration of experience question

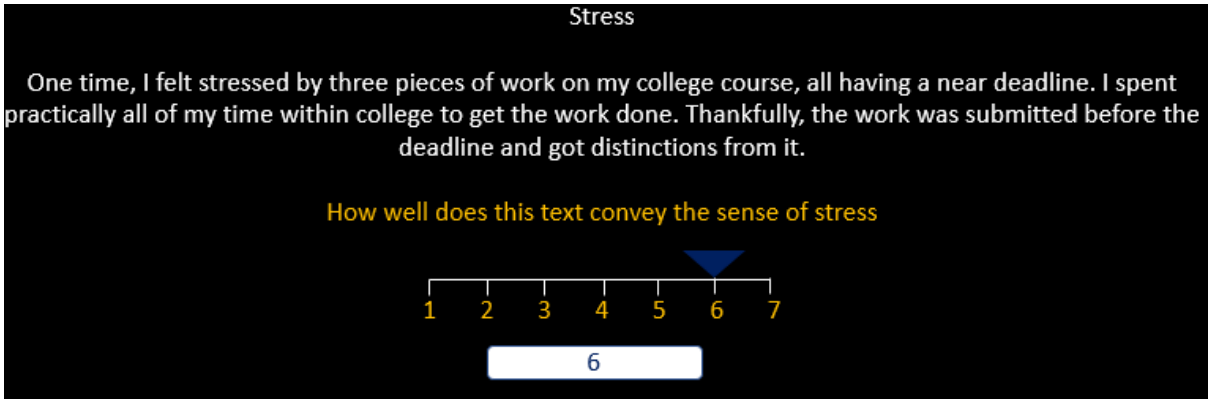

Figure 4.4. Illustration of conveyance question

4.3.1.3 Procedure

Participants were informed that they would see a series of text scripts from people who wrote about experiences in their life where they felt excitement, guilt, love, pride, shame and stress. They were not informed about the diagnostic status of the targets. Texts written by

the targets were then shown in a random order on a computer screen using PsychoPy3 (Peirce et al. 2019). For every text viewed, questions on coherence, experience and conveyance appeared consecutively (as shown in figures 4.2, 4.3, and 4.4 above). Participants answered the questions on a scale of 1 to 7, ('1' being the least and '7' being the most) and then pressed space to move on to the next text. Each participant rated 60 texts in total on each of the three questions. There was no time limit for this task; however, all participants managed to complete the study within an hour.

4.3.2 Results

Each target had scores from 20 participants for each of their individual texts. These 20 scores were again averaged to get one score for each target per experience, per question. In line with the analytic approach in Chapters 3 and 4 scores of excited, proud and in love texts were combined to form an average score for positive experiences and scores of guilt, shame and stress texts were combined to form an average score for negative experiences. Thus, every autistic and neurotypical target had an average rating score for their positive and negative experiences for each of the three questions asked: coherence, experience and conveyance.

4.3.2.1 Coherence

Figure 4.5 shows how participants judged autistic and neurotypical texts on coherence. According to the graph, the ratings given to autistic and neurotypical texts almost seem identical. A 2 (positive versus negative) X 2 (autistic versus neurotypical) repeated measures ANOVA reported no main effects and no significant interactions (p>.05) suggesting that participants found autistic and neurotypical texts equally clear and coherent and there were no differences between positive and negative experiences.

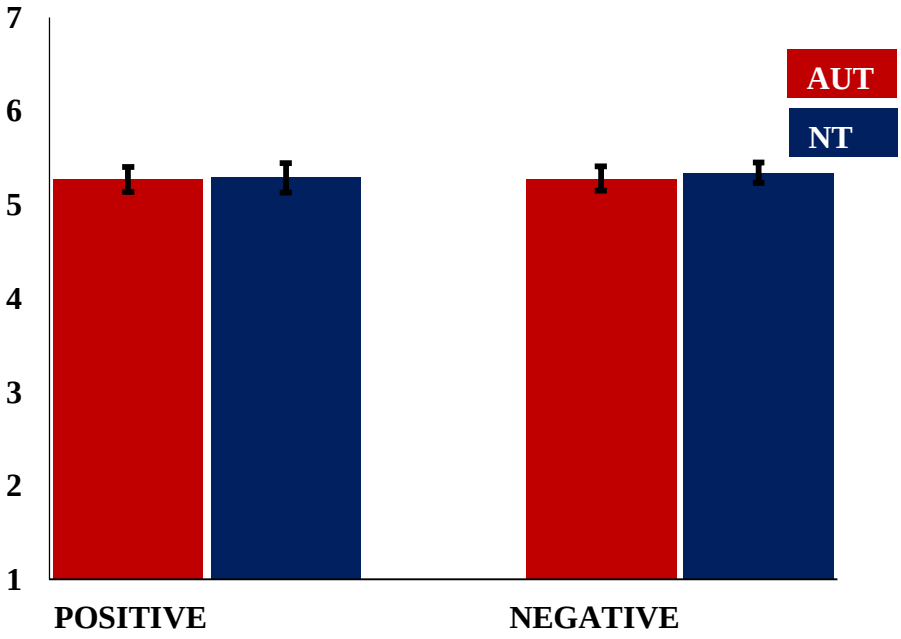

Figure 4.5. Mean coherence ratings for autistic and neurotypical texts

4.3.2.2 Example Selected

Figure 4.6 shows how participants rated whether targets selected a good example to write about for a particular mental state. A 2 (positive experiences versus negative experiences) X 2 (autistic versus neurotypical) repeated measures ANOVA reported a main effect of valence, ($F(1,19) = 6.10$, $p < .05$, $\eta^2p = .24$), suggesting that negative experiences were perceived to have better examples ($M = 5.36$, $SD = 0.48$) than positive experiences ($M = 5.24$, $SD = 0.51$) . A main effect for target group was also reported, ($F(1,19) = 4.98$, $p < .05$, $\eta^2p = .21$), suggesting that neurotypical targets ($M = 5.35$, $SD = 0.48$) were perceived to select better examples for their experiences than autistic targets ($M = 5.24$, $SD = 0.50$). A significant interaction, ($F(1,19) = 5.16$, $p < .05$, $\eta^2p = .21$), suggested that the effect of valence depended on type of target group. Post hoc paired samples t-tests revealed that the autistic group were perceived to select better examples of negative experiences than positive experiences, ($t(19) = -3.97$, $p < .005$) while the neurotypical group were perceived as selected equally good examples for both experiences. Furthermore, neurotypical targets were

perceived as selecting better examples than autistic targets for positive experiences ($t(19) = -3.67$, $p < .005$) but not for negative experiences.

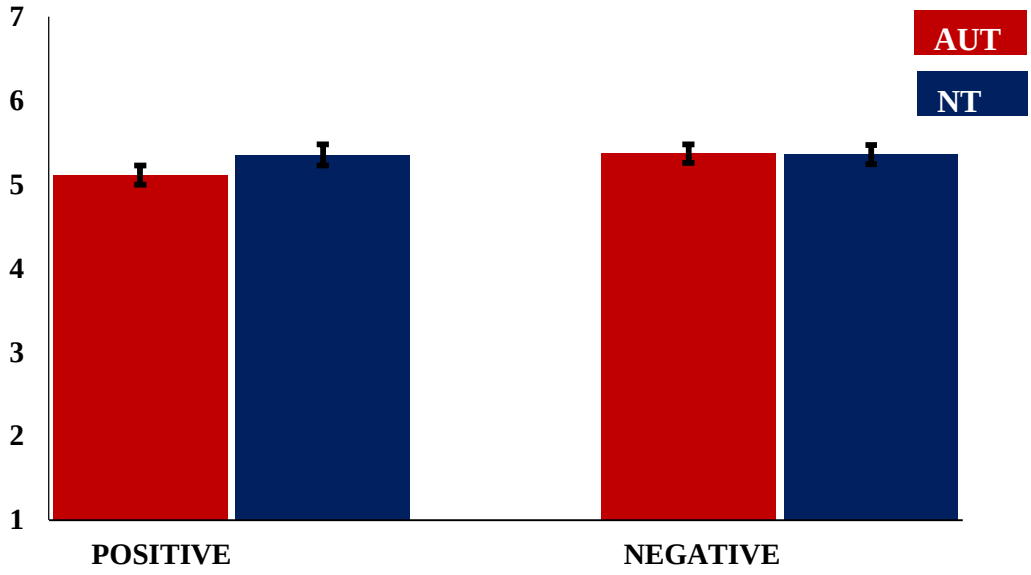

Figure 4.6. Mean example ratings for autistic and neurotypical texts

4.3.2.3 Conveyance

Figure 4.7 shows ratings of how well texts were perceived to convey a sense of a particular mental state. A 2 (positive experiences versus negative experiences) X 2 (autistic versus neurotypical) repeated measures ANOVA reported no main effects of valence and target group ($p > .05$), but there was a significant interaction ($F(1,19) = 19.54$, $p < .001$, $\eta^2p = .51$). Post hoc paired samples t-tests revealed that negative experiences ($M = 5.07$, $SD = 0.66$) were perceived to be conveyed better than positive experiences ($M = 4.81$, $SD = 0.59$) only in the autistic group ($t(19) = -3.06$, $p < .05$), but not the neurotypical group. Moreover, autistic targets ($M = 5.07$, $SD = 0.66$) were perceived to be better at conveying a sense of their negative experiences ($t(19) = 3.55$, $p < .005$) than neurotypical targets ($M = 4.78$, $SD = 0.62$).

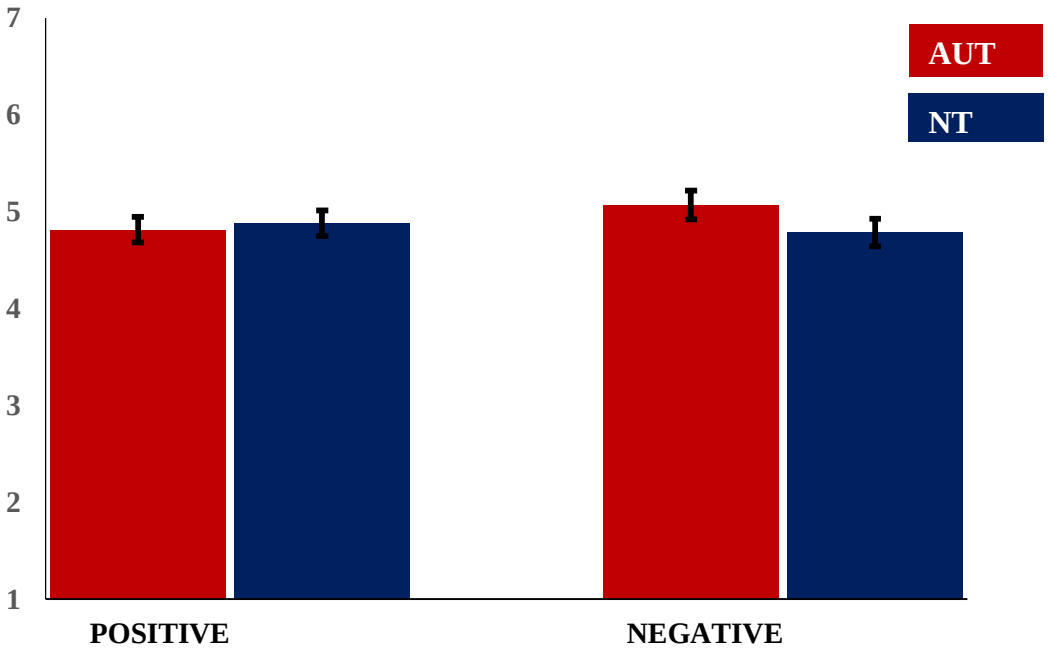

Figure 4.7. Mean conveyance ratings for autistic and neurotypical texts

4.3.3 Discussion

Findings from study 2 reveal that autistic and neurotypical texts were perceived to be equally clear and coherent. This suggests that references and ideas in the autistic texts were well connected in a coherent way and showed no sign of being impoverished in comparison to the neurotypical texts.

Significant differences were found where perceivers judged how good an example was selected to narrate an emotional experience. Results revealed that negative experiences were perceived to have better examples than positive experiences, but only in the autistic target group. And neurotypicals were perceived to have selected better examples than the autistic individuals, but only for the positive experiences. In other words, it was perceived that poorer examples were chosen specifically for positive experiences by autistic targets than for the other group/experience combinations. One possible explanation for this is that autistic targets' positive experiences (although not their negative ones) do not conform so well to what neurotypical others consider to be positive experiences. Since the perceivers in this

study who were judging the examples were neurotypical, they may have related more easily to positive experiences of other neurotypical people.

With regards to how well the texts were conveyed, findings revealed the sense of the emotion in negative experiences was perceived to be better conveyed than positive experiences only in the autistic group and autistic individuals were perceived to be better conveyors of the sense of the emotion than neurotypical individuals only when describing negative experiences. This is somewhat in line with the findings from the LIWC which found rather rich emotional content in the autistic texts at the level of individual words, although in that case it was for positive rather than negative content. Again, these findings go against the notion that autistic people lack the ability to reflect on or identify their own emotions.

4.4 General Discussion

The main aim of the study was to compare written texts produced by autistic and neurotypical targets when describing their emotional experiences. Two kinds of analysis were carried out. The first of these was done using a computer software (LIWC), which specifically examined the frequency of various kinds of words within the text. The second analysis investigated people's global impressions of the texts, to examine how clear and coherent they perceived it to be; how good the examples chosen to illustrate each emotion were; and how well the writing conveyed a sense of that emotion.

With regards to the number of words used to describe their narratives, in contrast to the prediction made, there were no differences found between autistic and neurotypical texts suggesting that both target groups were equally able to create narratives to describe their life experiences. The ability to develop narrative descriptions of our own experiences indicates that we are able to make sense of behaviours (Zellermayer, 1997). Autistic and neurotypical targets were able to do so for both their positive and negative experiences. This does not support findings from previous research (Brown & Klein, 2011; Brown et al. 2014) that

reported autistic texts to be shorter in length. The differences could be due to the fact that the current study required targets to write about emotional experiences that they have felt in their lifetime, which gave targets quite a bit of freedom to write narratives of their choices from their own lives. Whereas, for example, in Brown and Klein's (2011) study, autistic individuals were presented with a specific problem that occurred between people and were told to explain what the problem was. So, the topic of writing was something external whereas in the current study, it was from their own autobiographical experiences which, perhaps, led them to write more.

Moreover, autistic and neurotypical targets groups used more words to describe their negative experiences compared to the positive ones. This is consistent with previous findings that reported individuals tended to write longer narratives to describe their negative experiences when compared to writing narratives of positive experiences (Bohanek et al. 2005; Gray & Lombardo, 2001). In fact, previous research indicated that narratives related to traumatic experiences were reported to be longest even though the experience may have happened further in the past (Gray & Lombardo, 2001). Bohanek et al. (2005) proposed that negative experiences may be viewed as a problem that needs to be solved. And as a coping method, individuals may need to process the experiences and reflect on how and why it happened and how they felt about it. This helps them make the experience more meaningful and thus support them in coping with the negativity. The current findings indicate that autistic individuals were as good as neurotypicals in creating narratives for their negative experiences.

When examining the number of words used in relation to affect as a whole, there were no group differences, consistent with Brown and Klein's (2011) study that found no differences in number of emotion words used by autistic and non-autistic individuals, but contradicting Barnes et al's. (2009) study that suggested that autistic individuals used less

mental state words than their neurotypical counterparts. However, group differences did emerge in use of words related to positive emotions (but not negative emotions) whereby autistic individuals used more words related to positive emotions than neurotypical participants. Examining some individual mental states, there were no group differences in words related to anxiety or anger, but the autistic participants used more words related to sadness suggesting that sometimes they actually used more affect to describe their experiences. The use of more words in describing these experiences might indicate having more elaborate memories of events in these categories but it is not clear why autistic people used more words for these types of experience in particular. Given that the targets' task was to write about emotional experiences, these results appear consistent with Gillespie-Lynch et al's. (2020) study that reported enhanced writing skills in autistic individuals.

Unlike previous studies, the results suggest that autistic individuals have a good understanding of their emotional experiences and are able to recognise and express their own mental states (Downs & Smith, 2004; Erbas et al. 2013). A possible explanation for the differences could be the difference in tasks used in the studies. In Barnes et al. (2009), autistic individuals watched emotionally charged video clips that depicted moral dilemmas and were then told to write about what they saw. Brown and Klein's (2011) study also used a similar approach of making autistic individuals watch video clips depicting various types of conflicts and then were told to write a narrative about it. In contrast, the current study asked participants to write their personal experiences. It could be that autistic individuals were more motivated and interested in writing about their own experiences rather than those of others, and in particular they may have been able to write more when having the freedom to select an example of their own choosing. Indeed, autistic individuals showed enhanced writings skills when they were free to write about a topic of their interest (Gillespie-Lynch et al. 2020). Nevertheless, the findings are still somewhat surprising as, in contrast to previous studies that

have reported impairments in autobiographical memories in autistic individuals (e.g., Crane et al. 2012; Kristen et al. 2014), the findings seem to suggest that autistic targets did not struggle with retrieving autobiographical content during the task.

With regards to the personal concerns category, words related to leisure were significantly higher in positive experiences for both autistic and neurotypical groups, indicating that for both groups positive experiences were related to leisure activities more often than negative experiences. Indeed, leisure activities have been reported to spawn positive emotions within individuals (Stebbins, 2018) and are also associated with physical and psychosocial health and well-being (Pressman et al. 2009). Overall, there were few group differences in their references to personal concerns. This was contrary to the prediction as findings revealed that both autistic and neurotypical individuals used words related to leisure, religion and home in similar ways. However, with regards to words related to work, and in contrast with Nguyen et al.'s (2014) findings, no significant differences were found between the groups. A plausible explanation for the difference in findings could be the differing context of writing. Nguyen et al.'s (2014) study looked at texts that were on a social media platform written by bloggers and therefore had a more general and varied content while this study was specifically addressing emotional autobiographical experiences. Also, the sample in the current study was largely of students, who may not have a large number of experiences relating to work yet, whereas Nguyen et al.'s (2014) study involved the general population. Hence group differences may only emerge in populations where employment is a key part of life.

Group differences did however emerge in use of words related to money. Neurotypical individuals used significantly more words related to money when describing their positive experiences than autistic individuals did. These results support Nguyen et al. (2014) which found that autistic individuals used less words related to money. One possible

explanation for this is that the autistic participants were less materialistic and consequently did not consider their experiences relating to money as being particularly positive, with other kinds of positive experience being more salient to them. Alternatively, autistic individuals may simply have had fewer positive experiences involving money. Previous studies suggest that families of autistic individuals experience additional economic burden (Buescher et al. 2014); however, no measures of financial status were taken in this study, so it is not clear whether this applies in the current research.

The second study investigated the quality of autistic and neurotypical targets' writing based on other's judgements of it with regards to how clear and coherent the text was, how good of an example the experience was for the emotional state, and how well it conveyed the sense of that emotion. The results reported no differences in coherence and clarity of writing between the groups suggesting that autistic writing was perceived to be equally clear and coherent as neurotypical writing. Coherence in narratives has been associated with higher quality of social relationships (e.g., Burnell et al. 2010; Vanaken & Hermans, 2021; Waters & Fivush, 2015). The ability to create a coherent and emotional integrated narrative of one's experiences demonstrates that an individual has managed to give meaning to the experience and has acquired control over it (Bohanek et al. 2005) and the ability to create coherent narrative is also associated with better psychological well-being (Alvarez-Conrad et al. 2001). This might, therefore, suggest that autistic and neurotypical targets had equal insight into their experiences and were at a good state of psychological well-being during the study. However, this finding does not support that of King et al. (2014) that suggested autistic narratives to be less coherent. The differences may be attributed to the age of the participants; King et al's. (2014) study had participants between the age of 11 and 14 years while this study had adult participants. Therefore, the lack of coherence may be related to delayed language development in autism (e.g., Mody & Belliveau, 2013) as differences in coherence

of writing were only present in children. It is also worth bearing in mind that the participants within the study were university students, who have completed many years of formal education, and are required to write quite regularly for their courses. Thus, it is perhaps not unsurprising that the written texts produced by both groups were of a similar standard of quality in this respect.

When perceivers were asked to judge how good of an example targets used, to narrate their positive and negative experiences, findings revealed that negative experiences of the targets were perceived to have better examples chosen than for positive experiences. Further analysis revealed that this effect was only found in autistic targets while positive and negative experiences of neurotypical targets were judged equally. Perceivers also judged neurotypical texts to have better examples of narratives when compared to the autistic narratives, but only found for positive narratives. In other words, examples of positive experiences from autistic targets were judged more poorly than the other types of examples. This could indicate that autistic individuals may have had fewer positive experiences in their lives and therefore have less options to select from in order to narrate a positive experience. Consistent with this possibility, it has already been established that autistic individuals experience considerable stigma (Botha et al. 2020; Shtayermman, 2009), and are at a higher risk for mental health problems (Rosbrook & Whittingham, 2010; Strang et al. 2012) than neurotypical individuals. However, further research needs to be carried out to investigate this. A possible way to do this could be to carry out diary studies in which matched autistic and neurotypical individuals write out their everyday positive and negative experiences over a short period of time. An alternative approach could be to give out surveys that includes questions on frequency measures on the number of times autistic and neurotypical individuals experience negative and positive events.

Another possible interpretation noted earlier is that the perceivers, who were neurotypical, may have just found the examples of positive experiences written by other neurotypical individuals as more relatable than those generated by the autistic targets. Indeed, the Double Empathy Problem (Milton, 2012) proposes that due to having broadly different perceptions and experiences of the world, autistic and non-autistic individuals often struggle to empathise with one another. Thus, perhaps the neurotypical perceivers did not empathise so readily with the circumstances that autistic targets reported as giving rise to those mental states (although it is not clear why this was only the case for positive emotions). Future research could pose the same questions to autistic perceivers to determine whether they would consider the examples produced by autistic targets as more suitable.

Furthermore, perceivers rated that the sense of emotion was conveyed similarly in the positive and negative experiences and by autistic and neurotypical targets. However, there was an interaction that suggested that for autistic narratives, the sense of emotion in negative experiences were judged to be better conveyed than in their positive experiences. Also, for negative narratives, autistic individuals were judged to be better at conveying the sense of the emotion than the neurotypical individuals. This contradicts the notion that autistic people are impaired in identifying or communicating about their emotions (e.g., Kings et al. 2014)) and even implies that they may be particularly adept at doing so when the emotions are negative. In line with Bohanek et al. (2005), it can be argued that autistic individuals processed their negative experiences better than neurotypical individuals.

In summary, these findings suggest that autistic individuals' narratives have many similarities but also some differences from neurotypical individuals' narratives in the quality and the structural aspects of writing. Autistic individuals even seemed to be better on some of the measures - particularly those relating to the amount and quality of the emotional content of the narratives. While surprising in the context of the extant literature, these findings are

arguably somewhat analogous to those in Chapter 3 in which video clips were used where perceivers were more accurate in recognising some of the experiences of autistic individuals compared to neurotypicals. Furthermore, findings from this study suggest that autistic individuals are perceived to be good in expressing their own emotional experiences in writing, which, in turn, implies that they have a good understanding of their mental states. Nevertheless, it is important to note that these findings may not extend to how autistic individuals understand and express other people's experiences. Thus, perhaps, future research can investigate the differences in autistic and neurotypical writing, in tasks that require writing about not only their own experiences but also writing about others experiences such as their friends and family.

The next Chapter explores the ability of perceivers to identify an autistic diagnosis by reading target narratives and also by watching brief samples of target behaviour. It will also investigate whether perceivers being informed about the targets having an autism diagnosis affects their likeability rating

Chapter 5: Can non-autistic individuals perceive the diagnostic status of autistic individuals?

5.1 **Introduction**

In Chapter 4 autistic and neurotypical targets' narratives were compared using computer software and people's judgments regarding certain aspects of the nature and quality of the texts. Autistic targets' texts were not judged as being poorer in terms of the quality for most of the judgments made including those made regarding its clarity and coherence, and how it was conveyed. In fact, some of the autistic texts were perceived to be better conveyed than the neurotypical texts. This finding reflected that of Chapter 3 in which perceivers were not less accurate in interpreting autistic targets' expressions while thinking about past events compared to neurotypicals, and, in some cases, were more accurate in judging autistic targets' behaviour. However, apart from the youngest age group (four-six years old), all perceiver groups tended to give more likes to neurotypical individuals compared to autistic individuals when asked to judge whether or not they liked the target. This suggests that based on what they see, perceivers were to some extent systematically discriminating between autistic and neurotypical target groups without even having the knowledge of their diagnosis.

According to Wearden et al. (1998), it takes only about 100 milliseconds for a person to form a first impression of a target for various traits such as trustworthiness, aggressiveness, likeability, competence, and attractiveness. Autistic individuals have been reported to be systematically judged negatively after people watched brief samples of their behaviour (Chapter 3: de Marchena & Eigsti, 2010; Faso et al. 2015a; Grossman, 2015; Heerey et al. 2003; McCann & Peppé, 2003; Sasson et al. 2017). For example, one of the studies showed neurotypical participants video clips and images of autistic and typically developing children and asked them to imagine being part of a social group whereby they had to interact with the children (Grossman, 2015). They were then asked whether they thought the children were

socially awkward. Participants carried out the task without being aware of the children's diagnostic status. The results revealed that although not all autistic children were rated as socially awkward and some typically developing children were rated as such, the autistic children as a group were rated significantly more awkward.

Similar findings were produced by Sasson and colleagues (2017) when they showed children and adults brief samples of behaviour through video clips, audio clips, still images and speech transcripts of autistic and neurotypical individuals as they performed a mock audition for a reality show. The participants rated the stimuli on traits such as trustworthiness, attractiveness, likeability, awkwardness. Participants were also asked questions such as how likely they would hang out with the person or start a conversation with them and how willing would they be to live near them. Autistic children and adults were given significantly more negative ratings than neurotypical targets when perceivers were viewing video, audio clips and still images, although this effect was not found when participants viewed speech transcripts. The participants made these judgements within seconds and without having information of the diagnostic status of the people they were shown.

A more recent study (Alkhaldi et al. 2021) showed participants video clips of autistic and neurotypical individuals depicting brief samples of their behaviour and asked them whether they liked or disliked the individual. Participants were not aware that some of the targets in the video clips were autistic individuals and were more likely to dislike autistic individuals than the neurotypicals. These findings suggest that not only are autistic people perceived less favourably as a matter of degree (Sasson et al. 2017) but they are at least, by some, perceived quite negatively. Being disliked, as opposed to being liked, might be associated with particularly negative outcomes for the individual such as being stigmatised, and experiencing social exclusion or bullying (Alkhaldi et al. 2021).

Some researchers have gone on to ask whether certain conditions might impact likeability ratings for autistic targets, and in particular whether neurotypical individuals can be influenced to give more favourable ratings under some circumstances. This was addressed in Sasson and Morrison (2019), who examined the impact of diagnostic disclosure on social favourability ratings of autistic targets. In this study, they gave one group of participants accurate information regarding autistic diagnosis of each target, gave another group inaccurate information i.e., mislabelled autistic targets as neurotypical and vice versa, and gave no information to the third group. They also added a fourth condition in which they mislabelled participants as having schizophrenia, a psychotic disorder which also has some social features. The results revealed that the participants who were given accurate diagnostic information gave significantly better first impression ratings to autistic individuals when compared to the group that was given no information. This was most apparent in ratings of likeability, trustworthiness and likelihood of starting a conversation. Furthermore, the group that was given inaccurate information gave mislabelled neurotypicals (labelled as autistic) better ratings than the group that was given no information. This effect was not found when participants were mislabelled as having schizophrenia suggesting a decreased stigma attached to autism comparatively. Similar findings have also been reported by (Matthews et al. 2015). They gave participants three vignettes that described an interaction with a main character. The main character was either labelled as autistic, neurotypical, or had no label at all. Participants read the vignettes and rated their attitudes towards the vignette characters. They found that people rated the autistic characters much more favourably than the characters in vignettes which had no label. Overall, Matthews et al. (2015) and Sasson and Morrison's (2019) findings seem to indicate the possibility of more positive social outcomes for autistic individuals if they were to reveal their diagnostic status to others.

Nevertheless, it is important to note that both studies gave labels individually to the targets and therefore participants might have been biased in their ratings where targets were labelled as autistic. They might have been aware that their attitudes towards autism would be reflected in their ratings and therefore choose to give responses that are socially acceptable. This can be observed from Sasson and Morrison's (2019) findings where neurotypicals who were mislabelled as autistic were given higher ratings than when no information was provided. Therefore, it can be argued that the increase in social favourability ratings might just be a reflection of perceivers' desire to be socially tolerant as they were aware that their ratings might expose their attitudes towards autistic individuals. Indeed, some research has reported that people tend to show positive attitudes toward autism only in explicit contexts but perceive it as quite negative implicitly (Dickter et al. 2020). Moreover, according to autistic individuals' self-reports, revealing their diagnostic status has been observed to lead to more feelings of discrimination (Jones et al. 2015). Therefore, the findings of increased likeability ratings once diagnosis is disclosed (Matthews et al. 2015; Sasson & Morrison, 2019) may be linked to their explicit attitude that produces the positive response bias. Additionally, a more recent study (Jones et al. 2021) reported positive results in reducing explicit attitudes towards autism after being exposed to an autism acceptance training program. However, implicit attitudes towards autism remained unchanged. The authors explain that implicit biases may be more difficult to change as they indicate a person's underlying beliefs and unconscious associations that they may have formed over time which are consistent with societal stereotypes (Schuman et al. 1990). On the other hand, explicit biases can be easily changed and are influenced by knowledge and experience (Jones et al. 2021).

Furthermore, there is evidence that people's attitudes towards autism plays a role in how disclosing diagnosis affects their views of autistic individuals. Morrison et al. (2019)

found that individuals who possess high levels of stigma are more likely to negatively rate individuals who were labelled as autistic when compared to ratings when no diagnostic information was provided. According to Corrigan's (2007) labelling theory, when a clinical diagnosis is disclosed to others, the individuals expose themselves to pre-established stereotypes that people have regarding the diagnosis which further worsens their perceptions. Therefore, it is possible that those studies who found an increase in likeability after diagnostic disclosure actually measured perceivers' explicit attitudes/social desirability bias and not their real attitudes, which in turn led to biased positive results. Hence, this suggests a need for further investigating the effect of disclosing diagnostic information on autistic individuals.

As can be seen from previous studies, it is quite apparent that perceivers are able to distinguish between autistic and non-autistic targets in the manner in which they make their judgments, particularly about social favourability, albeit in an implicit fashion. The studies reported in this chapter ask whether perceivers can more directly determine which targets are autistic if explicitly required to do so. Thus, the first of aim of this chapter was to present perceivers with video clips of autistic and neurotypical individuals to determine whether they can accurately deduce whether the target is autistic or not (study 1a). The research also asked whether perceivers would be able to judge autism diagnosis based on the written text excerpts used in Chapter 4 (Study 2a).

Based on the previous studies (Alkhaldi et al. 2021; Sasson et al. 2017) we expected to find that perceivers would be significantly accurate (above chance) in their judgements about whether targets were autistic or neurotypical when presented with video clips depicting brief samples of their behaviour. In relation to text excerpts, Sasson et al. (2017) found no differences between the social favourability ratings given to autistic and neurotypical texts which might suggest that perceivers would struggle to discriminate them. However, based on

results from Chapter 4, where perceivers rated autistic individuals to be better conveyors and choosing better examples to illustrate their negative experiences, it is possible that perceivers will, to some extent, differentiate autistic and neurotypical texts; hence, again we predicted that perceivers would discriminate at above chance levels.

The second aim of the research was to investigate whether participants show any bias in the way they respond to the question about whether the target is autistic, which would be potentially revealing of the underlying strategy or approach perceivers use to make such judgments. Given the differing base rates of autistic and neurotypical individuals in the general population i.e., that neurotypical is the predominant neurotype and autism is relatively uncommon (e.g., Milton, 2012), we predicted that perceivers may show a bias towards judging that the target is neurotypical.

Two further studies (study 1b and study 2b) aimed to investigate the effect of disclosing diagnostic information on the likeability of the targets in conditions that might reduce the possibility of socially desirable responding. Participants were informed that some of the clips or texts they will be presented with were from autistic individuals but were not told which were which. Based on previous research, if perceivers are able to distinguish between autistic and neurotypical individuals then it is expected that perceivers will increase their ratings for autistic video clips and text excerpts. However, if it is the case that participants in the previous studies were indeed biased to give positive responses due to being more socially desirable then perceivers in this study may not change their ratings in the condition where autistic diagnosis is disclosed.

Finally, the research aimed to determine whether there is a relationship between judged likeability of a target and whether or not that target is perceived to be autistic. If there is a relationship, this would suggest that social favourability judgments and autism judgments are based on similar information (appearance, behavioural cues etc.) If there is no

relationship, this would suggest that judgments about diagnostic status and likeability are unrelated.

5.2 Methods

In total, four studies were carried out. Studies 1a and 1b used video clip stimuli and Studies 2a and 2b used text stimuli. Participants gave their informed consent prior to each study. All studies were approved by the University of Nottingham School of Psychology ethics committee.

5.2.1 ***Study 1a***

5.2.1.1 Design

The study used a within-subjects design, the independent variable being the type of target group (autistic and neurotypical) and the dependant variable being the categorical judgments of the participants about whether the target was autistic or not.

5.2.1.2 Participants

Twenty participants (five males and 15 females) aged between 17 and 28 (M=20.05, SD=2.31) were recruited from the University of Nottingham.

5.2.1.3 Materials

Video clips from 18 targets (nine autistic and nine typically developing) were used in this study (from the set of videos developed in Chapter 3). Two target participants (one autistic and one typically developing) were excluded from this study as they had consented to using their videos only in the study explained in Chapter 3, but not in future research. Perceivers were presented with four looped video clips of each target in each of which they were thinking about a time when they either felt proud, in love, guilty or stressed (as shown in Fig 5.1). Under each target video clip was a written question which asked whether the participant thought the target was autistic.

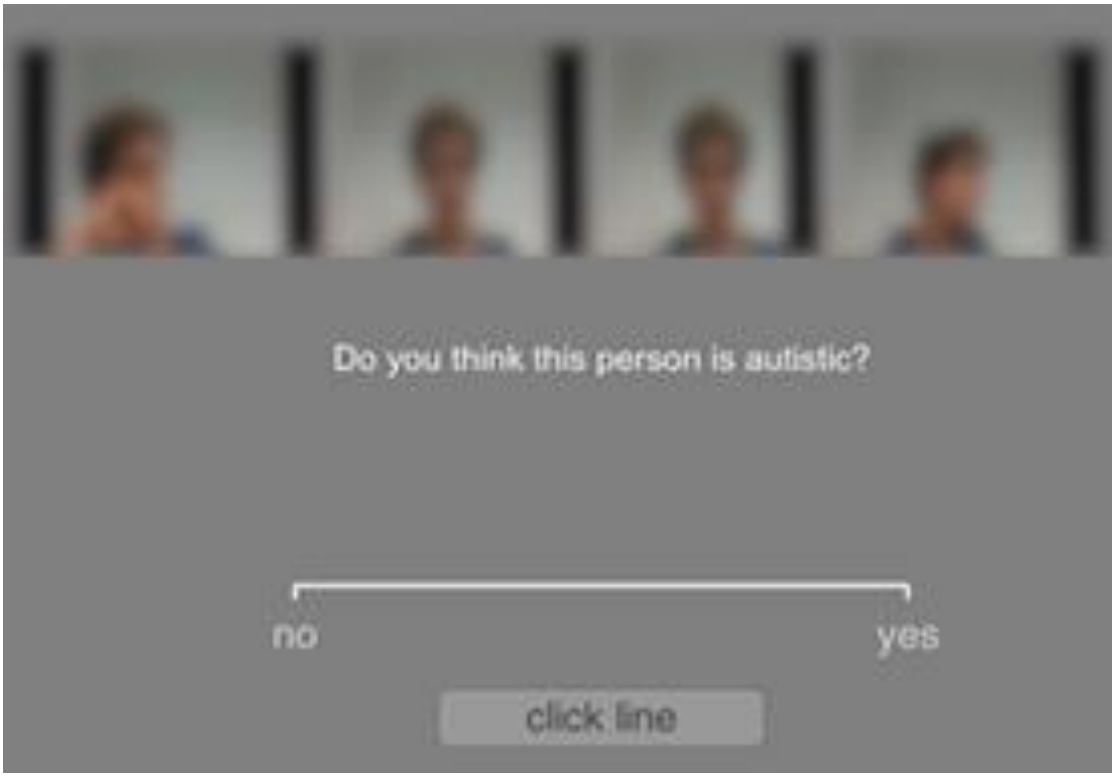

Figure 5.1. Illustration of Study 1a stimulus

5.2.1.4 Procedure

Perceivers were informed that they will see a series of video clips of people who were thinking about experiences in their life where they felt proud, in love, guilty, and stressed. Perceivers were also informed that some of the people they will see are autistic and that they would be required to judge whether or not they believed each person was autistic. The target videos were then shown in a random order on a computer screen using PsychoPy3 (Peirce et al. 2019) software. The looped video clips relating to each target appeared on the screen as shown in Fig. 5.1 and participants responded by clicking on ‘yes’ or ‘no’ when asked if they thought the target was autistic and their responses were recorded by the software. Once they had made their choice, they clicked a button to move to the next set of target videos, until they had completed the total of 18 screens (one for each target). No feedback was given about the accuracy of participants' responses and there was no time limit given for this task.

5.2.1.5 Results

Perceiver responses of 'yes' and 'no' were coded as 1 (if correct) and 0 (if wrong) depending on the target group. Responses made for autistic targets were coded as '1' for every 'yes' and '0' for every 'no'. Responses made for neurotypical targets were coded as '0' for every 'yes' and '1' for every 'no'. The scores for all 18 targets were then averaged for each of the 20 perceivers. Figure 5.2 illustrates accuracy for each perceiver while the red line represents chance performance (0.5). It can be seen that perceivers varied in how accurate they were, with just over half performing numerically above chance. One sample t-tests showed that accuracy scores (M=0.55, SD=0.84) were significantly above chance (0.5), $t(19)=2.83$, $p<.05$. This suggests that perceivers were to some degree accurate in recognising whether a target was autistic or neurotypical.

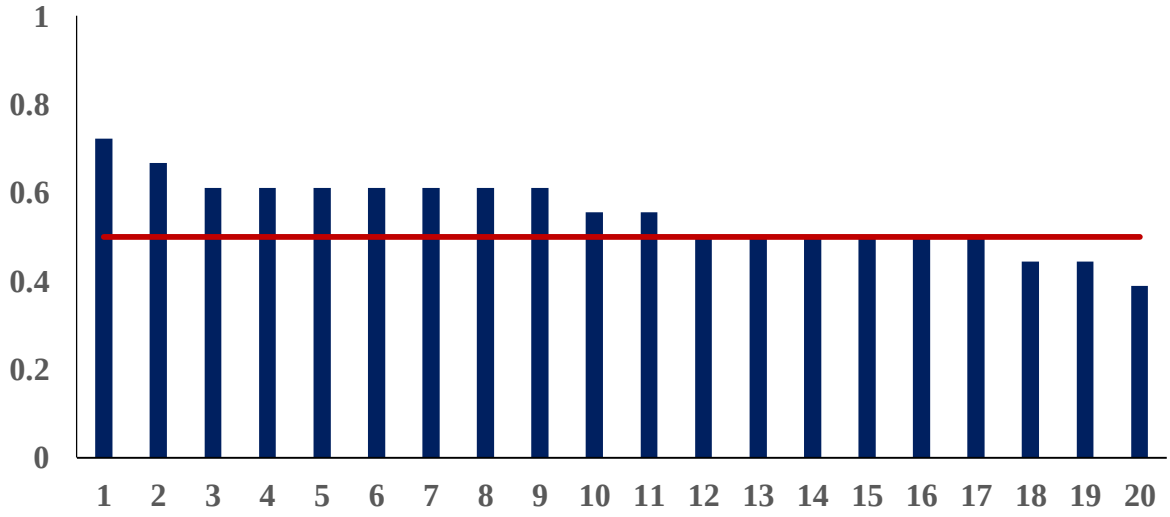

Figure 5.2. Accuracy scores of perceivers on judgments made for target diagnosis when watching video clips

The next analysis was carried out to determine whether there was any bias in perceivers' judgments. In other words, the analysis aimed to establish whether participants had a tendency to say 'yes' too much, indicating a bias towards judging the target as autistic or 'no' too much, indicating a bias towards judging the target neurotypical. Perceiver

responses of 'yes' and 'no' were coded as 1 (if 'yes') and 0 (if 'no') for both target groups. Figure 6.3 shows the mean bias scores for each of the 20 perceivers. The red line represents an absence of bias i.e., an equal chance of judging the target as being autistic and typically developing (0.5). The majority of scores fall below this mark illustrating a bias towards judging targets to be neurotypical. The scores for all 18 targets were then averaged for each of the 20 perceivers. One sample t-tests showed that scores (M=0.40, SD=0.10) were significantly below chance (0.5), $t(19)$=-4.56, p<.001, suggesting that perceivers show a significant bias towards saying 'no'.

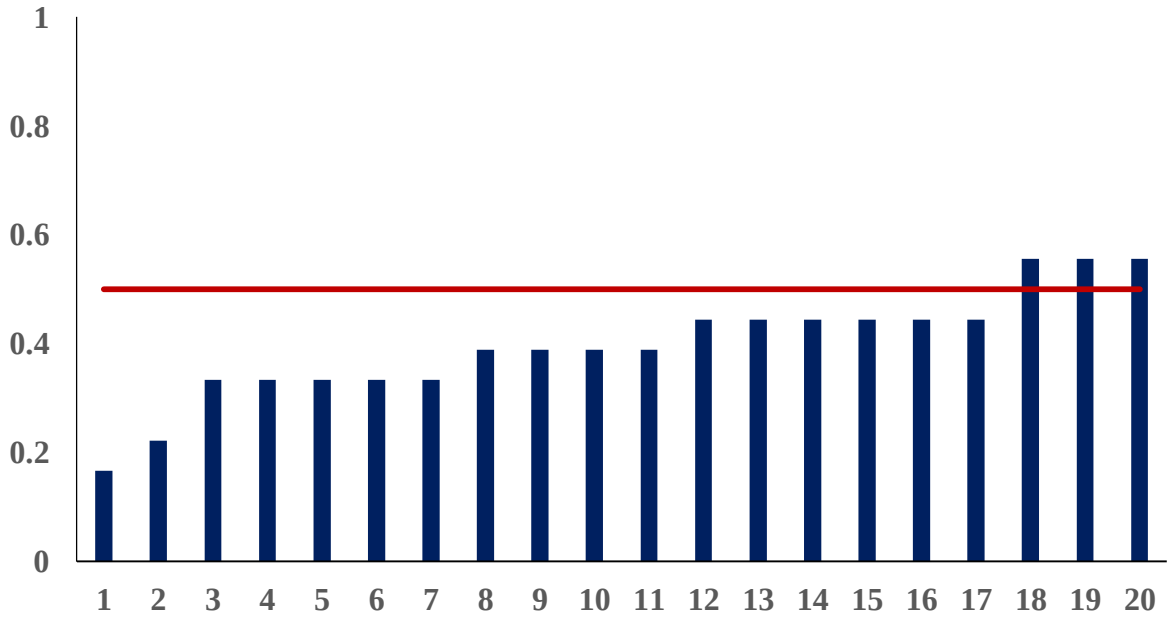

Figure 5.3. Perceiver bias on judgments made for target diagnosis when watching video clips

5.2.1.6 Discussion

Perceivers were significantly accurate at guessing whether a person is autistic or neurotypical, at above chance levels. Notably, the scores were only slightly above chance, suggesting that the task was difficult for perceivers and several individual perceivers scored only at or below chance. Nevertheless, the results suggest that targets emitted cues that were revealing of their diagnostic status, and that as a group, perceivers were sensitive to these cues at least to some extent. There was also significant bias in that perceivers tended to judge

that targets were neurotypical at above chance levels, even though there was actually an equal number of autistic and neurotypical targets. One possible explanation for this may be that perceivers are aware that autism is a relatively rare condition with prevalence estimates around one in 100 (WHO, 2021); hence in real life encounters it is much more common for a person to be neurotypical than autistic. In consequence, a reasonable strategy when approaching the task might be to assume that all targets are neurotypical unless there is something about them that suggests otherwise. This would potentially result in higher levels of responding that the target is neurotypical than autistic.

The next study (1b) aimed to determine whether perceiver judgments that targets were autistic related to the likeability of those targets. Perceivers were presented with the same set of videos and made a scaled likeability judgment for each target. These judgments were then used as a correlate for the perceived autism judgments in the current study. Study 1b also investigated whether likeability scores are affected when perceivers are informed that some of the targets are autistic before presenting them with the video clips of brief samples of their behaviour.

5.2.2 Study 1b

5.2.2.1 Design

The study used a 2x2 mixed design, with the independent variables being the type of target group (autistic and neurotypical; within-subjects), and type of perceiver group (diagnostic disclosure and no diagnostic disclosure; between subjects). The dependent variable was the likeability ratings received for each target.

5.2.2.2 Participants

Forty participants (29 females and 11 males) aged between 18 and 23 (M=20.25, SD=1.41) were recruited from the University of Nottingham.

5.2.2.3 Materials

The same video clips from Study 1a were used, presented in the same format. Below the videos, perceivers were presented with a single question asking how much they liked the person on a scale ranging from 0-10 (as shown in Fig 5.4)

Figure 5.4. Illustration of study 1b stimuli

5.2.2.4 Procedure

Perceivers were informed that they would see a series of video clips of people who were thinking about experiences in their life where they felt proud, in love, guilty, or stressed. Each perceiver was allocated to one of two conditions on an alternating basis. In one condition (Diagnostic disclosure), the perceivers (N=20) were informed that some of the people they will see are autistic, while in the other condition (No diagnostic disclosure) perceivers were given no information about the diagnostic status of the targets. Like study 1a, the study was carried out using PsychoPy3 (Peirce et al. 2019) to present the videos. For each

set of videos pertaining to a particular target, perceivers were asked how much they liked the person in the video clips on a scale ranging from 0 (not at all) and 10 (I like the person a lot) and they indicated their response by clicking on a relevant point on a 10-point Likert scale. Once they had made their choice, perceivers clicked a button to move to the next set of target videos. There was no time limit given for this task.

5.2.2.5 Results

Likeability ratings for each target were averaged across the perceivers, such that every target had an average likeability score. The scores acquired from those perceivers with diagnostic disclosure were compared with likeability scores from those perceivers who received no diagnostic disclosure. Figure 5.5 illustrates the scores for each target group and perceiver group.

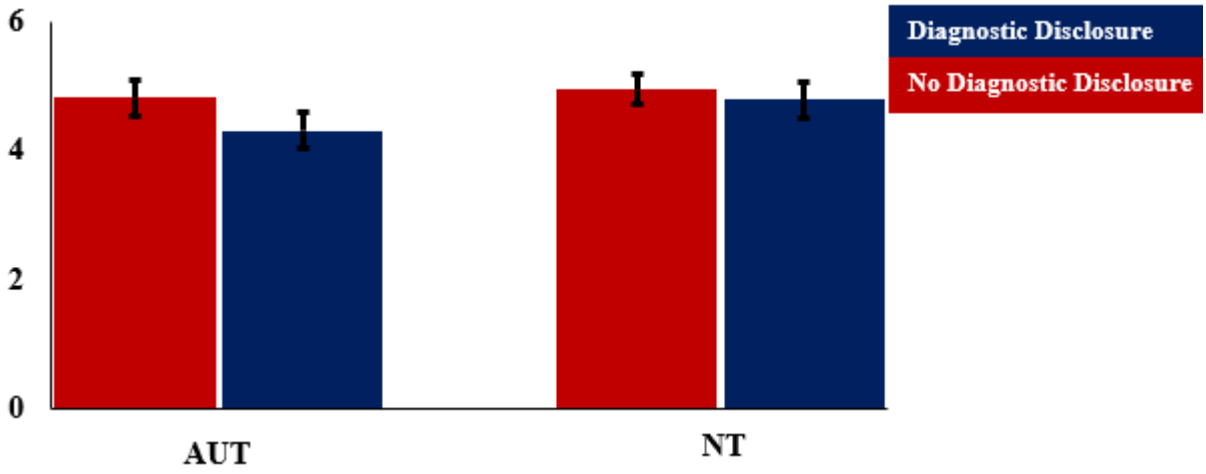

Figure 5.5. Average likeability scores for each target group and across each perceiver group when watching video clips

A 2 (diagnostic disclosure versus no diagnostic disclosure) by 2 (autistic versus neurotypical) mixed measures ANOVA reported a main effect of perceiver group, $F(1,16)=15.53$, $p< 0.005$, $\eta^2p = 0.49$, suggesting those who received diagnostic disclosure gave significantly lower likeability scores than in the no disclosure condition. No main effect

of target group was found, suggesting no significant differences in likeability between target groups. No significant interaction was found.

Furthermore, to understand whether perceiver likeability scores were associated with perceived autism, a correlation analysis were carried out between the likeability scores of perceivers who were not aware of the autism diagnosis of some of the targets and perceived autism scores (PAS) for each target. Using data from study 1a, PAS was calculated by adding up the number of 'yes' responses each target got when the perceivers were asked if they thought the target was autistic. There was a significant negative association between the likeability scores and PAS, r=-0.68, p< 0.005, suggesting that the more a target was perceived to be autistic, the less liked the target was (Figure 5.6).

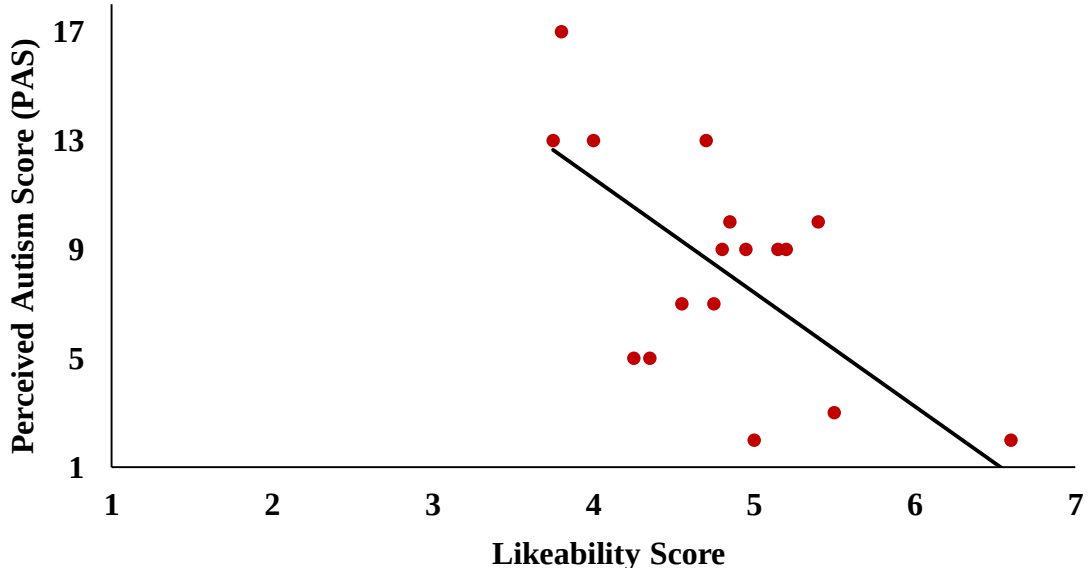

Figure 5.6. Correlation between likeability scores of perceivers not aware of the diagnosis and PAS when watching video clips

5.2.2.6 Discussion

When perceivers were informed that some of the targets are autistic, the likability ratings significantly reduced not only for autistic targets but also for neurotypical targets. This suggests that when autistic diagnosis was disclosed to perceivers, they perceived all

targets as less likeable compared to when they had no knowledge of diagnostic disclosure. This gives support to the argument that differentiates the implicit and explicit attitudes of neurotypicals towards autism. In the current study, autistic targets were not individually labelled as autistic and therefore, perhaps, perceivers were not concerned about being socially desirable and therefore were not biased to rate autistic targets more likeable. Moreover, likeability was not related to the true diagnosis of the autistic individuals as likeability ratings of neurotypical and autistic targets were not significantly different. However, there was a significant association between likeability and whether a target was perceived as autistic, suggesting that more likely a target is perceived to be autistic the less likely the target is liked by the perceivers. The findings seem to suggest that likeability judgments and autism judgments may be based on the same kinds of information.

The next set of studies were similar to studies 1a and 1b but utilised the targets' text excerpts in place of videos. Study 2a, which is reported next, examined the ability of perceivers to accurately judge targets' autistic diagnosis when presented with autistic and neurotypical written texts describing their emotional experiences.

5.2.3 Study 2a

5.2.3.1 Design

The study used a within-subjects design, the independent variable being the type of target group (autistic and neurotypical) and the dependant variable being the categorical judgments of the participants about whether the target is autistic or neurotypical.

5.2.3.2 Participants

Twenty participants (18 females and two males) aged between 18 and 23 (M=20.5, SD=1.28) were recruited from the University of Nottingham.

5.2.3.3 Materials

Text excerpts produced by the 20 targets (10 autistic and 10 typically developing) were used as stimuli in this study (as reported in Chapters 3 and 4). The stimuli consisted of 4 text excerpts from each target which described a time when they felt proud, in love, guilty and stressed. The four excerpts were presented side by side on a single screen (as shown in Fig 5.7). Under each target's text excerpts, a single question was presented which asked whether or not the target in question is autistic. This was designed to be identical to the question and response format used in Study 1a.

Figure 5.7. Illustration of study 2a stimuli

5.2.3.4 Procedure

Perceivers were informed that they will see a series of text excerpts written by people about experiences in their life where they felt proud, in love, guilty, and stressed. Perceivers were also informed that some of the text excerpts they will read were written by people who were autistic. The four text excerpts produced by a single target were then presented alongside each other on the computer screen using PsychoPy3 (Peirce et al. 2019) software. Participants were asked to judge whether or not they thought the target was autistic and

responded by clicking on ‘yes’ or ‘no’. Once participants had made their choice, they clicked a button to move to the next screen, where a new set of text excerpts was presented. In total, participants viewed 20 screens with 10 showing texts from autistic targets and 10 from typically developing targets, the order of which was randomised. Participants were given no feedback about whether their answers were correct and there was no time limit given for this task.

5.2.3.5 Results

Similar to Study 1a, perceiver responses of ‘yes’ and ‘no’ to the question about whether the target was autistic were coded as 1 (if correct) and 0 (if wrong) depending on the target group. Responses made for autistic targets were coded as ‘1’ for every ‘yes’ and ‘0’ for every ‘no’. Responses made for neurotypical targets were coded as ‘0’ for every ‘yes’ and ‘1’ for every ‘no’. The scores for all 20 targets were then averaged for each of the 20 perceivers. Figure 5.8 shows the individual accuracy scores for each perceiver arranged from the most accurate to the least accurate. The red line in Figure 5.8 represents chance performance (0.5). As in Study 1a, it can be seen that despite variability in accuracy, the majority of perceivers scored numerically above chance. One sample t-tests showed that accuracy scores (M=0.58, SD=0.14) were significantly above chance (0.5), $t(19)=2.53$, $p<.05$. This suggests that perceivers were accurate to some degree in recognising whether a target was autistic or neurotypical.

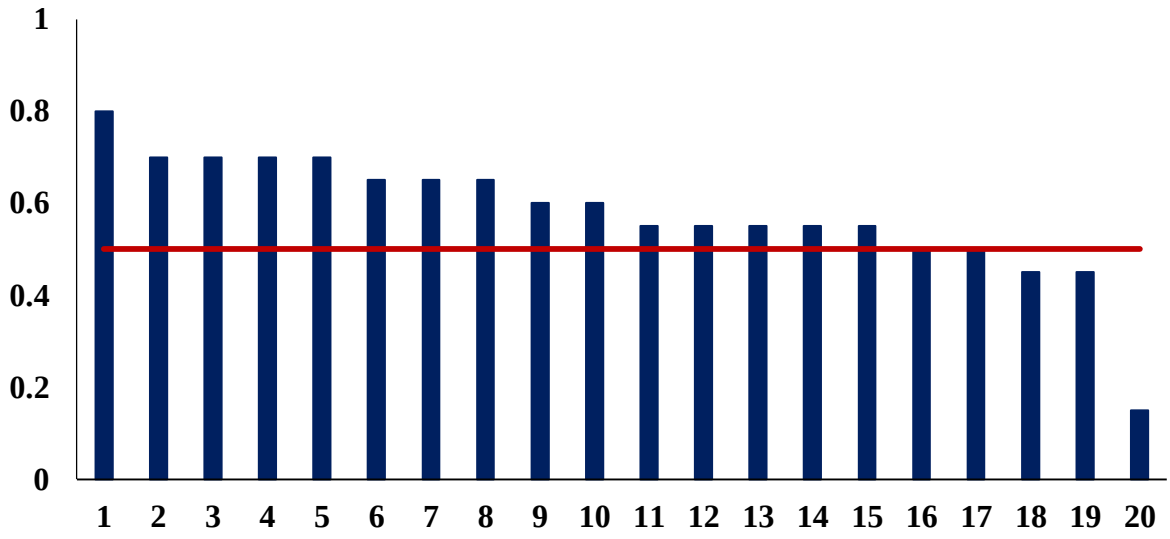

Figure 5.8. Accuracy scores of perceivers on judgments made for target diagnosis when reading text excerpts

Similar to study 1a, the next analysis aimed to determine whether there was bias in perceiver responses i.e., whether they said 'yes' too much indicating a tendency to judge that targets were autistic, or 'no' too much indicating a tendency to judge that targets were typically developing. Perceiver responses of 'yes' and 'no' were coded as 1 (if 'yes') and 0 (if 'no') for both target groups. The scores for all 20 targets were then averaged for each of the 20 perceivers. Figure 5.9 shows the mean bias score for each individual perceiver. The red line represents the score that would occur if there was no bias (if perceivers are equally likely to judge that the target is autistic and typically developing, 0.5). Scores below this mark illustrate bias towards judging the target to be neurotypical. One sample t-tests showed that scores (M=0.34, SD=0.14) were significantly below 0.5, $t(19)$=-4.97, p<.05, suggesting that perceivers were more likely to say 'no' than 'yes'. In other words, perceivers were more likely to judge targets to be neurotypical.

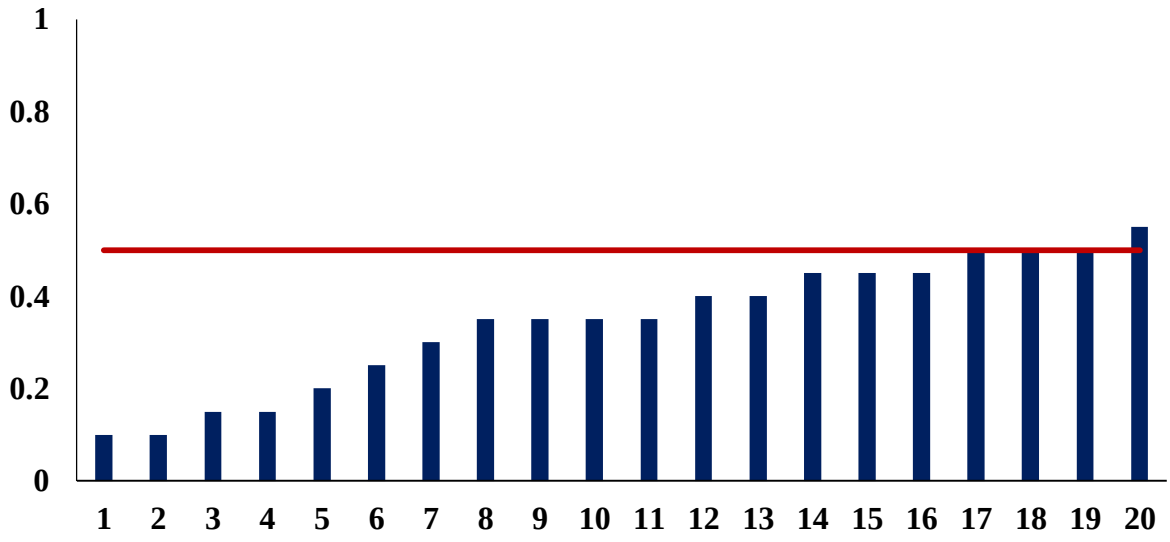

Figure 5.9. Perceiver bias on judgments made for target diagnosis when reading text excerpts

5.2.3.6 Discussion

Similar to the findings of study 1a, perceivers were significantly accurate i.e., at above chance levels at guessing whether a person is autistic or neurotypical when they were presented with texts describing targets' emotional experiences. The scores for this study were also only slightly above chance, suggesting that just like in the video clip condition, perceivers found this task quite difficult with some perceivers scoring at chance or even below chance. Nevertheless, the results suggest perceivers were sensitive enough to pick on hints from the descriptions of targets' emotional experiences that made it possible for them, to some extent, to accurately guess the targets' diagnostic status.

Moreover, a significant bias was also found in the responses, suggesting that perceivers tended to judge that targets were neurotypical at above chance levels, even though the number of autistic and neurotypical targets in the study was equal. This finding is consistent with that found in the video condition suggesting that the strategy used when doing the task is similar in both the conditions. As suggested before, it seems reasonable for

perceivers to adopt a default assumption that the text was written by a neurotypical individual unless there is something about it that suggests otherwise.

The next study (2b) paralleled study 1b in its aim to determine whether perceivers judgments that targets were autistic related to the likeability of those targets. Perceivers were presented with the same set of text excerpts and made a scaled likeability judgment for each target. These judgments were then used as a correlate for the perceived autism judgments in the current study. Study 2b also looks at how likeability ratings of targets are affected when perceivers are informed that some of the targets are autistic before presenting them with the text excerpts.

5.2.4 Study 2b

5.2.4.1 Participants

Forty participants (31 females and nine males) aged between 18 and 62 (*M*=22.90, *SD*=9.25) were recruited from the University of Nottingham and from the local community through word of mouth.

5.2.4.2 Materials

The same text excerpts (from 20 targets) that were used in Study 2a were employed here. As in Study 2a, four excerpts from the same target that described times when they felt proud, in love, guilty and stressed respectively were presented alongside one another on a single screen. Beneath the text excerpts a question was presented asking to what extent the perceiver liked the person. A ratings scale ranging from 0-10 was presented for responding (as shown in Fig 5.10). This was presented in the exact same format as appeared in Study 1b.

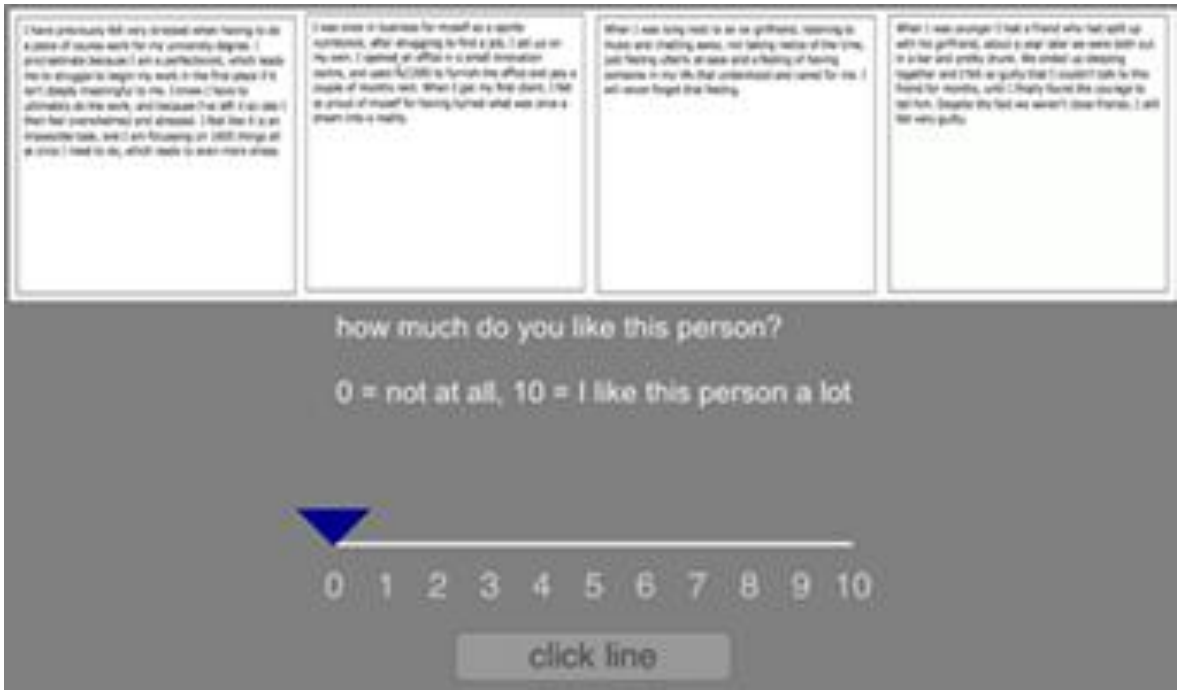

Figure 5.10. Illustration of study 2b stimuli

5.2.4.3 Procedure

Perceivers were informed that they would see a series of screens showing text excerpts produced by people who wrote about experiences in their life where they felt proud, in love, guilty, and stressed. Each perceiver was allocated to one of two conditions on an alternating basis. In one condition (Diagnostic disclosure), the perceivers (N=20) were informed that some of the people who wrote the texts are autistic, while in the other condition (No diagnostic disclosure) perceivers (N=20) were given no information about the diagnostic status of the people who wrote the texts. Like study 2a, the study was carried out using PsychoPy3 (Peirce et al. 2019) to present the text excerpts. For each set of texts written by a particular target, perceivers were asked how much they liked the person on a scale ranging from 0 (not at all) and 10 (I like the person a lot) and they indicated their response by clicking on a relevant point on a 10-point Likert scale. Once they had made their choice, perceivers clicked a button to move to the next set of target excerpts. There was no time limit given for this task.

5.2.4.4 Results

Similar to study 1b, likeability ratings for each target were averaged across the perceivers, such that every target had an average likeability score. The scores given by those who received diagnostic disclosure were compared with likeability scores given by those who did not receive diagnostic information. Figure 5.11 illustrates the mean scores for each target group given by the two perceiver groups.

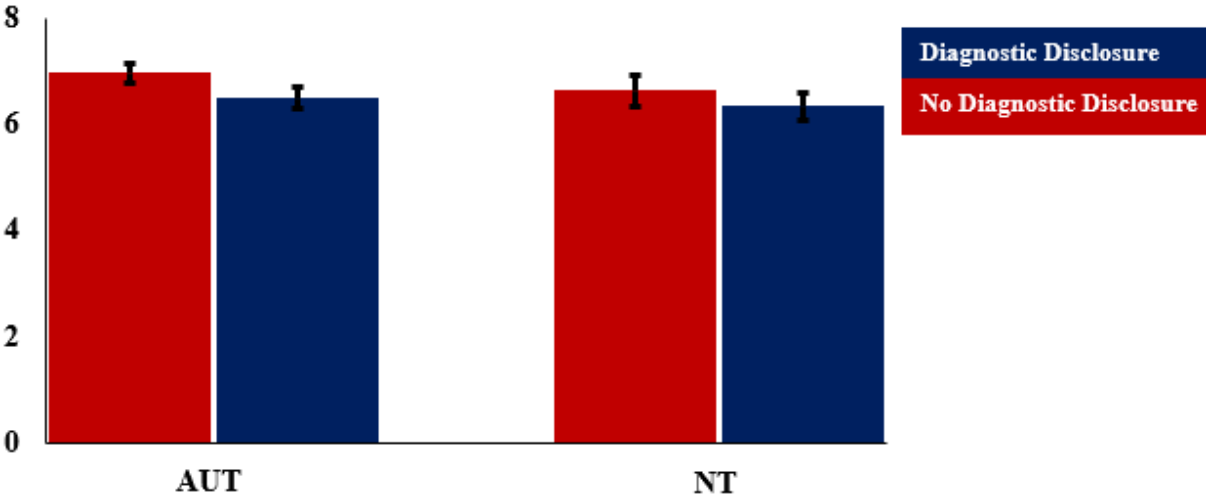

Figure 5.11. Average likeability scores for each target group and for each perceiver group when reading text excerpts

A 2 (Diagnostic disclosure versus No diagnostic disclosure) by 2 (autistic versus neurotypical) mixed measures ANOVA reported a main effect of perceiver group, $F(1,18)=16.33$, $p< 0.005$, $\eta^2p = 0.48$ suggesting those who received diagnostic disclosure gave significantly lower likeability scores than those in the no disclosure condition. No main effect of target group was found, suggesting no significant differences in likeability between target groups. No significant interaction was found.

Furthermore, to understand whether perceiver likeability scores were associated with perceived autism, correlation analyses were carried out. The correlation was done between the likeability scores of perceivers who were not aware of the autism diagnosis of some of the targets and perceived autism scores (PAS) for each target. Using data from study 2a, PAS

was calculated by adding up the number of 'yes' responses each target got when the perceivers were asked if they thought the target was autistic. The correlation revealed no significant association between the likeability scores and PAS (r=-0.10, p>.05), suggesting that likeability was not associated with whether the perceivers thought target was autistic.

5.2.4.5 Discussion

The findings revealed that when perceivers were informed that some of the targets were autistic, the likeability ratings for both autistic and neurotypical targets significantly reduced. This is similar to the findings reported in study 1b when perceivers were presented with video clips, suggesting that disclosing the diagnostic status of autistic individuals has similar effects when watching brief samples of behaviour and when reading text excerpts of their emotional experiences. However, for the text condition, likeability was neither related to the true diagnosis of the autistic individuals (as likeability ratings of neurotypical and autistic targets were similar) nor related to perceived autism score.

Therefore, similar to the video condition, reduced likeability scores after diagnostic disclosure may indicate a presence of stigma towards autistic individuals. However, the associated stigma is less apparent on target-by-target basis for the text condition as likeability scores did not correlate with whether perceivers believed a target to be autistic. Nevertheless, it seems to demonstrate that the 'autism' label itself is sufficient to stir up negative attitudes in perceivers.

5.3 General Discussion

The first aim of the study was to investigate whether people can accurately guess a person's autism diagnosis. As predicted, people were, to some extent, able to do so when they watched video clips and also when they read text excerpts of the targets. These findings tell us two things: firstly, and consistently with the other chapters in this thesis, this indicates that there were some kind of reliable differences between the video clips/texts produced by

autistic and neurotypical targets. Secondly, they tell us that to some extent perceivers are aware of these differences and relied on them to make their judgments.

It is not possible to know from the current research what cues were used by perceivers to make the judgments, but we can speculate. Within the video clips perceivers may have relied on behavioural cues of the targets or aspects of the targets' overall appearance such as clothing, hairstyle etc. For the texts, based on Chapter 4, findings suggest that autistic writing can be differentiated from neurotypical writing. Perceivers may have received clues from the content or style of writing. Perhaps, perceivers may have found the content of the experiences and the style of writing different from their own and may have used their own selves as a reference to guide them in judging whether the writer is autistic. For example, findings from chapter 4 revealed that perceivers found neurotypical targets to have better examples of narratives that described their experiences. Therefore, it is possible, that the experiences they related to were judged to be coming from a neurotypical individual and vice versa. However, future work needs to be done to investigate the motivation behind perceivers' decision-making not only for the text excerpts but also for the video clips.

It is important to note that, although these findings are in line with previous studies, (e.g., Faso et al. 2015a; Grossman, 2015; Sasson et al. 2017), in which perceivers were able to differentiate between autistic and non-autistic targets, this study is slightly different from the rest. The study directly asked perceivers regarding target diagnosis, which required perceivers to rely on any knowledge they had of what autism really looks like in behaviour/appearance and how it sounds like on paper. Since most of the perceivers in this study were University students, these findings seem to indicate that the students have some knowledge or understanding of autism and are able to spot autistic individuals based on brief samples of behaviour and, more surprisingly, also by reading text describing their past emotional experiences. According to White et al. (2019), awareness and knowledge of autism

in the universities has substantially increased over recent years. This could partly be due to the increasing rates of admissions of autistic individuals in postsecondary institutions (Bakker et al. 2019; VanBergeijk et al. 2008).

Also, in contrast to previous studies, the targets were recorded in the absence of a social context. This might mean that the autistic individuals did not find the need to camouflage. Camouflaging occurs in a social situation when autistic individuals try to mask their autistic traits so as to appear more like the neurotypical individuals for presumed social benefits, such as being more liked or accepted by society (Hull et al. 2017; Lai et al. 2019). Therefore, it is possible that perceivers would have been less able to differentiate autism from stimuli acquired in a social situation. Future research should examine the relationship between the social context, (self-reported) camouflaging, and perceived autism.

The second aim of the study was to explore whether perceivers were biased in their judgements. Again, as predicted, findings revealed a significant bias in perceiver responses when they watched video clips and also when they read text excerpts, suggesting that targets were more likely to be judged as being non-autistic. This bias may reflect a reasonable strategy based on perceivers' knowledge that autistic individuals are a minority in the society and therefore in reality any given individual is more likely to be neurotypical than autistic. Perceivers may tend to judge by default that a target is neurotypical unless there is something about their video or text that positively indicates that the target is autistic. Future research could explicitly inform perceivers that half of the targets are autistic, which ought to reduce or eliminate bias in responding.

The study also aimed to investigate the effect of disclosing diagnostic information on likeability. The results revealed that when perceivers were made aware that some of the targets are autistic, the likeability ratings for both autistic and neurotypical targets significantly reduced for both the video and text conditions. This suggests that perceivers in

this study stigmatised autistic individuals. As the videos and texts were identical with and without diagnostic disclosure, it appears that mere awareness that some of the targets might be autistic made the perceivers feel less positively towards them. These findings stand in contrast to previous studies (Matthews et al. 2015; Sasson & Morrison, 2019) that found increased likeability ratings when the diagnosis was disclosed. The differences in findings may be related to the fact that in the current study, perceivers were not told about each target's diagnostic status thereby minimising social desirability bias. It is possible that the impact of diagnostic disclosure in this study is more reflective of perceivers' implicit attitudes to autism than their explicit attitudes, and previous research has already indicated that these may differ from one another (e.g., Jones et al. 2021). Moreover, a decrease in likeability ratings after disclosing label has been linked to the level of stigma an individual holds for the label (Morrison et al. 2019). The perceivers in this study, who were undergraduate students reveal a negative implicit attitude towards the autistic population, and this group of students have also been observed to not openly hold negative attitudes explicitly (White et al. 2019).

The findings are consistent with self-reports of autistic individuals whereby autistic students felt more stigmatised after disclosing their diagnosis (Jones et al. 2015). Moreover, autistic students between the ages of nine and 16 years have reported feeling more judged once their diagnosis was disclosed and therefore have preferred to hide their diagnosis (Calzada et al. 2012). Furthermore, although there is an increase in autistic knowledge and awareness in university students, this has not brought with it changes in their attitudes towards autistic individuals (White et al. 2019). As mentioned, earlier, according to Corrigan's labelling theory, once a label is disclosed, it activates within people pre-established stereotypes about that label, which may or may not be a true representation of the label (2007). Although stigma towards diagnosis of autism may be lower than for certain

other diagnoses (Gillespie-Lynch et al. 2020; Sasson & Morrison, 2019), the results here suggest that it can still be present in a way that impacts on people's decisions. Furthermore, previous studies have suggested that females tend to show less stigma towards autistic individuals when compared to males (Corrigan & Watson, 2007; Gillespie-Lynch et al. 2015), but most perceivers in the current study were females and therefore, reports of reduced likeability towards targets after disclosing diagnostic information is unexpected. However, it could also mean, that differences in likeability following diagnostic disclosure may have been even more prominent if more perceivers were males.

On the other hand, several studies have argued that disclosing autism diagnosis may actually be beneficial, for example, to create a positive self-concept and group identity for autistic individuals (Mogensen & Mason, 2015) and also to help them to reduce camouflaging in social situations (Hull et al. 2017). Furthermore, in the Criminal Justice System, autistic individuals were more likely to be acknowledged and understood after disclosing their diagnosis and are dealt with accordingly (Maras et al. 2017). Therefore, although findings from the current study do not recommend autistic individuals to disclose their diagnostic status, this may be dependent on the environmental context that they are in.

Contrary to expectation, findings also revealed no significant differences in likeability between autistic and neurotypical targets. For the video condition, this finding varied from the one in Chapter 3 and previous studies (e.g., Sasson et al. 2017), where autistic targets have been consistently rated as less likeable. For the text condition, the finding is consistent with Sasson et al. (2017) who also found that autistic targets were not rated as less favourable based on a transcript of their speech. However, these findings are difficult to interpret because the analysis here was done at a target level as opposed to the perceiver level, whereby the sample size (10 or nine targets in each group) might not give enough power to

spot differences between target groups. Therefore, future work should try to include a greater sample size of targets if analysis at the target level will be considered.

Finally, we explored whether likeability ratings were associated with the perceiver's perception of the target being autistic. Results revealed a negative relationship between target likeability and perceived autism in the video condition only. Those targets that were rated lower in likeability were the same ones that tended to be perceived as autistic. Although a clear association was observed the direction of causality between these observations is not clear, and indeed there may or may not be a direct association. For instance, it is possible that on watching the videos, perceivers have a sense of whether or not they like the target and directly use this to judge whether or not the target is autistic. Conversely, it is at least theoretically possible that the reverse is true, that perceivers first sense autism and include this in their judgments of social favourability. However, it is quite possible that perceivers simply rely on the same behavioural cues/aspects of appearance to make both types of judgment but that there is no direct relationship. For future studies, perceivers can be asked to give reasons for liking or disliking a person, as well as their reasons for judging a person to be autistic or not.

For the text condition, although perceivers, to some extent, were able to determine an autistic text from a neurotypical text, ratings of likeability were, however, not associated with the perceived autism. This suggests the negative conceptions that people seem to have are mostly based on the physical aspects of appearance or behaviour. Perhaps, when it comes to the content of the emotional life experiences, perceivers may have been able to gain insight into what autistic individuals go through in their lives and find themselves empathising with them. The findings seem to suggest that it might be helpful for autistic individuals to open up about and share their life experiences to others without disclosing their diagnosis. Moreover, perhaps, it may be easier for autistic individuals to socially connect with others on platforms

that uses text as a form of communication. However, further studies need to be done to investigate this suggestion.

One of the limitations of the study is the fact that majority of the perceivers in this study were University students and therefore the findings cannot be generalised. Further work can be done to investigate whether the stigma exists in other settings such as workplace, and even within family structures. Moreover, the study did not administer an autism knowledge questionnaire which would have given a measure of how much the perceivers know about autism.

In conclusion, the findings from this study indicate that although perceivers tend to judge that targets are neurotypical as opposed to autistic, nevertheless to some extent autistic individuals can be distinguished based on their behaviours and also from written excerpts that describe their life experiences. Furthermore, when informed that some targets were autistic, perceivers rated all targets to be less likeable compared to the condition when no diagnostic was used. This suggested that people seem to have a negative attitude or stigma towards autistic individuals that influences their judgments. An association between likeability and perceived autism in the video condition suggested that likeability and autism judgments may be based on the same kinds of visible cues. A lack of this association in the text condition implies autistic people may be judged more fairly based on their written communication and recommends autistic individuals may benefit from using social platforms that have text as a predominant platform of communication.

Chapter 6: General Discussion

6.1 Research Overview

It has been almost 80 years since autism was first described by Kanner (1943); and research into autism continues to develop until the present day. For many years, autism research followed a medical model which gave rise to an extensive literature on this approach. However, in recent years, the focus of research has shifted away from the medical approach towards a more social-developmental approach. Current research is now beginning to acknowledge the significant role of the environment in contributing towards the difficulties faced by autistic individuals. This thesis used the social-developmental approach to further investigate the role of environment, specifically, the contribution of non-autistic people to the difficulties faced by autistic individuals.

One concept of autism research that embraces the social developmental approach is known as the double empathy problem (DEP). The DEP suggests that when a social interaction is not effective between two people, rather than holding only one of the interaction partners to account, it is more likely that the problem lies with both people involved in the interaction (Milton, 2012). The DEP argues that misunderstandings (or a lack of empathy) is particularly likely to occur where the interaction partners bring differing world views, perceptions and experiences– as is often the case for autistic and non-autistic people. Thus, if autistic individuals experience difficulties when socially interacting with non-autistic individuals, then the latter may play a part in contributing to the difficulties of autistic individuals. Studies that have attempted to test predictions of the DEP can be separated into two categories. The first category of research investigates on how accurately autistic individuals are read by the non-autistic individuals. The second category of research investigates how socially favourable autistic individuals are perceived when compared to non-autistic individuals. Findings from studies that investigated how readable autistic

individuals are, have produced mixed results. While most research (e.g., Sasson et al. 2017; Sheppard et al. 2016) demonstrated that autistic individuals are less accurately perceived by non-autistic individuals (giving support to the DEP theory), a few studies have indicated quite the opposite (e.g., Faso et al. 2015). Nevertheless, studies that indicated autistic individuals as more accurately perceived when carrying out tasks, did not involve a direct social interaction (e.g., Faso et al. 2015). Instead, they used posed expressions or used past emotional events in their lives to evoke observable inner states. Similarly, previous research (e.g., Alkhaldi et al. 2019) on social favourability demonstrated that autistic individuals are perceived less favourably than neurotypicals, which in turn, may contribute to the difficulties autistic individuals face in social situations.

The aim of this research was to further investigate the presence (or absence) of support for the DEP in a context where the social aspect is completely removed. It also aimed to investigate the context in which autistic people are perceived, especially in terms of readability and social favourability. Chapter 2 presents a new experimental paradigm to investigate whether people emit readable signals when they think about past experiences. The study captured dynamic, natural and spontaneous samples of behaviour after being cued to think about scenarios of an emotional nature, and also captured the content of the targets' thoughts during their behaviour. Chapter 3 then adapted the same methodology to investigate differences between autistic and non-autistic individuals in readability, likeability and expressiveness. This chapter also looked at how autistic and non-autistic individuals are perceived by different age groups. Chapter 4 investigated the narratives of autistic and neurotypical individuals acquired from Chapter 3 methodology. The narratives were targets' descriptions of positive and negative emotional events they had experienced in their past. LIWC computer software was used to analyse and compare differences between autistic and neurotypical narratives. Judgements from a group of non-autistic perceivers were used to

compare the global differences or the differences in the quality of autistic and neurotypical narratives. Finally, chapter 5 used these narratives from chapter 4 and video clips that depicted samples of behaviour from Chapter 3 to investigate whether non-autistic individuals are able to accurately guess whether a person is autistic. The chapter also investigated the effect of disclosing autism diagnosis to non-autistic individuals on social favourability and how perceived autism is linked to social favourability ratings.

In summary, the research asked the following questions:

- Do targets emit observable signals when thinking about past experiences when alone in a room?
- Are perceivers able to guess how intensely targets felt their experiences when observing their brief samples of behaviour?
- Are perceivers of different age groups more or less accurate in interpreting signals emitted by targets thinking about past experiences when alone in a room?
- Do perceivers from different age groups perceive autistic individuals as less likeable? Do perceivers perceive autistic individuals as less expressive?
- Are there any differences in the overall structure and quality of autistic and neurotypical narratives of emotional experiences?
- Can non-autistic individuals accurately guess autism diagnosis by watching brief samples of behaviour or by reading narratives that describe their personal emotional experiences?
- Are autistic individuals less liked when their diagnosis is disclosed?
- Are those who are perceived to be autistic generally less liked?

6.2 Summary of Results

6.2.1 Chapter 2 – Can people guess a person's inner states when they are thinking about past experiences?

The main aim of this study was to develop a new methodology to test whether people produce readable signals when thinking about emotional events that they have experienced in their lives. Target participants were asked to think and write about positive (excited, proud, in love) and negative experiences (guilt, shame, stress) and rated how intensely they felt each experience. Findings from this study revealed that people emitted signals that were readable by perceivers. However, there seemed to be a bias in the perceiver responses, in that, perceivers were more likely to judge targets to be thinking about negative experiences than positive experiences. Although, it is impossible to objectively know what exactly people are thinking, the content of their writing gave evidence that targets were indeed thinking about the specific emotional experiences they were asked to think about.

Findings further revealed that targets reported feeling the experiences more intensely at the time the event happened when compared to when they were recalling their experiences during the task. Moreover, targets were more likely to feel their positive experiences more intensely than their negative experiences at the time it happened as well as when recalling the experience during the study. When perceivers were asked to guess how intensely targets were feeling during an experience, they tended to give significantly lower ratings than the targets' self-report rating of how intensely they felt their experiences. Surprisingly, the more intensely the targets reported feeling their experience, the less intensely the emotion was perceived by the perceivers.

Interpretation

The study replicated Valanides et al. (2017) who found that targets emitted readable signals when thinking about past experiences and that there was a tendency for perceivers to judge that targets were thinking about negative experiences, even when targets were thinking about positive experiences. The bias in giving negative responses could, perhaps, be due to the fact that while some targets made expressive and interpretable behavioural responses,

others may have retained a neutral expression which may have appeared as sad to the perceivers, who therefore gave negative judgements.

Notwithstanding, a possible reason as to why targets felt positive experiences more intensely than the negative experience at the time of the event could be due to the fact that the study did not include extremely negative cue words as it would not have been ethical to do so in the present study. Positive experiences were also more intensely recalled than negative experiences, which is in par with previous studies on memory that have found a bias towards retrieving positive life experiences (e.g., Berntsen et al. 2011; Walker et al. 2003). Moreover, people tend to perceive events in their lives as being more pleasant than unpleasant, perhaps because this helps to create and uphold a coherent, positive sense of self and also helps in developing positive social relationships (Chwalisz et al. 1988; Holland & Kensinger, 2010; Thompson et al. 1996).

Perceivers were not able to accurately judge the intensity of experiences felt by the targets. Indeed, the higher the targets rated the intensity of their experiences, the lower the perceiver ratings. Although surprising, this can possibly be explained by the reduced state of apparent alertness that is experienced when a person thinks inwardly about something intensely (Vago & Zeidan, 2016). Perceivers might have, instead, assumed that targets were daydreaming or disengaged from the task.

6.2.2 Chapter 3 – Do non-autistic individuals find it difficult to read autistic people in non-social contexts?

The aim of the study was to use the methodology introduced in Chapter 2 to investigate the DEP in a non-social context. The study primarily investigated how readable autistic individuals were by the non-autistic individuals. Findings revealed that autistic targets were on average more readable than the neurotypical targets. Specifically, autistic targets were more readable when they were thinking of a time when they felt stressed and when they were in love. Autistic targets were perceived to be more expressive than the neurotypical

targets, however, there was no link between expressiveness ratings and how readable the targets were.

The study also aimed to compare different age-groups of perceivers in their accuracy when judging targets' inner states. Findings did not identify any significant differences in the accuracy levels of perceivers of different age-groups. With regards to likeability ratings, perceivers aged 10-12 years, adults and the elderly adults registered more 'likes' for the neurotypical targets than for autistic targets. However, likeability ratings for autistic and neurotypical targets did not significantly differ in perceivers between the age of four and nine years. Furthermore, there was no association between the likeability and readability ratings given by perceivers.

Interpretation

The most surprising findings of the study is that autistic targets were more readable to non-autistic perceivers than the neurotypical targets. The findings could be explained by the possibility that autistic individuals experience social anxiety in social situations which may have been a key factor in making them difficult to read by non-autistic individuals in previous studies (e.g., Sasson et al. 2017; Elizabeth Sheppard et al. 2015). An alternative possible explanation of these findings may be related to the way autistic and neurotypical targets recalled their experiences. Perhaps, when recalling positive and negative experiences, neurotypical targets experienced a mixture of emotions whereas autistic individuals may have experiences that were unequivocally positive or negative. If that were the case, then the cues reflected on autistic behaviour may have been purely positive or negative and therefore more easily readable. A third explanation could be that the neurotypical individuals have learned to hide their feelings, especially when experiencing stress and love, whereas autistic people may exert less control over their expressions which are more likely to be displayed in an

uninhibited fashion. However, this does not explain why autistic people would be less readable in social contexts.

With regards to likeability, findings seem to suggest that children aged between four and nine years may not view autistic individuals negatively, suggesting they are more tolerant of diversity than the older individuals. It may also suggest that autistic features that distinguish them from non-autistic individuals, may not be perceived as something negative by the younger children. Furthermore, lack of any evidence for an association between readability and likeability contradicts previous research (Alkhaldi et al. 2019) and raises the possibility that while readability of autistic individuals might be influenced by the context, their likeability ratings may not. However, these findings need to be interpretated with caution as the sample size was quite small.

6.2.3 Chapter 4 – Analysing autistic and neurotypical written texts using computer software and perceiver impressions

This chapter reports the differences in the content of autistic and neurotypical targets' emotional experiences that they have felt in their past. To investigate the texts, computer software called the Linguistic Inquiry and Word Count (LIWC) was used. The study looked at three word-categories. The first category was the word count or number of words used to describe each type of experience (positive and negative). Findings did not reveal any significant difference between target groups in the number of words used. And both autistic and neurotypical targets used more words to describe their negative experiences than their positive experiences.

The second category looked at words describing affective processes. Autistic and neurotypical targets used similar number of words to describe anxiety, anger and their negative emotions. Autistic targets used more words related to positive experiences and sadness compared to neurotypical targets.

The third category looked at words used to describe personal concerns. Findings did not reveal any evidence of differences between the number of words used to describe work, home, religion, death, and money between target groups and between positive and negative experiences. Significant interactions revealed that money features more prominently in positive experiences for neurotypical than autistic individuals. With regards to words relating to leisure, both target groups used them more when describing their positive experiences, indicating that leisure concerns were associated with positive life experiences for both autistic and neurotypical individuals.

The study also investigated differences in the quality of the content of autistic and neurotypical texts that described their positive and negative emotional experiences. Specifically, the study looked at three aspects of quality: how clear and coherent the text is, how good is the example to describe an experience, and how cohesive the text is.

Findings revealed that perceivers judged autistic and neurotypical texts equally clear and coherent. This suggested that autistic narratives were well connected in a coherent way and similar to the neurotypical narratives in this respect. With regards to the second aspect, findings revealed that perceivers judged negative narratives to have better examples of experiences than positive narratives in the autistic group, and neurotypical targets were judged to select better examples to describe their experiences than autistic targets but only for their positive narratives.

Findings from the third aspect revealed that in the autistic group, the sense of emotion in negative narratives was perceived to be better conveyed than positive experiences. Moreover, autistic individuals were perceived to be better conveyors of the sense of the emotion than neurotypical individuals when describing their negative experiences.

Interpretation

Two kinds of analysis were carried out to investigate possible differences in autistic and neurotypical narratives that describe their positive and negative emotional experiences. LIWC was used to investigate differences in detail and perceiver judgments were used to investigate at a global/holistic level.

When narratives were analysed with LIWC, findings revealed that both target groups used similar numbers of words to describe their narratives, suggesting that both groups were equally able to make sense of their behaviour and were able to create narratives to describe their life experiences (Zellermayer, 1997). Moreover, the reason why narratives describing negative experiences were significantly longer than those describing positive experiences for both target groups may be because negative experiences are more likely to be perceived as a problem that needs to be solved (Bohanek et al. 2005). Therefore, individuals are more likely to use more words to process the negative experiences and reflect on why it happened so as to make it more meaningful to them (Bohanek et al. 2005). Findings revealed that autistic individuals were as good as neurotypicals at creating a narrative for their negative experiences.

No group differences were found between autistic and neurotypical narratives in the number of words used in relation to affect as a whole. However, in some cases, autistic narratives were observed to include more words that were particularly related to sadness and positive emotions. Although it is not entirely clear why autistic narratives had more words related to the affect category, it might be consistent with a previous study that reported enhanced writing skills in autistic individuals (Gillespie-Lynch et al. 2020) given that the targets' task was to write about emotional experiences.

Higher use of words related to leisure in both autistic and neurotypical narratives when describing positive experiences indicate that leisure spawns positive emotions in both groups. Leisure activities are also an indicator of psychosocial health and well-being

(Pressman et al. 2009) and therefore findings suggest that both target groups may have had some experiences conducive to psychosocial health. Furthermore, neurotypical individuals used more words related to money when describing their positive experiences suggesting that autistic individuals may be less materialistic and consequently did not consider their experiences relating to money as being particularly positive. Or it could be that autistic individuals have had fewer positive experiences that involve money.

Moving on, when narratives were analysed at a global level, both target groups were equally able to create clear and coherent narratives, as rated by neurotypical others. This demonstrated that both groups managed to give meaning to their experiences and exerted control over it (Bohanek et al. 2005). Moreover, coherence in narratives has been associated with higher quality of social relationships (e.g., Burnell et al. 2010; Vanaken & Hermans, 2021; Waters & Fivush, 2015). The ability to create clear and coherent narratives is also associated with better psychological well-being (Alvarez-Conrad et al. 2001). When perceivers were asked to rate how good of an example a narrative is in describing a particular experience, findings indicated that autistic individuals may have had fewer positive experiences in their lives and therefore have less options to select from in order to narrate a positive experience. However, the findings could also indicate that neurotypical perceivers found the examples of positive experiences of neurotypical individuals to be more relatable and therefore gave them higher ratings. This would support the DEP theory (Milton, 2012) which suggests that due to having broadly different perceptions and experiences of the world, autistic and non-autistic individuals struggle to empathise with one another. Therefore, it may have been that the neurotypical perceivers did not empathise so readily with the experiences of autistic individuals compared with their neurotypical counterparts. Lastly, when perceivers were asked to rate how well the sense of a particular experience has been conveyed in the narrative, findings indicated that autistic individuals are not disadvantaged in identifying or

communicating about their emotions and were particularly effective at doing so when the emotions are negative. Overall, the findings are contrary to the notion that autistic individuals lack the ability to reflect on or identify their own emotions (e.g., King et al. 2014). In fact, they seemed to be better in some of the measures that investigated the narratives at a detailed and a global level. The findings are somewhat analogous to those in Chapter 4 in which video clips were used and perceivers were more accurate in recognising some of the experiences of autistic individuals compared to neurotypicals.

6.2.4 Chapter 5 – Can non-autistic individuals perceive the diagnostic status of autistic individuals?

The aim of this chapter was to investigate whether people can determine an autism diagnosis after viewing a brief sample of behaviour (video clips) or written narratives (text excerpts) and whether people show any bias in their responses when determining an autism diagnosis of another. Findings revealed that perceivers were, to some extent, able to accurately guess a person's autism diagnosis when they watched video clips and also when they read text excerpts of the targets. Further findings revealed that targets were more likely to be judged as non-autistic than autistic, both when perceivers viewed video clips and when they read text excerpts. The study also aimed to investigate the effect of disclosing diagnostic information on likeability. When perceivers were made aware that some of the targets were autistic, the likeability ratings for both autistic and neurotypical targets considerably reduced for both the video and text condition. However, no differences in likeability were found between autistic and neurotypical targets.

The study also explored whether likeability ratings were associated with the perceivers' perception of the target being autistic. For the video clip condition, findings revealed that the targets rated lower in likeability were the same that tended to be perceived as autistic. For the text condition, although perceivers, to some extent, were able to determine

an autistic text from a neurotypical text, ratings of likeability were not associated with perceived autism.

Interpretation

Consistent with other chapters, the findings indicated that there were some reliable differences between the video clips and texts of the autistic and neurotypical targets. Findings also indicated that, to some extent, perceivers are sensitive to these differences and relied on them to make their judgments. Although it is difficult to pinpoint the cues used by perceivers that aided them in making their judgments, for the video condition, it can be speculated that they relied on behavioural cues or targets' overall appearance such as aspects of clothing, hairstyle, etc. For the text condition, consistent with Chapter 4 findings, perceivers may have found clues in the content or style of writing. Furthermore, the findings seem to indicate that University students have some knowledge and understanding of autism and are able, with some degree of accuracy, to identify autistic individuals based on brief samples of behaviour and also based on their narratives that describe their past emotional experiences. Also, as targets were recorded in the absence of a social context, autistic individuals may not have found a need to camouflage (e.g., Hull et al. 2017) and therefore their autistic trait may have been unmasked.

Findings of bias in the responses indicates that perceivers may tend to judge a target to be neurotypical by default unless there is something about their video or text that positively indicates that the target is autistic. Findings on the effect of disclosing diagnostic information suggested that perceivers in this study stigmatised autistic individuals. As the video and texts were identical with and without diagnostic disclosure, it appears the mere awareness that some of the targets might be autistic made the perceivers feel less positively towards them. The impact of diagnostic disclosure in this study is arguably more reflective of perceivers' implicit attitudes towards autism rather than their explicit attitudes as they were

not aware of each targets' diagnosis. This stands in contrast with previous studies which gave diagnostic disclosure of each individual target whereby perceivers were well aware of which target was autistic (e.g., Matthews et al. 2015; Sasson & Morrison, 2019). Perceivers in previous studies might have been aware that their attitudes towards autism would be reflected in their responses and may have been inclined to give responses that are socially acceptable.

The lack of significant differences between likeability ratings of autistic and neurotypical targets was inconsistent both with considerable previous research as well as the results reported in Chapter 2, but this is difficult to interpret as the analysis here was done at a target level as opposed to the perceiver level (Chapter 2) whereby the sample size might not have given enough power to yield significant differences between the groups.

For the video condition, the negative relationship between target likeability and perceived autism suggest that although a clear association was observed, the direction of causality is not clear. It is possible that perceivers have a sense of whether or not they like the target and directly use this to judge whether or not the target is autistic. Or it could be that perceivers first sense that the person is autistic and then take this into account in their judgments of social favourability. Nevertheless, it is quite possible that perceivers rely on the same behavioural cues or aspects of appearance to make both types of judgments but that there is no direct relationship. This negative association was not observed in the text condition, suggesting that negative perceptions of autistic people may be mostly based on the physical aspects of their appearance or behaviour. Moreover, it could also be that, narratives of autistic people's life experiences helped perceivers to gain insight into what autistic individuals go through in their lives which may have then led the perceivers to better empathise with them (and perceive them more favourably).

6.3 Implications

6.3.1 Retrodictive mindreading

The methodology devised for this research measures the ability of a person to engage in retrodictive mindreading; the ability to understand others' inner states, and the incident that led to the inner states, by interpreting signals in their behaviour. Findings imply that people managed to retrodictively mentalise when trying to understand the minds of non-autistic individuals. This is consistent with past studies that have looked at this ability (e.g., Pillai et al. 2012; Teoh et al. 2017; Valanides et al. 2017). The methodology produced written descriptions of people's mental states, which gives it an extra dimension. More surprisingly, in some cases, people were even better at understanding the minds of autistic individuals when compared to the neurotypical individuals. This suggests that inner states of individuals are signalled in behaviour even in the absence of any social context.

Furthermore, perceivers of different age-groups demonstrated this ability, suggesting that the ability to mentalise develops early on during childhood. This is consistent with the Theory of Mind research that indicated children as young 4 years were able to pass false-belief tasks (e.g., Tomasello, 2018). And contrary to some studies (Pardini & Nichelli, 2009), this ability did not seem to decline as people got older. The study was carried out by older adults, some of whom were in their 80s and demonstrated the presence of the ability to mentalise.

6.3.2 The Double Empathy Problem

Findings from this work revealed that the issues that could be identified by the DEP theory proposed by Milton (2012) may not be present in situations where the social element is missing. This perhaps emphasizes the role of the social context in contributing to the difficulties faced by autistic individuals. The findings suggest that autistic people are not necessarily less readable per se, and in fact whether or not their behaviour is difficult for non-autistic others to interpret may depend on the situation. This suggests that in situations where autistic individuals are less readable than non-autistic individuals, the difficulty may be

attributed to something which is provoked by the social context such as social anxiety. The nature of the task in this work gave targets the freedom to write any experiences related to the cue word given. Autistic individuals may have found this task interesting and felt motivated to share their experiences in writing and may have enjoyed the process as they were given their space and unlimited time to carry out the task alone and undisturbed. This may have reduced or eliminated any anxiety which they would otherwise have experienced had others been present.

Findings on social favourability differed from the findings on readability. As in previous studies (e.g., Sasson et al. 2017), autistic individuals were less liked than neurotypical individuals even in the absence of social context, suggesting that this is a particularly robust phenomenon. There may be something inherent in the behaviour or aspects of appearance in autistic individuals that are consistently less liked by the neurotypicals. Moreover, the fact that autistic people were equally readable but less liked, in the absence of any correlation between readability and social favourability, appears to contradict Alkhaldi et al's. (2019) conclusions that readability and social favourability are directly related, suggesting rather that this relationship may be contextual.

Autistic individuals were less liked than neurotypical targets by 10-12 years old children, adults and even the older adults. This indicates a strong presence of negative perceptions of the autistic individuals by the neurotypical participants from adolescence onwards. Following the social transactional model of development (Mitchell et al. 2021), these negative perceptions of autistic individuals may later translate into negative (or less positive) behaviours towards them such as peer rejection or bullying. This will in turn significantly impact the abilities of autistic individuals– even those who may be more socially aware and socially interested– to form social networks in their workplaces and schools. Therefore, educational institutions and workplaces are recommended to have more training

and awareness programs that aim to promote understanding and concomitant social favourability towards autistic individuals

There was no evidence of negative perceptions of autistic individuals in children under the age of 10 years. This indicates that the negative perceptions present in older children and adults may be something that are acquired during development, possibly, through social norms that are espoused by adults (Piaget, 2013) and are more likely to be established in children as they get older. Therefore, it may help to develop intervention programs for children within this age range that aim to inculcate acceptance of autistic individuals and maintain social favourability of this population.

6.3.3 Narrative writing

Findings from this work revealed narratives of autistic targets were perceived to be as clear and as coherent as the narratives of neurotypical individuals. Indeed, autistic narratives that described their negative experiences were perceived to be better conveyed. This suggests that writing may potentially be a good platform for autistic individuals to effectively communicate with the non-autistic group. This is also good news for autistic authors who may be encouraged to write stories that narrate autistic experiences in order to reduce the gap in understanding between the autistic and the non-autistic individuals.

Findings may also indicate that, generally autistic individuals tend to have more negative experiences or less positive experiences in their lives. This is consistent with research indicating higher levels of mental health problems in the autistic population (Pellicano et al. 2014) and higher rates of death by suicide at an early age (Hirvikoski et al. 2016). This lends support to the notion that autistic individuals are more likely to suffer in a world with a neurotypical population in the majority.

6.3.4 Knowledge of autism and attitudes

According to previous research, knowledge of autism and awareness of the condition has substantially increased over recent years in the university population (White et al. 2019) and the findings in this thesis can be considered consistent with this. Non-autistic individuals, to some extent, are able to correctly guess autism diagnosis just by observing brief samples of other people's behaviour or samples of their life narratives. This suggests that a non-expert student population has enough knowledge or prior experience of autism to be able to make such judgments with some degree of accuracy, even with highly limited information available. However, these findings may not necessarily be beneficial for the autistic population as findings from this work also revealed the presence of negative implicit attitudes towards autistic individuals– namely telling non-autistic participants that some targets were autistic was sufficient to reduce overall social favourability ratings for the targets, in comparison with when no such information was provided. This means that if non-autistic individuals are able to guess the diagnosis of autistic people, then autistic individuals may be perceived even less favourably than non-autistic individuals.

6.4 Limitations

One of the limitations of the experimental paradigm used was that when thinking about the different kinds of experience, targets may have had a mix of emotions that were not purely positive or negative. Therefore, although targets were cued to think about an occasion when they felt a particular state, we cannot be absolutely sure that they felt completely positive or completely negative about their experiences. Therefore, in circumstances where the cue word and the experience they remembered elicited a mixture of feelings this might give rise to mixed cues which may have made the positive/negative distinction more difficult for perceivers to make.

When comparing autistic and neurotypical data, the sample size used in this work, was relatively small which may limit interpretation and generalisability. Furthermore, most of

the participants that took part in the studies were University students (especially in Chapters 4 and 5). Therefore, some of the findings and conclusions made from this work may only reflect behaviours of this specific population. It may be that people who work closely with autistic individuals such as their parents, teachers and caregivers have different impressions towards autistic individuals.

Furthermore, it was not known how familiar perceivers were with autistic people, as we did not include a measure of how much prior experience perceivers had had with autism. Given that increased familiarity is associated with increased preference (Zajonc 1968), people's perceptions of others might be affected if they are more familiar with them (e.g., Morrison et al. 2019). Moreover, a more recent study suggests that family members of autistic individuals, who would have high levels of familiarity with autism also tended to misperceive their autistic relatives (Heasman & Gillespie, 2018).

The studies conducted in this thesis did not take alexithymia into account. Alexithymia is suggested to be predictive of the difficulties autistic individuals experience with emotion processing (Cook et al. 2013). Nevertheless, findings from the studies revealed that autistic individuals were able to retrodictively recognise and immerse themselves in emotion which were later more accurately perceived by others. This suggests that even if the autistic participants might be having a certain degree of alexythimia, this did not stop them from carrying out the task required in this thesis. However, future studies should include a measure of alexithymia which would enable one to determine whether and to what extent alexithymia does impact on the readability of autistic individuals.

The current study was only limited to investigating a non-social context. Ideally, it would have been much more informative to have a direct comparison between social and non-social situations when carrying out the studies. However, it would be challenging to find suitable matched social and non-social scenarios.

Lastly, since culture play a part in how much we show our inner states (e.g., Chen & Jack, 2017; Jack et al. 2012; Matsumoto, 1991); the conclusions made with these findings may be only limited to a specific culture.

6.5 Future Work

One of the ways this work can be improved and expanded further is to have additional measures about the targets or perceivers. For example, to further investigate the circumstances which make autistic individuals more readable than neurotypical individuals, social anxiety measures for the targets may be informative. As mentioned, in order to fit in with the majority, autistic individuals tend to camouflage or mask their autistic traits which act as a mediator between social stressors (e.g., lack of autism acceptance) and mental health problems such as anxiety and depressions (Cage et al. 2018; Cage & Troxell-Whitman, 2019). Since autistic individuals are reported to have higher levels of social anxiety than non-autistic individuals (e.g., Nimmo-Smith et al. 2020), it would be particularly informative to determine whether social anxiety might explain poor readability of autistic people in social situations.

According to Sasson et al. (2017), neurotypical's negative impressions towards autistic individuals reduce once diagnosis is disclosed. However, Sasson et al's. (2017) study involved explicit attitude measures while the current research involved more implicit attitudes whereby the effect of disclosing diagnosis was negative for autistic individuals. Further investigation of the effects of diagnostic disclosure could directly compare implicit and explicit attitudes whereby some participants are presented with diagnostic information of each target to measure explicit attitudes, while other participants are presented with general information about diagnosis to assess implicit attitudes. The study can further be extended and carried out beyond the student population to include other settings such as workplaces

and home. This might be able to give a holistic view of the people's attitudes towards autistic individuals.

Future research could also employ the methodology introduced in this thesis to investigate how autistic individuals are perceived by their autistic peers. According to the social deficit model, if social impairments are inherently an autistic problem, then autistic-neurotypical interaction would be better than autistic-autistic interaction (Crompton et al. 2020). However, if DEP is taken into account, then autistic-autistic interaction would be better than autistic-neurotypical interaction (Crompton et al. 2020). Previous research suggests that autistic individuals who have a preference of interacting with their own peers are likely to experience close social affiliations with them (Crompton et al. 2020; Morrison et al. 2019). Therefore, autistic perceivers would be predicted to perform better than neurotypical perceivers in accurately interpreting the signals emitted by autistic targets.

Most of the research on DEP focuses on issues relevant to an adolescent and adult population (e.g., Sasson et al. 2017). Further work can look into the presence (or absence) of DEP in social interactions between young children in order to investigate the developmental stage in which DEP issues may emerge. The current work suggested that younger children performed differently than the older children and adults, in that, autistic individuals were not less liked by the younger children. Therefore, a possible future direction could be to create target stimuli that includes autistic and neurotypical individuals and investigate differences that may exist as a consequence of ageing/growing up.

Moreover, it may be, that in the absence of a social context, autistic individuals did not feel the need to engage in masking which may have made them more readable to others. People did not have trouble in accurately perceiving the brief samples of behaviour produced when autistic individuals were alone. Given that current findings contradict previous research conducted in the presence of a social context (e.g., Alkhaldi et al. 2019; Sasson et al. 2017) it

may imply that engaging in masking can be counterproductive and reduce the quality of autistic interaction. Therefore a possible future direction to explore can be to compare a context in which autistic individuals engage in masking to a context in which they do not. For example, the task created in this PhD could be adapted such that autistic individuals think about their emotional experiences in the presence of an experimenter and then verbally narrate them to the experimenter while being surreptitiously video recorded. The perception of their behaviour in this context can then be compared to a non-social context to directly investigate the effects of masking.

Lastly, the research field needs to be open to application of richer and inclusive methodologies and should encourage participatory approaches (Davis & Crompton, 2021). Participatory research is when the perspectives of autistic individuals inform decisions on what research needs to be done, how it is done and how it is caried out (Cornwall & Jewkes, 2001). Therefore, one way to move forward is to have a collaboration between the autistic and non-autistic communities that will bring about a facilitative environment to investigate relevant and crucial research questions (Fletcher-Watson et al. 2019). For instance, the autistic narratives produced from this research may provide a platform to include an autistic voice in understanding the experiences faced by the autistic community.

6.6 Conclusions

In summary, the work presented here gives further insight into the DEP (Milton, 2012). It demonstrates that the DEP may not exist in all contexts of life. Neurotypical individuals were able to correctly read autistic behaviour and found autistic individuals more expressive than other NT individuals. However, consistent with past research, autistic individuals were perceived less socially favourable than neurotypical individuals. Findings from autistic and neurotypical narratives suggests that writing as a medium of communication for autistic individuals should be encouraged at least when trying to engage in social

interaction with another person for the first time. Lastly, in contrast to previous research, the current studies caution against autistic individuals disclosing their diagnosis, as a presence of negative implicit attitudes still appear to exist in non-autistic individuals even among populations that apparently have some awareness of autism.

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Supplementary Materials

A. The Autism Spectrum Quotient (AQ)

1. I prefer to do things with others rather than on my own.	definitely agree	slightly agree	slightly disagree	definitely disagree
2. I prefer to do things the same way over and over again.	definitely agree	slightly agree	slightly disagree	definitely disagree
3. If I try to imagine something, I find it very easy to create a picture in my mind.	definitely agree	slightly agree	slightly disagree	definitely disagree
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.	definitely agree	slightly agree	slightly disagree	definitely disagree
5. I often notice small sounds when others do not.	definitely agree	slightly agree	slightly disagree	definitely disagree
6. I usually notice car number plates or similar strings of information.	definitely agree	slightly agree	slightly disagree	definitely disagree
7. Other people frequently tell me that what I've said is impolite, even though I think it is polite.	definitely agree	slightly agree	slightly disagree	definitely disagree
8. When I'm reading a story, I can easily imagine what the characters might look like.	definitely agree	slightly agree	slightly disagree	definitely disagree

9. I am fascinated by dates.	definitely agree slightly agree slightly disagree definitely disagree
10. In a social group, I can easily keep track of several different people's conversations.	definitely agree slightly agree slightly disagree definitely disagree
11. I find social situations easy.	definitely agree slightly agree slightly disagree definitely disagree
12. I tend to notice details that others do not.	definitely agree slightly agree slightly disagree definitely disagree
13. I would rather go to a library than a party.	definitely agree slightly agree slightly disagree definitely disagree
14. I find making up stories easy.	definitely agree slightly agree slightly disagree definitely disagree
15. I find myself drawn more strongly to people than to things.	definitely agree slightly agree slightly disagree definitely disagree
16. I tend to have very strong interests which I get upset about if I can't pursue.	definitely agree slightly agree slightly disagree definitely disagree
17. I enjoy social chit-chat.	definitely agree slightly agree slightly disagree definitely disagree

18. When I talk, it isn't always easy for others to get a word in edgeways.	definitely agree	slightly agree	slightly disagree	definitely disagree
19. I am fascinated by numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
20. When I'm reading a story, I find it difficult to work out the characters' intentions.	definitely agree	slightly agree	slightly disagree	definitely disagree
21. I don't particularly enjoy reading fiction.	definitely agree	slightly agree	slightly disagree	definitely disagree
22. I find it hard to make new friends.	definitely agree	slightly agree	slightly disagree	definitely disagree
23. I notice patterns in things all the time.	definitely agree	slightly agree	slightly disagree	definitely disagree
24. I would rather go to the theatre than a museum.	definitely agree	slightly agree	slightly disagree	definitely disagree
25. It does not upset me if my daily routine is disturbed.	definitely agree	slightly agree	slightly disagree	definitely disagree
26. I frequently find that I don't know how to keep a conversation going.	definitely agree	slightly agree	slightly disagree	definitely disagree

27. I find it easy to “read between the lines” when someone is talking to me.	definitely agree	slightly agree	slightly disagree	definitely disagree
28. I usually concentrate more on the whole picture, rather than the small details.	definitely agree	slightly agree	slightly disagree	definitely disagree
29. I am not very good at remembering phone numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
30. I don’t usually notice small changes in a situation, or a person’s appearance.	definitely agree	slightly agree	slightly disagree	definitely disagree
31. I know how to tell if someone listening to me is getting bored.	definitely agree	slightly agree	slightly disagree	definitely disagree
32. I find it easy to do more than one thing at once.	definitely agree	slightly agree	slightly disagree	definitely disagree
33. When I talk on the phone, I’m not sure when it’s my turn to speak.	definitely agree	slightly agree	slightly disagree	definitely disagree
34. I enjoy doing things spontaneously.	definitely agree	slightly agree	slightly disagree	definitely disagree
35. I am often the last to understand the point of a joke.	definitely agree	slightly agree	slightly disagree	definitely disagree
36. I find it easy to work out what someone is thinking or feeling just by looking at their face.	definitely agree	slightly agree	slightly disagree	definitely disagree

37. If there is an interruption, I can switch back to what I was doing very quickly.	definitely agree slightly agree slightly disagree definitely disagree
38. I am good at social chit-chat.	definitely agree slightly agree slightly disagree definitely disagree
39. People often tell me that I keep going on and on about the same thing.	definitely agree slightly agree slightly disagree definitely disagree
40. When I was young, I used to enjoy playing games involving pretending with other children.	definitely agree slightly agree slightly disagree definitely disagree
41. I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).	definitely agree slightly agree slightly disagree definitely disagree
42. I find it difficult to imagine what it would be like to be someone else.	definitely agree slightly agree slightly disagree definitely disagree
43. I like to plan any activities I participate in carefully.	definitely agree slightly agree slightly disagree definitely disagree
44. I enjoy social occasions.	definitely agree slightly agree slightly disagree definitely disagree
45. I find it difficult to work out people's intentions.	definitely agree slightly agree slightly disagree definitely disagree

46. New situations make me anxious.	definitely agree	slightly agree	slightly disagree	definitely disagree
47. I enjoy meeting new people.	definitely agree	slightly agree	slightly disagree	definitely disagree
48. I am a good diplomat.	definitely agree	slightly agree	slightly disagree	definitely disagree
49. I am not very good at remembering people's date of birth.	definitely agree	slightly agree	slightly disagree	definitely disagree
50. I find it very easy to play games with children that involve pretending.	definitely agree	slightly agree	slightly disagree	definitely disagree

B. Illustration of the editing of thinking times (Chapter 3)

	THINKING TIME AFTER EDITING			
PTPT	**GUILTY**	**STRESS**	**LOVE**	**PROUD**
AUT1	10.83	4.94	50.00	1.28
AUT2	27.97	3.95	8.00	48.57
AUT3	14.44	10.87	10.00	2.56
AUT4	22.56	24.71	21.00	67.74
AUT5	11.73	34.59	19.00	2.56
AUT6	11.73	65.23	18.00	5.75
AUT7	30.68	84.01	12.00	83.08
AUT8	35.19	40.52	12.00	12.14
AUT9	55.94	48.43	14.00	7.03
AUT10	13.54	36.57	120.00	10.86
N1	32.48	20.76	22.00	8.31
N2	7.22	4.94	9.00	5.11
N3	5.41	4.94	8.00	15.98
N4	14.44	5.93	16.00	9.59
N5	21.66	6.92	11.00	4.47
N6	9.93	4.94	8.00	5.11
N7	17.14	12.85	21.00	93.31
N8	12.63	1.98	15.00	7.03
N9	61.36	2.97	18.00	23.65
N10	8.12	4.94	13.00	10.86
MEAN	**21.25**	**21.25**	**21.25**	**21.25**