Self-regulation and Communication Skills in Children with Moderate Learning Difficulties

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Abstract

Self-regulation is increasingly considered to play an important part in several aspects of learning. It has also been claimed to be a strong candidate in explaining many of the difficulties faced by children with learning difficulties. Difficulties in monitoring one's own comprehension and controlling one's own cognitive processes, for example, is likely to affect progress on many school tasks. At the same time, the language and communication difficulties frequently faced by children with learning difficulties can also be explained by reference to poor self-regulatory skills.

This thesis explores the link between self-regulation, communication and learning for a group of children with moderate learning difficulties (MLDs). It reports the design and evaluation of an intervention study which sought to promote MLD children's use of self-regulatory strategies within a communicative context. The study was motivated by the Vygotskian proposal that collaborative interactions provide the opportunity for metacognitive skills to be modelled, shared and practised on the social plane before being internalised to become part of the child's own repertoire of self-regulatory behaviours.

Preliminary analysis of the children's communication strategies indicated general improvements. However, on a separate measure of communicative performance, only half the children were observed to make gains. In attempting to explain this apparent dissociation between communicative process and

communicative performance, the thesis raises some important questions about the kind of methodology which is used to measure individual contributions during collaborative interactions. By providing an alternative approach, micro-genetic in nature, which concentrates on looking at the *appropriateness* of children's performance within the context in which it is taking place, an explanation for the seemingly discrepant results is proposed. Generalised gains in communicative performance can be explained by changes in particular types of strategic behaviours, specifically strategies associated with effective information provision and strategies which serve to regulate the interaction.

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Chapter 1: Introduction

Over recent years there has been increasing interest in the social foundations of cognition. Perhaps the most influential theoretical framework used to explore this concept is that proposed by Vygotsky (Vygotsky, 1978). Here, social interaction and communication are claimed to play a central role in the transmission of culture and the formation of higher mental processes such as reasoning, memorising, problem solving, planning and evaluating. Vygotsky's thinking has stimulated research in a variety of fields. These include investigations of parent-child interaction (for example Wertsch, 1985), peer interaction (for example Forman, 1987; Garton & Pratt, 2001; Tudge & Rogoff, 1989), methods of instruction (for example Brown, Palincsar, & Armbruster, 1984; Moll & Greenberg, 1990), help-seeking behaviour (Puustinen, 1998) and moral reasoning (Kruger, 1992). This first chapter of the thesis provides an overview of the research which has explored the relationships between children's learning and higher mental processes within the Vygotskian tradition, and goes on to discuss how this literature relates particularly to children with learning difficulties. The review is not intended to be exhaustive; rather it presents a selective picture of the issues which are considered to have particular relevance to the empirical work presented in later chapters.

1.1 The role of self-regulation in learning

The principal focus of this thesis is the Vygotskian claim that cognitive processes are constructed through social interaction. Not only do children learn about the particular activity which is the focus of this joint participation, but they also learn how to learn – cognitive and metacognitive skills are demonstrated, shared and practised. A central mechanism for learning within this theoretical framework is the transfer of responsibility during social interactions from the more capable (or more experienced) to the less capable (or less experienced) partner. At the beginning, the more capable partner assumes control over the interaction; monitoring achievements, guiding activities and evaluating outcomes until these strategies become part of their partner's own system of control. Not only does the experience therefore provide the less capable member with the opportunity to achieve success, but it also enables regulatory behaviours such as planning, monitoring, memorising and evaluating to be employed by both members of the interaction on the inter-individual plane such that, for the less competent member, internalisation of these strategies to the intra-individual plane is achieved. Processes which were once used to regulate aspects of the interaction and a partner's behaviour, become self-regulatory processes which can act on internal cognitions (Vygotsky, 1978).

Self-regulatory processes are increasingly considered to be implicated in many aspects of learning. These include, for example, reading (Meyers & Paris, 1978; Paris, Wasik, & Turner, 1991), writing (Scardamalia & Bereiter, 1984), mathematics (Van Haneghan & Baker, 1989), communication (Robinson, 1983) and problem-solving (Swanson, 1990). The consistent finding arising from these kinds of studies is that children who perform at higher levels demonstrate more sophisticated regulatory processes than those children performing at lower levels.

1.1.1 Cognition, metacognition and self-regulation: Issues of definition

Despite the long-standing interest amongst both academics and practitioners in the role, nature and origins of self-regulation, there remains some debate about what behaviours should be described as self-regulatory (see for example Boekarts, 1999; Brown, 1987; Wong, 1991; Zimmerman, 1995). This in part stems from the controversy surrounding definitional issues of metacognition. Specifically the discussion concerns what processes can be described as metacognitive and whether these processes are necessarily conscious.

In Flavell's early discussions of metacognition (for example Flavell, 1976), he described the concept as involving two components; the 'knowledge' component which refers to knowledge about one's own cognitive processes, and the 'regulatory' component which includes those processes with serve to monitor, or to control, one's cognitive processes. This two–component model of metacognition has attracted wide debate, with some researchers placing emphasis on the knowledge component (for example Annevirta & Vauras, 2001; Cavanaugh & Perlmutter, 1982) and others promoting the original two-component model (for example Baker, 1994; Brown, 1987).

The second aspect of metacognition which has been widely discussed is whether metacognitive processes are conscious or unconscious processes (see for example Brown, 1987; Diaz, Neal, & Amaya-Williams, 1990; Pressley, Borkowski, & Schneider, 1987; Reeve & Brown, 1985). In their interpretation of Vygotsky's thesis about the role of socialisation and education in the transformation of biologically determined processes to higher psychological functions, Diaz et al (1990) claim that higher 'metacognitive' processes can differentiated from basic 'cognitive' processes because they are "(1) self-regulated rather than bound to the immediate stimulus field; (2) social or cultural rather than biological in origin; (3) the object of conscious awareness rather than automatic and unconscious; and (4) mediated through the use of cultural tools and symbols" (p. 128). Brown (1987) argues that although some aspects of monitoring, correcting and controlling cognitive processes may occur below the level of consciousness in young children, deliberate and strategic behaviours which serve to regulate one's own cognitions, and which one is consciously aware of, represent those behaviours which ought to be considered metacognitive. It is this "increasing ability to gain conscious control of and regulate their metacognitive processes that determines the growth of problem-solving skills" (Reeve & Brown, 1985 p.347).

In line with researchers such as Baker (1994), this thesis takes the view that metacognition refers to both knowledge *and* regulation of cognitive processes and is conscious or accessible to consciousness. It is this regulatory component of metacognition which is the central focus of the research described in the following chapters.

Also worthy of comment here is the use of the term 'strategy' when referring to cognitive and metacognitive processes. There is some confusion in the literature about whether any strategic behaviour is necessarily metacognitive (see for example Brown, 1987). This thesis considers only those strategic actions which serve to act on one's own cognitions as being regulatory, or metacognitive in nature. Conversely, strategies which serve to promote cognitive progress without incorporating an element of reflection on those cognitions are considered to be cognitive strategies (Flavell, 1981, 1987).

1.1.2 The development of self-regulation

A description of the antecedents of self-regulation is provided by Kopp (Kopp, 1982). In this model, Kopp proposes that the development of self-regulatory behaviours proceeds through five phases during the period from early infancy to the beginning of the pre-school years. Evidence of a rudimentary control over one's own behaviour is demonstrated towards the end of a child's first year, when he or she begins to comply with adult requests. The end point in Kopp's model is the achievement by children between the ages of three and four, of a set of self-regulatory behaviours such as compliance, delay, and self-monitoring in the absence of adults which, Kopp argues, demonstrate an awareness of socially approved behaviours. Kopp's phases describe how a baby moves from attempting to modulate arousal states through organised patterns of behaviour, for example self-soothing behaviours such as thumbsucking; gradually co-ordinating these actions in response to stimuli in the environment (but with no conscious awareness); successfully maintaining, initiating or ending behaviours in response to verbal directives from the caregiver; complying with the caregiver's demands in their absence; and finally adopting contingency rules which guide behaviour irrespective of any situational pressures. This final 'self-regulatory' phase is distinct from the previous 'self-control' phase as the child has limited flexibility in adapting behaviours to different situations. This contrasts with the self-regulation phase which consists of "a distinctly more mature form of control and presumably implicates the use of reflection and strategies involving introspection, consciousness, or metacognition" (Kopp, 1982 p. 207).

The primary evidence that Kopp draws upon to support her argument is the nature of young children's cognitive capacities at each phase. For example, she draws on findings from Piagetian and neo-Piagetian research which demonstrate limitations in processing capacity, problem-solving strategies, perspective-taking skills and metacognitive strategies, in order to highlight characteristics of children in the self-control phase who find it difficult to monitor the different requirements of different situations and adapt their behaviour to meet these requirements.

In their review of Kopp's model, Diaz and colleagues (Diaz et al., 1990) make two important points. The first relates to the difference between self-control and self-regulation. In Kopp's model, the latter develops out of the former as children internalise adult commands and begin to use them for themselves.

However, true self-regulation, Diaz et al (1990) argue, is demonstrated when the child moves away from a reliance on adult-internalised regulations to an ability to formulate and apply their own rules and plans of action in different circumstances. The second point made by these researchers is that Kopp's model, although referring to the facilitating influence of caregivers and other adults in the child's social environment, leaves the precise mechanisms of the development of self-regulation unspecified.

In order to address this second question, it is useful to draw on Vygotsky and Luria's work on the role of private speech and the internalisation of external relations among stimuli, signs and behaviours in the development of regulatory behaviours (see for example Fuson, 1979; Luria, 1982; Vygotsky, 1978). Vygotsky and Luria propose that a child's speech which is initially used to label aspects of the environment, begins to play a different function when, rather than accompanying the child's actions, it precedes them. This indicates the commencement of speech being used to plan, guide and monitor behaviour. And although having its origins in social exchange, it is not a simple imitation of adult regulatory speech, but the result of the child's own new levels of behavioural organisation. As Vygotsky claims, "the specifically human capacity for language enables children to provide for auxiliary tools in the solution of difficult tasks, to overcome impulsive action, to plan a solution to a problem prior to its execution, and to master their own behaviour." (1978; p.28).

The remainder of this half of the chapter reviews the evidence that demonstrates the important role that self-regulation plays in the development of abilities in two well-researched domains; communication and problem solving. Following this, research which has specifically addressed the question of whether the development of self-regulatory skills can be promoted is discussed, with reference in particular to an intervention programme called 'reciprocal teaching' (Brown & Campione, 1990; Palincsar & Brown, 1984).

1.1.3 Self-regulation and communication

Self-regulatory activity has been shown to play an important part in the development of effective communication skills. Successful transfer of information is dependent upon an understanding of particular strategies and conventions of language use coupled with an ability to regulate one's use of these in order to produce comprehensible and coherent messages. Monitoring the effects one's communicative efforts by observing and interpreting the actions and reactions of a partner in interaction provides essential feedback about the possible sources of confusion, ambiguity and misunderstanding engendered by the act of communication. Similarly, being on the receiving end of inadequate or ambiguous help and instructions may provide a basis for insights into how information has to be structured and paced in order to be comprehensible.

Brown and her colleagues (Brown, Anderson, Shillcock, & Yule, 1984), though not explicitly influenced by Vygotskian theory, have explored these ideas. Working with adolescents in Scotland, they investigated the effects of extended experience in structured peer interaction activities on the development of communication skills. They draw a distinction between 'chat' and 'information-giving talk', claiming that the latter requires the use of specific skills which are not necessarily employed in the course of everyday talk. In a series of studies, these researchers demonstrated that many children approaching the end of their secondary education still have difficulty in accurately transferring information. Brown et al (1984) argue that it is not the case that these children are deficient in a particular aspect of spoken language, but rather that they have difficulty in knowing how and when to deploy their language in order to be most effective as communicators. By providing the children with the opportunity to practise information-giving over a range of situations, they were able to demonstrate that children made considerable progress over a relatively short period of time. These improvements in children's communication were shown to last over time and were transferable to new communication tasks.

Work by Bouna (Bouna, Lloyd, & Peers, 1999) and Guldberg (Guldberg, Lloyd, & Peers, 1997) also provides evidence that experience with structured communication tasks leads to improved speaker and listener performance for primary school children. In addition, the former study demonstrated that providing feedback about the adequacy of message-giving not only heightened the gains that were made but also, as found by Brown et al, lead to transferred capability to different tasks.

1.1.4 Self-regulation, verbalisation and problem solving

Another line of enquiry which has implications for our understanding of the relationship between self-regulation and learning comes from investigations into the impact of verbalisation on problem-solving performance. Several studies (for example Chi, Bassock, Lewis, Reimann, & Glaser, 1989; Chi, de Leeuw, Chiu, & Lavancher, 1994; Fergusson-Hessler & de Jong, 1990; Renkl, 1997) involving comparisons of effective and less effective problem solvers (for example, in solving physics problems and learning from expository texts) have demonstrated that efficient and accurate problem solving performances can be distinguished from less effective efforts by analyses of the content of concurrent verbalisation - solicited commentaries made by problem-solvers about their own, ongoing, attempts at solution. The 'self-explanation effect' refers to a number of differences in the characteristic talk which accompanies good and poor performance. Chi and her colleagues claim that the self-explanations provided by effective learners reflect accurate monitoring of their own understanding and misunderstandings as they problem-solve. Less effective learners are not only less likely to provide unprompted self-explanations (Chi et al., 1994), but when they do, their verbalisations appear not to connect with their understanding of the problem (Chi et al., 1989). Analysis of these verbalisations indicates that, despite poor students having more difficulties with the task, they appeared not to detect miscomprehensions as often as better students.

In an extension to the Chi studies, Renkl (1997) demonstrates that effective learners use a range of qualitatively different self-explanations. He identifies four different self-explanation styles which, he argues, contribute to more or less effective learning.

Research into the self-explanation effect, therefore, claims a causal role for language in the control of cognitive processes. Concurrent verbalisations which serve to explicitly regulate one's problem–solving actions is demonstrated to result in better problem-solving performance.

1.1.5 Promoting self-regulation

Given the importance of self-regulatory activity for communication and cognitive development and the role proposed by Vygotsky of social interaction in the development of these skills, one might expect that the social experiences children have at home and at school will have an impact on the development of their self-regulatory skills. A range of studies have been conducted in order to establish how metacognitive and self-regulatory skills are facilitated in these situations, some concentrating on naturalistic observations, others focussing on interventions which have been designed to explicitly teach self-regulatory skills. These are reviewed in turn.

Adult-child interactions and self-regulation

Whilst several studies provide evidence that children with mothers and teachers who provide more direct instruction about metacognitive skills are better able to regulate their own learning than children who do not experience these kinds of experiences (Freund, 1990; Moely et al., 1992; Moss & Strayer, 1990), the majority of research in this area suggests that these deliberate instructional experiences are rare for many children. However, observations of adult-child interactions have revealed some interesting findings which begin to shed light on children's acquisition of self-regulatory and metacognitive skills. The first line of enquiry comes from those studies which have set out to examine the effects of parental regulation during adult-child interactions on the children's subsequent independent achievements. Specifically, much of this work is framed by the Vygotskian claim that internalisation of self-regulatory processes is facilitated during adult-child problem solving interactions by the adult (a) taking responsibility for aspects of the task which are beyond the child's abilities; (b) regulating the child's behaviour by, for example, directing and guiding the child's attention to key features of the task, planning future steps, monitoring successes and failures, and co-ordinating strategies when the child is able to participate (operating within the child's 'zone of proximal development' or ZPD); and (c) transferring the responsibility to the child for the completion of those aspects of the task which are or become achievable by the child (Vygotsky, 1978).

Within this framework, Freund (1990) compared a group of children's independent efforts at a sorting task after they had interacted with their mother on a similar task with a group of children's efforts after only receiving feedback about whether earlier attempts had been effective. Freund's results demonstrated higher levels of independent problem solving behaviours for the former group. Her conclusions were enhanced by the associated finding that mothers took more responsibility for aspects of the task when the task was difficult than when the task was more straightforward. Mothers also demonstrated more frequent regulatory behaviours in these situations. Diaz et al (1990) also report findings of a study of mother-child interactions which demonstrated that the rate at which mothers transferred responsibility for regulating the interaction within the context of the task was positively correlated with the rate at which the child took over the regulatory role. Wertsch and his colleagues make similar claims. In their studies of mother-child interactions these researchers (for example Wertsch, 1979, 1985; Wertsch, McNamee, Budwig, & McLane, 1980) demonstrated that mothers took more control of the interaction for younger children than older children and that the regulating strategies which the older children used were the same as those used by the mother when interacting with younger children.

The argument used to explain these results is that, in line with Vygotskian thinking, alongside instruction of task-specific skills, the regulatory behaviours being demonstrated by the mothers in these problem solving interactions are internalised by the child. This enables the child to employ his or her own control processes which in turn lead to greater independent achievements.

There have been several studies, however, which have failed to replicate such results. For example, Kontos (1983) demonstrated no beneficial effects on independent problem solving following a session where mothers and children worked together. Attempts to resolve these inconsistencies have centred around discussions about the nature and difficulty levels of the tasks being used. Rogoff (1990) and Baker (1994), for example, argue that studies which have involved tasks which require cognitive or metacognitive processes which are less easy to reflect on openly and discuss are less likely to result in expected gains in independent performance. Others, for example Azmitia and Perlmutter (1989), Moss and Strayer (1990) and Garton (1992), argue that task difficulty and the child's age is necessarily going to affect the child's abilities to regulate their own problem solving behaviours in the independent conditions (due to the tasks themselves putting a strain on the children's limited cognitive resources) presumably despite characteristics of previous interactions with an adult or more experienced partner.

There are several important limitations of studies of this kind. First, little attempt is made to analyse the child's behaviours during the interactions and therefore no conclusions can be drawn either about the characteristics of change in the child's problem solving behaviours over the course of the study (Gauvain & Rogoff, 1989) or about the effect of the child's active contributions to the interaction on the process of internalisation (Elbers, Maier, Hoekstra, & Hoogsteder, 1992). A related problem stems from the fact without an analysis of how the parent modifies and adapts his or her regulatory behaviours according to the specific abilities and behaviours of their child we can say little about how the adult is performing regulatory functions within the child's ZPD (Baker, 1994). A third limitation is that without longitudinal data it is difficult to draw strong conclusions about the nature of the transition from other-regulation to self-regulation in these kinds of situations (Elbers et al., 1992; Freund, 1990).

The second line of enquiry comes from the few naturalistic studies of teacher-child interactions in the classroom. Findings from this research suggest that spontaneous teaching of self-regulatory strategies by teachers happens infrequently in classroom interactions. Moely and colleagues (Moely et al., 1992), for example, demonstrated that out of twelve categories of teacher verbalisations which could be described as suggestions to the children to use a metacognitive or cognitive strategy, the two categories which represented teachers' suggestions to children to use a metacognitive strategy only accounted for 13.1% of the total number of verbalisations. Conversely, 86% of strategy suggestions were categorised as referring to cognitive strategies. Teachers were also rarely observed to explicitly encourage strategy generalisation. Explanations for this finding include the fact that teachers may be unaware of the effectiveness of metacognitive and self-regulatory strategies in learning or may assume that the children they are teaching already possess these skills. In an earlier study which examined teachers' beliefs about children's metacognitive development, Moely et al (1986) reported that teachers did demonstrate some awareness of the differential metacognitive knowledge of their pupils but this was with respect to general ability levels rather than age. Higher ability children were assumed by teachers to be better at regulating their own learning.

To summarise, research which has examined the impact of various types of interactions between adults and children on the development of children's self-regulatory skills remains inconclusive. There is some evidence that adults do take responsibility for some aspects of the task, do take on the role of 'regulator' and do hand over responsibility when they feel that the child is ready. These findings provide researchers with a preliminary insight into the mechanism by which other-regulation becomes self-regulation within social interactions.

Teaching self-regulation

A growing body of research examines the effectiveness of various approaches to teaching children to use self-regulatory skills. The assumption made by the majority of these studies is that promotion of metacognitive skills within a particular domain, for example in reading or in communication, will lead to cognitive gains in that domain (for example Palincsar & Brown, 1984; Scardamalia & Bereiter, 1984). The alternative view is that self-regulatory or metacognitive strategies should be the specific focus of the intervention in their own right, rather than being part of a domain-specific programme. Feuerstein's 'Instrumental Enrichment Programme', for instance, advocates the teaching of metacognitive skills independent of any specific academic domain (Feuerstein, 1980). The crucial issue here seems to be whether the researcher anticipates that metacognitive behaviours will generalise to tasks outside those used as part of the intervention programme. Some argue that metacognitive skills are necessarily domain-specific and do not generalise easily (for example Cole, 1990; Flavell & Wellman, 1977). Others argue that, especially for children who find learning difficult, interventions which teach domain-specific skills *in addition* to providing explicit support in the management and control of regulatory skills which can be generalised to new tasks, are the most successful (Brown & Campione, 1981). Gitomer and Glaser (1987) argue that domain-specific knowledge develops hand-in-hand with specific regulatory skills and it is only by providing the opportunities for these to be generalised across a range of domains that they are likely to become general regulatory principles. Certainly, interventions which have aimed to promote task-general skills, such as monitoring, planning and checking have been successful in improving some aspects of the intellectual performance of children with learning difficulties in a way that is both maintained and generalised (Borkowski & Cavanaugh, 1979; Brown, Campione, & Day, 1981; A. L. Brown et al., 1984).

An example of an intervention programme which has focused on the fostering of self-regulatory and metacognitive skills is the 'reciprocal teaching' programme which aims to improve the reading achievements of children who experience difficulty in reading comprehension (see for example A. L. Brown et al., 1984; Palincsar, 1986; Palincsar & Brown, 1984). Working explicitly within a Vygotskian framework, Brown and her colleagues hypothesise that some children's difficulties in learning stem from the fact that self-regulatory or metacognitive activities like planning and monitoring are typically implicit within the social context of learning situations. By making them explicit, bringing them into focus on the 'social plane', such children can be helped to acquire self-regulatory skills and thus improve their subsequent learning.

Brown et al. claim that this instruction of self-regulatory processes is best achieved within the context of expert 'scaffolding' (Brown & Campione, 1984). Here the child is guided through the learning situation by an adult or more able peer who also serves as an effective model. In the first instance, the more able partner guides the child through the task, making strategic, regulatory behaviours overt and explicit. As the child becomes more proficient, he or she takes progressively more responsibility for their learning, and the adult gradually reduces support (Wood, Bruner, & Ross, 1976). In this way the child begins to adapt his or her own regulatory strategies and becomes increasingly in control of their own learning. During these interactions it is important that the adult draws the child's attention to the significance and relevance of the strategies which are being used by providing direct feedback about the effectiveness of their learning (Baker & Brown, 1984).

Reciprocal teaching consists of collaborative small group reading sessions where the pupils and teacher take turns to lead a discussion around a text which they have all read. The teacher models appropriate behaviours and scaffolds the children in the use of comprehension fostering and comprehension monitoring skills such as questioning, clarifying, summarising and predicting. Through guided practice in applying these usually implicit strategies, such self-regulatory behaviour gradually becomes an automatic part of the child's own reading process.

Using this method, Brown et al demonstrate substantial improvements in pupils' reading comprehension scores after such interventions and go on to demonstrate that these improvements are maintained a year after intervention (Brown & Ferrara, 1985). In a later study the researchers took over responsibility for a social studies programme lasting a complete academic year and applied the same technique. Gains were made not only in children's performance on standardised measures of reading, writing and subject knowledge, but also in the 'quality of the thinking process' as demonstrated by the nature of their discussions and writing (Brown & Campione, 1990).

1.1.6 Summary

Frequent demonstrations of the role that self-regulation plays in learning indicate that an understanding of how best to promote the use of self-regulatory behaviours may be a useful pedagogical aim. The little evidence of direct teaching of self-regulatory skills during parent-child interactions suggests that these skills are typically cultivated through collaborative interactions in everyday situations (Baker, 1994). However, studies of unplanned interactions between children and their teachers at school reveal few attempts to encourage and promote children's use of metacognitive and self-regulatory strategies. The fact that the usefulness of these strategies remains implicit in many educational contexts means that those children who, for whatever reason, do not have a repertoire of metacognitive and self-regulatory skills which they can apply to a range of situations, are likely to be limited in their achievement on a range of tasks.

1.2 Children with learning difficulties

The remainder of the chapter discusses issues relating to the educational performance of children with learning difficulties who are the focus of the current research and in doing so, explores the evidence which suggests a link between poor self-regulatory skills and learning difficulties.

1.2.1 Characteristics of children with moderate learning difficulties

The children who form the focus of the research presented in this thesis are described as having 'moderate learning difficulties' (MLD). These children have been placed in special MLD schools after initial identification by their class teacher in a mainstream school and subsequent referral by an educational psychologist. Although such schools officially cater for children with general learning difficulties, in reality the schools often provide for children with associated specific learning or language difficulties and emotional and behavioural problems (Rutter, 1970). Accordingly, this group of children tend to be an under-researched population, and as such, a clear picture of the range and relationships of these children's abilities is lacking.

The remainder of this chapter reviews the modest research which has specifically addressed this group of children.

Intelligence

In the past, IQ scores have been used to determine a child's placement in special education. Once a child was identified by his or her class teacher as having difficulties and referred to the educational psychology service, a psychologist or medical officer would perform a standard IQ assessment and, depending on the result of this, the child would be placed in appropriate special education. An IQ below 50 would lead to the label of severe learning difficulty (or Educationally Sub-Normal: Severe, as it was known) and the child would be placed in a special school for children with severe difficulties. Children with an IQ score of between 50 and 75 would be described as having moderate learning difficulty (or Educationally Sub-Normal: Moderate) and would be placed in a special school for children with less severe difficulties.

Since the Warnock Report (DES, 1978) there has been an increasing shift towards staged approaches to identifying and assessing special educational needs. This shift of emphasis to teaching arrangements and resources when making a decision about special-school referral means that measures of IQ are no longer a necessary part of the assessment process

Specific cognitive abilities

Of course, an IQ score does not necessarily identify the precise characteristics of a child's cognitive processes, and children with similar IQ scores may well demonstrate a range of different problems in learning. However, what does seem to be typical of children with moderate learning difficulties is that they reach a lower level of performance on school tasks than their peers and demonstrate a slower rate of learning. A range of causal mechanisms for these problems has been proposed, for example, reduced speed or efficiency of processing and poor attentional and memory processes, although it is unlikely that there is one common cause to explain all these children's difficulties. What seems more likely is that various combinations of factors account for general problems in learning.

With respect to speed or efficiency of information processing, children with moderate learning difficulties have been demonstrated to have slower reaction times (for example Jensen & Munro, 1979), although there is some debate about the source of this difficulty. Some researchers argue that slow responses could be due to a lack of consistent use of resources (for example Campione, 1986), others that it represents an inefficiency at the level of the central executive (for example Nettlebeck & Brewer, 1981).

Children with moderate learning difficulties have also been shown to demonstrate poor attentional processes. These children commonly fail to focus on critical dimensions of the task, either because they have not noticed them, or do not realise that they are critical (for example Zeaman & House, 1963). Once again, research has suggested that these demonstrations of unsatisfactory attentional mechanisms may be the result of central executive deficiencies. It can be argued, for example, that attentional difficulties can be explained by problems monitoring the requirements of the task or allocating appropriate resources (Borkowski & Kurtz, 1987).

A wealth of research has demonstrated that children with general learning difficulties commonly demonstrate deficiencies in various aspects of the memory system although short term storage capacity and durability are no longer considered crucial candidates for explaining learning problems (Kail, 1990). More likely explanations come from observations of the strategic processing demonstrated by children with learning difficulties. When compared with normally developing children, MLD children demonstrate a much more passive approach to encoding and little spontaneous use of memory strategies such as rehearsal and categorisation (Borkowski & Kurtz, 1987).

Metacognitive abilities

These three characteristics of the processing deficiencies experienced by many children with moderate learning difficulties each suggest that one of the crucial difficulties faced by these children is that of co-ordinating and controlling their own cognitive processes in an efficient manner. The argument here is that many tasks, and particularly academic tasks faced by children at school, require some planful and active processing for success. In order for this to be achieved, children need at their disposal a range of strategies for dealing with these kinds of tasks and a knowledge that these are effective strategies (Campione, Brown, & Ferrara, 1982). Without these, children are likely to perform poorly. This proposal would also explain the commonly reported finding that children with learning difficulties find it difficult to generalise what they have learned in one context to a new situation. Brown and Campione (1981) describes this third characteristic of children with learning difficulties as being the result of a lack of 'flexible access' to previous learning events. The skills the children learn appear to remain 'welded' to the context in which they were first learned. As was suggested earlier, this difficulty may be due to poor self-regulatory or metacognitive abilities (Brown, 1978; Brown & Ferrara, 1985; A. L. Brown et al., 1984). Children who are able to regulate their own learning approach tasks strategically, are aware of effective problem-solving procedures, seek and use help effectively, check their own performance and can reflect on their success, for example. Children with learning difficulties, however, commonly demonstrate difficulties in the spontaneous production these types of strategies (Belmont & Butterfield, 1969; Brown, 1974; Ellis, 1970; Paris & Oka, 1986; Torgesen, 1982; Wong, 1985). As discussed above, interventions which have focussed on promoting executive processes as well as task-specific processes have often been the most successful in demonstrating effects which are generalisable.

Language and communication

It is also commonly recognised that children with learning difficulties frequently experience language and communication difficulties (Abbeduto & Rosenberg, 1987; Beveridge & Tatham, 1976; Krishef, 1983). With respect to linguistic competence, depending on the extent of the learning difficulties, slow-learning children commonly demonstrate delays in syntax and some aspects of semantics (Abbeduto, Furman, & Davies, 1989; Miller & Chapman, 1984). With respect to communicative competence, the areas that have received most attention by researchers working in the field comprise conversational turn-taking, expressing and understanding a range of speech acts, signalling and responding to signals about communication breakdown and the establishing of referents (Abbeduto & Hesketh, 1997; Abbeduto & Rosenberg, 1992). The general view is that for some of these aspects of communication, performance for children and adults with learning difficulties is as would be expected for children and adults without learning difficulties. This seems to be the case, for instance, with turn-taking (Abbeduto & Rosenberg, 1980) and, despite early delays in speech act development, individuals with learning difficulties generally come to demonstrate near-normal production and comprehension of basic speech acts by the time they reach adolescence (Abbeduto & Rosenberg, 1980; Owings, McManus, & Scherer, 1981). However, some aspects of the communication process are more problematic. Delays are observed, for example, in the development of referential skills, both in standard referential communication tasks (Beveridge & Tatham, 1976; Longhurst, 1974) and more natural conversations (Abbeduto, Davies, Solesby, & Furman, 1991); and in producing and responding to certain types of communication repairs (Abbeduto et al., 1991; Abbeduto & Rosenberg, 1980).

It can be argued that these communication difficulties may be also due, at least in part, to a lack of specific skills in metacognitive or self-regulatory processes (see for example Abbeduto & Rosenberg, 1987; Kamhi & Masterson, 1997). The social and instructional interactions which we experience through childhood which are proposed to form the basis for the development of self-regulatory processes has been discussed above. The Vygotskian argument here is that these interactions enable children to practise and perfect regulatory skills in the social plane in the company of more knowledgeable individuals (Vygotsky, 1978). However, some children may not benefit from these experiences, either because of cognitive and/or language disabilities (Abbeduto & Hesketh, 1997) or because appropriate interactions have been rare in the child's experience. A recent study by Abbeduto and his colleagues (Abbeduto, Weissman, & Short-Meyerson, 1999) has demonstrated that parental scaffolding of children's behaviours as speakers and listeners in a referential communication task was as frequent and as effective for parents of children with intellectual disability as it was for parents of children without learning difficulties. However, as discussed in section 1.5, the incidence of adult-child interactions in the classroom which provide opportunities for children practise aspects of communication such as elaborating on the topic, reasoning out loud and asking each other questions is frequently observed to be surprisingly low (see also Redfield & Rousseau, 1981; Wood & Wood, 1988). This has been found to be particularly the case with children who are experiencing difficulties at school (Au, 1980 cited

Brown & Ferrara, 1985; Griffiths, Wood, & Roberts, 1989; Wood, Wood, Griffiths, & Howarth, 1986).

1.2.2 Summary

This section of the chapter has considered various issues pertinent to the study of children with learning difficulties. Specifically it has highlighted the potential effects of having poor self-regulatory skills on learning generally, and communication specifically. Given the importance of self-regulatory activity for communicative and cognitive development, it is hypothesised that children with learning difficulties lack specific skills in self-regulation which result from, and lead to, language and communication difficulties.

1.3 Principal aims of the research

The central aim of the research presented in this thesis is to empirically evaluate the Vygotskian proposal that collaborative interactions can play a central role in the development of self-regulatory processes such as planning, monitoring and evaluating. A genuine test of such a claim is to evaluate the effects of these types of collaborations on a group of children who have general difficulties in learning which may stem precisely from poor self-regulatory skills (A. L. Brown et al., 1984). To achieve this aim an intervention programme designed to promote self-regulatory skills was carried out with a group of children with moderate learning difficulties. The children worked collaboratively at a series of communication tasks and were instructed and guided in the use of self-regulatory skills which, in line with the recommendations of Brown and Campione (1981) and Gitomer and Glaser (1987) discussed in section 1.5.2 above, had particular relevance to communication but also which, if applied more generally, might be implicated in effective learning across a range of domains. Prior to the intervention, an analysis was made of aspects of the children's linguistic and academic abilities. The main purposes of this profile stage were first to establish whether there was a relationship between communication skill and other measures which might be potentially explicable by self-regulatory abilities; and second to provide a baseline model against which the effects of the intervention could be assessed. Analysis of the outcomes of this profile study and the subsequent intervention programme constitute the first half of the research reported in this thesis and are presented in chapters two, three and four. The approach taken in these chapters is essentially quantitative and draws on outcome measures to assess the success of the intervention programme. The main findings arising from these analyses indicate that, although changes were observed for several aspects of the communication process for all the children involved in the programme, the effect on communicative performance was only apparent for half the group. The second half of the thesis pursues explanations for why this might be the case. The approach taken in this half of the thesis is more qualitative in nature. Rather than collecting additional data, the strategy used here was to return to the rich database provided by the intervention programme and to make a micro-genetic analysis of the children's collaborations over the period of the intervention. This approach, reported in chapters five, six, and seven raises some important theoretical and methodological issues. These are discussed in chapter eight.

Chapter 2: The nature of the population: A profile study

2.1 Introduction

This chapter reports the findings of the initial stage of the research which constitutes a profile study examining the relationships between aspects of linguistic, intellectual and academic performance for a sample of children with moderate learning difficulties (MLD). The research reported here has several aims. Primarily, the profile will provide a picture of the relationships between academic performance and biographic factors for children with moderate learning difficulties. This will fill a gap in the literature. A second aim is to establish the link between communicative competence and educational performance. Specifically, the study sets out to determine whether or not there is a direct link between communication skill and reading ability in a group of children with moderate learning difficulties The selection of reading ability to represent educational performance is motivated by the findings of Brown's (1984) research (see chapter one) which demonstrated a strong effect of their intervention specifically on reading. The third aim is to determine the effects of several other variables which have previously been identified as influencing the educational performance of this population of children and which are discussed in chapter two. Finally, the results of the investigation serve to provide a baseline model from which the effects of the intervention programme can be assessed.

The analyses described in this chapter, therefore, constitute a profile of abilities for a group of children with moderate learning difficulties, a sample of whom will take part in the intervention programme. This profile of abilities comprises measures of communication, reading skill and IQ. Biographic factors of age, gender, season of birth and socio-economic background are also included.

Gender

It has commonly been reported that boys are over-represented in all categories of special need (see for example Eme, 1979; Hill, 1994; Hey, Leonard, Daniels & Smith, 1998). Indeed, the number of boys attending special schools for learning difficulties generally outweighs the number of girls (Pumfrey, 1975) and boys are more often referred to educational psychologists (Vardill & Calvert, 2000). In addition, it has been found that within the special school population, boys commonly have higher IQ scores than their female peers (Vogel, 1990).

Season of birth

It is increasingly thought that season of birth may have implications for academic achievement and referral to special education. Various studies, both in this country and the USA, have shown that summer-born children (those born between May and August) tend to be over-represented in special schools (Pumfrey, 1975; Williams, 1964) and in referrals to psychology services (Drabman, Tarnowski, Kelly, & Anderson, 1990; Menet, Eakin, Stuart, &

Rafferty, 2000) compared with children born during the autumn term (September to December) and spring term [January to April; Williams, Davies, Evans & Ferguson, 1970). The summer-born group have also been found to do less well academically (Pidgeon & Dodds, 1961), have their abilities underestimated (Pumfrey, 1975) and are more likely to be considered to have emotional and behavioural problems (Mortimore, Sammons, Lewis, & Ecob, 1988; Tarnowski, Drabman, Anderson, & Kelly, 1990) .

Socio-economic background

Given that a large proportion of children classified as having moderate learning difficulties come from the 'working class' population (Tomlinson, 1982) and the percentage of children taking free school meals differed between the two schools participating in the study, 'school attended' was taken as an indicator of social background and is included in the analysis.

2.2 Method

2.2.1 Participants

A total of 87 children, 60 males and 27 females (mean age 13.9 years; standard deviation 1.35, range 11.5-15.4 years) contributed to the profile. The children came from two Nottingham schools catering for children with moderate learning difficulties and all spoke English as their first language. Consent had been given by all parents.

2.2.2 Measures

All the children completed a battery of tests. These included a communication skills task, assessments of their reading, and an intelligence test. All testing took place in a quiet room within the child's school over a period of two terms. Each child was therefore seen on three separate occasions. Two qualified educational psychologists administered the intelligence test, the author administered the assessments of reading and communication skill. The tests lasted between approximately 20 minutes (reading assessment) and 60 minutes (IQ), obviously varying with the age and ability of the child.

Communication Skill

Communication skill was assessed using a series of tasks taken from Concept Seven-Nine (Schools Council, 1972) . These tasks are used to provide a general picture of children's ability to use spoken language to transfer information and to give and follow instructions. Pairs of subjects sit facing each other across a table divided by a low screen preventing them seeing each other's materials. Both subjects have a similar booklet containing five diagrams of increasing complexity, drawing paper and a red and blue pen. The children take it in turns to describe the first diagram in their booklet for their partner to draw. When the instruction follower (IF) thinks that they have completed the diagram, they pass it over the screen to the information giver (IG). The IG compares this diagram with the original and reconstructs the description if the match is not acceptable. This continues until the experimenter and the IG agree to accept the IF's diagram. The children then exchange roles..

The activity continued in this way until both subjects had described and drawn five diagrams. As long as the children were still able to concentrate and succeed at the task, the experimenter gave both children another booklet each with more complex diagrams and the procedure started again. The activity continued until either the experimenter thought that the tasks were getting too hard, and the children were beginning to struggle to concentrate, or the final pair of booklets (booklets 9 and 10) had been completed. The experimenter intervened, where necessary, to keep the children on task. The performance of each pair of children was video-taped.

The highest level of complexity reached (as indicated by the highest book number achieved) was taken as a measure of communication skill. Clearly, using outcome measures from a collaborative task raises issues about the independence of the measures. Measures of communication are necessarily measures of joint achievement. This issue is discussed in chapter five. However, the aim in the present study is to see if such a measure relates in any theoretically coherent way to other independent measures of educational performance and biographic characteristics.

Reading Ability

Reading ability was assessed using the Individual Reading Analysis and the New Reading Analysis (Vincent & de la Mare, 1985a, 1985b). This test measures both reading accuracy and comprehension. The test was administered according to the criteria in the assessment manual with the exception of the comprehension measure which was adapted to suit the particular needs of this group of children[1].

Intelligence

An abbreviated version of the Wechsler Intelligence Scale for Children, Revised (WISC-R; Wechsler, 1974) was administered by two experienced educational psychologists according to the WISC-R manual. This version consists of two verbal subtests: Information and Comprehension and three performance subtests: Picture Arrangement, Block Design and Coding (Kennedy & Elder, 1982).

2.3 Results

16 children's scores were discarded from the present study for a variety of reasons. Eight (five males and three females) children failed to achieve a score on both the reading comprehension and reading accuracy tests. Two children (both males) achieved a reading accuracy score but failed to obtain a reading comprehension score. Six children (four males and two females) achieved a reading comprehension score but failed to achieve a reading accuracy score. The analysis presented below is therefore based on profiles of

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[1] If a child made an error decoding, or did not know a word, the tester told the child the correct word. This was an attempt to ensure that comprehension scores were not confounded by reading accuracy levels.

the 71 children who completed the full battery of tests. An inspection of the age, gender, season of birth and socio-economic status of the children not included in this analysis revealed similar distributions to the total sample.

Table 2A shows the means (and standard deviations) of all measures split by gender and season of birth. 'Summer born' describes those children born between May and August. 'Not summer born' constitutes children born in the months between September and April. Reading scores are age equivalents.

Bivariate correlations of all measures are shown in table 2B. There was no correlation between social background and any of the measures, so this variable was discarded before any further analysis.

Age was significantly and positively correlated with communication skill. Surprisingly, however, age did not correlate with either reading measure, despite the wide age range (11 to 16 years) sampled. Significant correlations also existed between IQ and gender, season of birth, reading comprehension and communication skill. Season of birth was significantly correlated with IQ, reading accuracy, reading comprehension and communication skill. There were significant and positive relationships between reading comprehension and reading accuracy and reading comprehension and communication skill. All other correlations failed to reach significance.

Table 2A: Profile study: Descriptive statistics

	IQ	Reading accuracy	Reading comprehension	Communication (range 1-10)
Female	59.2 (9.79)	7.6 (1.10)	8.0 (0.85)	6.9 (1.83)
Male	67.5 (10.35)	7.4 (1.29)	8.5 (0.95)	7.6 (1.85)
Summer-born	68.4 (10.54)	7.7 (1.14)	8.6 (0.95)	7.9 (1.68)
Not summer-born	59.7 (9.30)	7.2 (1.26)	7.9 (0.79)	6.6 (1.83)

Table 2B: Profile study: Zero-order correlations

	Age	Gender	Season of birth	IQ	Reading acc.	Reading comp.	Communication
Age	1						
Gender	0.066	1					
Season of birth	-0.007	-0.101	1				
IQ	-0.136	0.370**	0.402**	1			
Reading acc.	0.131	-0.099	0.234*	0.113	1		
Reading comp.	0.123	0.224	0.349**	0.494**	0.426**	1	
Communication	0.367**	0.165	0.358**	0.548**	0.121	0.335**	1

* $p \leq 0.05$; ** $p \leq 0.01$

T-tests carried out on the data shown in table 2A demonstrate that males and summer-born children have significantly higher IQ scores than females and children not born in the summer (gender: t=3.31, p < .001; season of birth: t=3.66, p < .001). Summer-born children also out-perform children born during the rest of the year in reading accuracy (t=2.01, p=.024), reading comprehension (t=3.10, p < .001) and communication skill (t=3.19, p < .001)[2].

The correlation matrix was subjected to a LISREL path analysis in order to assess the best fit to the data (Jörsekog & Sorbom, 1984). A null model that specified no relationships between the variables was used as a comparison model. Four models were computed based on the zero-order correlation matrix. In each of these models a path was specified from season of birth to IQ, communication ability, reading comprehension and reading accuracy. Similarly all four models had paths from gender to IQ and from age to communication ability. The direction of the paths for the biographic variables was always from the biographic variable to the measured variable. All four models included a direct path between communication ability and reading comprehension.

Using these path specifications two pairs of LISREL models were computed. In the first pair of models it was hypothesised that IQ predicts communication

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[2] A multivariate analysis of variance performed on this data revealed no interaction between gender and season of birth.

ability. In the second pair of models it was hypothesised that communication ability predicts IQ. Within the model pairs, the models differed according to whether it was hypothesised that reading comprehension predicted reading accuracy or vice versa.

In terms of the fit statistics, all four models were appreciably better than the null model. At the same time, the final model was the best fitting model with respect to all the fit statistics (see table 2C). The first two models which embody the hypothesis that IQ predicts communication ability do not successfully reproduce the correlation matrix. The χ^2 statistic shows that these models produce a pattern of covariance that is significantly different to the zero-order correlations to be explained. The second pair of models in which communication ability predicts IQ are not significantly different from the zero-order model. In other words, both these models are able to reproduce the original correlation matrix. The best fit overall is obtained when communication ability predicts IQ and reading comprehension predicts reading accuracy.

Not all the specified path coefficients for the best fitting model are significant. With respect to the biographic variables, the paths between season of birth and both reading comprehension and reading accuracy are not significant. The path between communication skill and reading comprehension is not significant either.

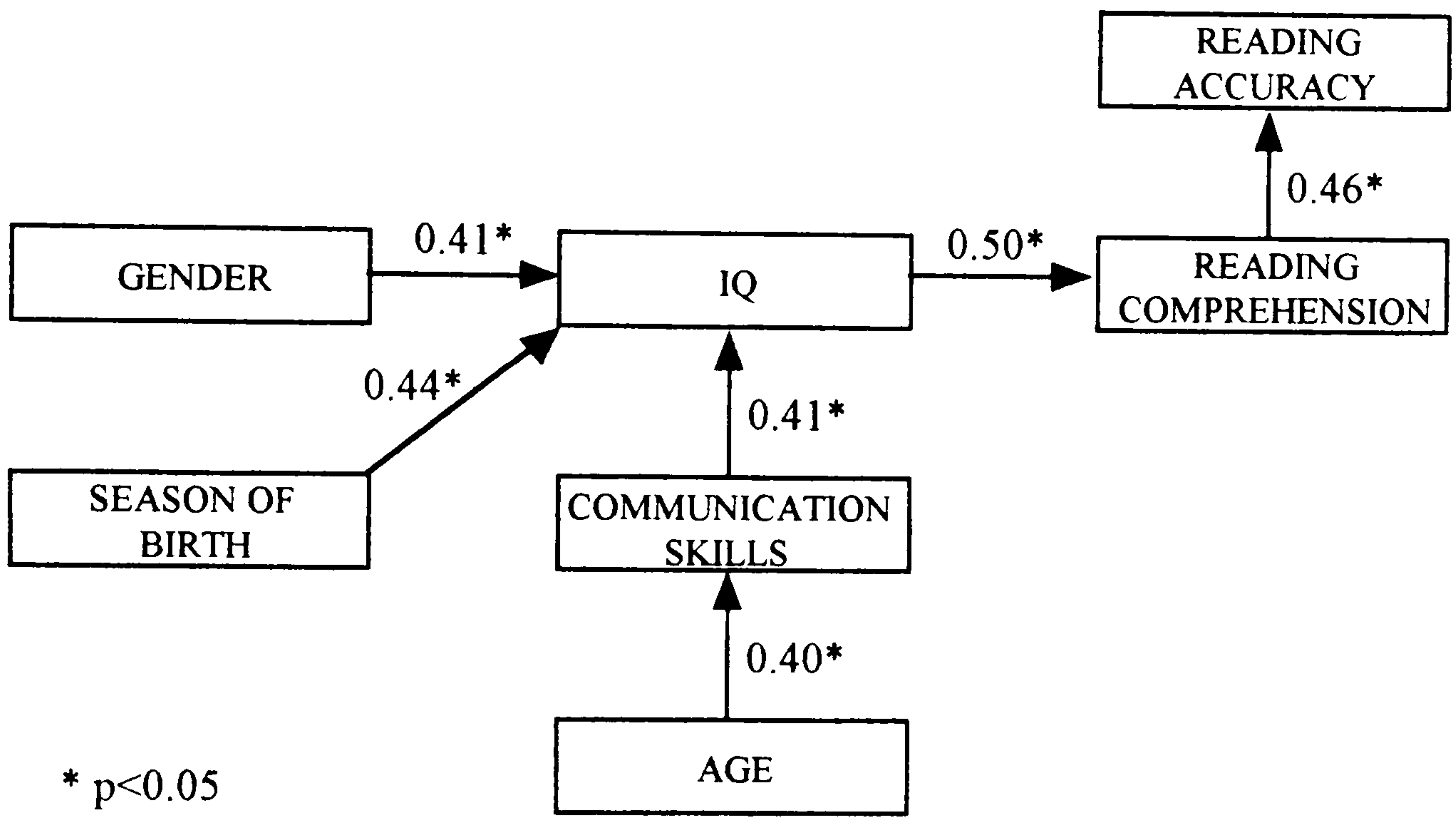
Table 2C: Profile study: Fit statistics for the LISREL models

Model	χ^2 (df)	p	GFI	TLI	RNI	$\Delta\chi^2$	Δ df
Null model	67.22 (12)	0.001	0.82				
IQ → Communication; Accuracy → Comprehension	32.32 (16)	0.001	0.87	0.78	0.70	34.90	4
IQ →Communication; Comprehension → Accuracy	32.44 (16)	0.009	0.89	0.78	0.70	34.78	4
Communication → IQ; Accuracy → Comprehension	25.48 (16)	0.064	0.90	0.87	0.83	41.74	4
Communication → IQ; Comprehension → Accuracy	18.59 (16)	0.290	0.93	0.96	0.95	48.63	4

GFI = goodness-of-fit index *TLI* = Tucker-Lewis index *RNI* = relative noncentrality index. For further details refer to Gerbing, (1993).

The effects of gender, season of birth and communication skills on reading comprehension are all mediated by IQ. Age has a direct effect on communication ability, and reading comprehension has a direct effect on accuracy. Figure 2A shows the significant standardised path coefficients.

Figure 2A: Profile study: Standardised path coefficients



2.4 Discussion

The expectation that communication skill would predict educational performance receives support from the best fitting model. It was hypothesised that communication skill would be related to reading. This relationship is demonstrated. Specifically, the model demonstrates that a relationship exists between communication skill and reading comprehension which is mediated by IQ. There is no evidence of a relationship between communication skill and reading accuracy.

The association of communication skill with reading comprehension is consistent with the premise underlying the work of Brown and her colleagues which was reviewed in chapter one. Their claim is that children who use spoken language effectively to describe, question and clarify in collaborative situations are able to achieve higher levels of reading comprehension. The study presented in this chapter offers some support for their position and for Vygotsky's claims about the effects of communication on the development of self-regulation.

Whilst communication skill is associated with reading comprehension, there is no correlation between communication and reading accuracy. In the present study, communication skill describes the ability to transfer information and negotiate meaning. Other aspects of children's communicative competence include having confidence to initiate interactions with teachers and knowing when and how to request help when in difficulty. These latter skills may be of more use for children facing problems in decoding the written word. Alternatively, the test of reading accuracy may be tapping phonological and decoding skills (for example Goswami & Bryant, 1990) which may be independent of communication skills. Whatever the explanation, the best fit model presented above predicts that improvements in communication skill will exert no direct influence on reading accuracy, although there may be effects mediated by any improvements in IQ or reading comprehension.

Age is not directly related to reading accuracy nor to reading comprehension, despite a sample range of 11 to 16 years. A possible explanation of this result is that the children in the sample have reached a plateau in their reading by the time they are about eleven years of age. This notion of children's reading levels reaching a plateau is not a new one for researchers examining the reading behaviours of children with special educational needs (for example Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Stanovich, 1986; Wood, 1986). Indeed, many remediation programmes which aim to improve children's reading levels specifically aim to support children in moving beyond this plateau in reading (for example Palincsar & Brown, 1984; Slavin, 1990).

In building a model of the inter-relations between biographic and cognitive factors, issues of gender and season of birth have also been raised. As found in previous studies, the proportion of males and summer-born children in the sample is greater than would be expected in the normal population. At the same time, within the present sample of children, both males and summer-born children are generally out-performing their peers on a standardised test of intelligence. It is interesting to note that the effects of both gender and season-of-birth on reading comprehension are mediated by IQ. This issue, although relevant to the educational achievement of the MLD children described in the study, is not a central focus of the thesis and is therefore not pursued here. Further analysis and discussion is provided in Bibby, Lamb, Leyden & Wood (1996) and Lamb, Warne and Bibby (2001) where it is suggested that the gender and season-of-birth effects observed in the study may be due to selection biases operating during the identification process in the mainstream school.

2.5 Summary

The profile study reported in this chapter has, as predicted, identified a relationship between communication skill and reading ability (mediated by IQ). This was important to establish if the claim that self-regulatory skills developed within the domain of communication might generalise to other domains is to be made. The profile has also provided a baseline against which the success of the future intervention study may be assessed. According to the model, any change in children's communication abilities due to an intervention should lead to changes in IQ and further onto reading comprehension and reading accuracy.

Chapter 3: The intervention programme

3.1 Introduction

The aim of the intervention programme was to provide opportunities for a group of children with moderate learning difficulties to practise and be guided in their use of self-regulatory strategies within a communicative context in a way that would support generalisation of these skills to different tasks.

Influential in the design of the intervention was the 'reciprocal teaching' programme (A. L. Brown et al., 1984) discussed in chapter one. The reciprocal teaching programme sets out to support children in the use of a set of self-regulatory skills specifically directed at reading comprehension. However, rather than taking reading strategies as a focus, the present study was concerned with the communication skills of the children. This decision to focus on communication was made for a range of theoretical, empirical and practical reasons. First, it has been suggested that the language and communication difficulties commonly experienced by young people with learning difficulties may be due at least in part to poor metacognitive or regulatory skills (for example Kamhi & Masterson, 1997). It was anticipated, therefore, that improving these children's regulatory strategies would lead to enhanced communicative competence. Second, the research carried out by Brown (1984) suggests that intervening at the level of communication skill for adolescents who find some aspects of the communication process particularly challenging, provides maintained effects which are generalised to a range of other communication tasks. The statistical model presented in the previous chapter also suggests that intervening at the level of communication for children with moderate learning difficulties may stimulate improved effects for tasks outside this domain, specifically on IQ assessment and reading test performance. Finally, on a practical note, the intervention concentrated on an area of learning which was immediately accessible to the children. In order to have maximum effect, the intervention needed to focus on something in which the children already were reasonably competent. This was important for two reasons; children with learning difficulties commonly demonstrate low self-esteem and self-confidence which can get in the way of learning (Dockrell & McShane, 1992; Dweck & Elliot, 1983); and, in order to introduce certain regulatory strategies, it was felt that a reasonable competence in basic strategies would be required.

The design of the intervention programme was based on three principles. These principles are characteristic of many interventions which have addressed metacognitive skills within the Vygotskian tradition (see for example A. L. Brown et al., 1984; Feuerstein, 1980; Paris & Winograd, 1990; Scardamalia & Bereiter, 1985). They also echo the qualities of 'guided participation' proposed by Rogoff (1990). In these learning contexts, a bridge is provided between new skills or information and familiar ones; a framework is introduced in which learning can be managed; the responsibility for managing learning strategies is transferred from the adult to the child; and the child is an active participant.

Instruction and guidance

The children were provided with explicit instruction and guided support in regulatory skills, in much the same way as in reciprocal teaching. First, the children are given opportunities to rehearse the strategies which are specific to the task. This notion that trained skills are taught and practised in the context in which they are used is thought to play an important part in the success of generalisable improvements in these skills (Brown & Campione, 1984). In the present study, regulatory communication strategies were taught in the context of communication activities. Second, in reciprocal teaching the children receive explicit instruction and practice in the management and monitoring of these skills. And finally, the teacher provides the children with information concerning the effectiveness and relevance of the regulatory strategies which are being used. By making regulatory processes explicit to the children, modelling expert use, and scaffolding the children in their own use of the strategies, it was anticipated that the children in the present study would begin to use these processes automatically and independently. The children were reminded, prompted and given feedback about their strategy use throughout the programme by an adult who also modelled effective strategy use where appropriate. This principle reflects the findings from research into parent-child interactions demonstrating that adults facilitate the development of self-regulation by modelling and scaffolding these strategies (for example Freund, 1990).

Active participation

The children practised these skills in collaboration with a peer. Each activity consisted of a co-operative activity which demanded input from both members of the dyad. These activities included variations on referential communication tasks and joint problem-solving tasks. The children were encouraged both to think about their own understanding of the activities, and to reflect on their partner's knowledge. In this way, the intervention programme provided opportunities for children to learn and actively practise self-regulatory skills during collaborative activities with a member of their peer group. The collaborative aspect of the intervention programme reflects views of researchers such as Berndt and Ladd (1989) and Damon and Phelps (1989) who claim that the equality in peer relationships is an interactional characteristic which facilitates communication. Through the social discourse afforded by these types of experiences, the children learn about effective communication (Damon, 1990; Wertsch, 1985). By encouraging the children to take an active part in the programme their characteristically passive approach to learning is minimised (Butterfield & Belmont, 1971).

Range of activities

Third, in accordance with recommendations outlined by researchers such as Stokes and Baer (1976), Brown and Campione (1986), and Dockrell and McShane (1992) a *range* of activities was provided in which the children practised the target skills. Across all the activities, the same regulatory strategies were emphasised, although the appropriateness of individual strategy use varied across the tasks. In this way the children were required to reflect on which strategies were most useful for particular tasks. The role of practice on the development of independent self-regulatory skills has also been highlighted by Kontos and Nicholas (1986) who claim that the child's own role in the development of these skills is often not considered in the midst of the Vygotskian emphasis on the role of others.

3.1.1 Details of the intervention programme

The intervention programme consisted of two strands. The first strand focussed on the communication skills as discussed above. A second strand provided a treatment group against which it was anticipated the effects of the communication skills strand could be compared. This part of the intervention involved the children in independent story-telling and was motivated by work by researchers such as Snow and Dickinson (1990) who propose a relationship between narrative ability and certain self-regulatory processes. The two strands of the intervention operated in parallel with half the children participating in the communication skills strand whilst the other half completed the narrative strand. The groups then exchanged programmes. Preliminary analysis of the effects of the narrative strand indicated such small effects that further analysis of this factor was not pursued. This thesis is therefore unable to make claims about the exact source of the change over the course of the full intervention programme. However, insights into the process of change in the children's regulatory communication strategies, strongly suggest that the interactions between the children over the course of the communication skills strand provide the foundations for the promotion of self-regulatory skills. The remainder of this thesis, then, focuses on an analysis of the communication skills strand, each child acting as their own control. From herein, reference to the 'intervention programme' refers only to this part of the intervention.

The activities

The activities used during the intervention programme were developed from a variety of sources (for example Schools Council, 1972; A. L. Brown et al., 1984; Palim & Power, 1990; Radziszewaska & Rogoff, 1988). The early tasks followed the typical referential communication paradigm where two children sit either side of a small screen and describe to each other aspects of the materials in front of them. For example, one child may have an arrangement of playing cards which they have to describe to their partner so that they can recreate the same arrangement with a second set of cards. Joint problem-solving activities, for example a co-operative version of the Tower of Hanoi (Glachan & Light, 1982), were introduced later in the programme.

The order of presentation of the activities over the programme was based on principles outlined by G. Brown and colleagues (1984) in their work with children struggling in mainstream schooling. These researchers claim that by presenting tasks within the classic referential communication paradigm (Glucksberg, Krauss, & Higgins, 1975) in ascending order of difficulty, performance on the more difficult tasks improves. Degree of difficulty is indicated by the number of elements and relationships within a task and whether or not the task is 'static' or 'dynamic'. Tasks whose descriptors do not change over time (static) are considered to be less difficult than tasks which, by their nature, require the participants to take into account changes which have occurred during the game (dynamic). For illustration, consider two tasks, one of which demands that the speaker describes a diagram to the listener who then has to draw it and another which involves the speaker describing a sequence of steps towards building a model which the listener has to build. In the first case, the speaker's stimulus never changes, however in the second case, the stimulus is constantly changing as the model gets nearer and nearer completion. The latter example is considered to place more demands on the communicators and is thus considered the more difficult.

In the series of activities which made up the programme, 'dynamic' tasks follow 'static' tasks according to these principles. In addition three 'collaborative tasks' were included where the solution was no longer purely dependent on the giving and receiving of instructions, but demanded collaboration from the children. See appendix A and Lamb (1996) for details of the full set of tasks used through the programme.

Strategy training and scaffolding the interactions

An important part of the intervention programme was the support which the children were given during each session. The children were guided in the application of regulatory strategies which were predicted would promote effective communication and generalisation to new tasks. Three straightforward strategies were selected which were anticipated to eventually become part of the children's own regulatory mechanisms which they would be able to apply independently. These strategies, derived from those used by A. Brown and her colleagues (A. L. Brown et al., 1984), were *asking*, *answering* and *checking*.

The three strategies were introduced by the author to the children during the first session. It was made explicit to the children that in order to help each other complete the tasks, they needed to be thinking about doing three things - asking questions if they do not understand, answering questions when they are asked and regularly checking their own and their partner's understanding. Throughout the sessions, emphasis was placed on involving the children in discussions about *why* particular strategies may be useful and when these might be best used (Reeve & Brown, 1985). In this way, the sessions also afforded opportunities for the children to monitor the effectiveness of their own and each other's strategy use. The following transcription serves to illustrate the approach in which child participation was emphasised and the nature of the strategies was made explicit. This excerpt took place at the beginning of one of the second sessions of the programme.

Excerpt 3.1

Adult:	Do you remember what three things were important for this type of game?
Child 1:	If you've not got it right, then you have to ask the person a question.

Adult:	Yes, asking a question is very important. Well done. So if someone asks you a question, what is it a good idea to do?
Child 1:	Answer it.
Adult:	Yes, answer it. You have to listen carefully to what the question is and answer it. There was one other thing that was important, asking, answering and ...? Can you remember R__?
Child 2:	Listening.
Adult:	Listening is very important, yes. That's a good one. We didn't actually talk about listening directly but of course to answer a question, it is important that you listen, otherwise you won't know what the question is will you? What about checking?
Child 1:	Oh yes checking.
Adult:	Do you remember? It's very useful if you keep checking that you understand, and that your partner understands.

The adult provided guidance during the sessions using several techniques. These can generally be described as *reminding*, *prompting* and *giving feedback* through *praise* and *reassurance*. The children were *reminded* about pertinent strategies and attention was drawn back to relevant earlier incidents. For example, "You look a bit confused, S___. Perhaps this would be a good time to check the rest of them [the playing cards] are in the right place." They were *prompted* to think about their own understanding and strategy use, for example, "When R___ was checking with you, was there anything you were a bit worried about?" *Praise* and *reassurance* confirmed the significance and relevance of the children's use of strategies, for example, "That was a really good question, P___, now you have that information you should be able to work out where the problem is." The adult also *modelled* effective questioning, answering and checking when required.

At the end of each activity the adult encouraged the children to reflect on the strategies which had been employed and discussed their effectiveness. For example:

Excerpt 3.2

Adult:	Why do you think you did so well?
Child:	'Cause we asked questions

Excerpt 3.3

Adult:	Now did you notice what you did to get yourself out of a mess? You started doing something...
Child:	I asked for help
Adult:	Yes you started asking for help. You started checking. And R___ you answered beautifully. You were really clear in telling S___ where everything should go

In this way, the adult aimed to offer support within the children's potential level of performance (Todman & McBeth, 1994; Vygotsky, 1978; Wood et al., 1976). As the children became more accomplished at the activities, the adult was able to reduce her input, enabling the children to practise using the strategies independently.

3.1.2 Evaluating the success of the intervention programme

The primary indicator of the success of the intervention was considered to be change in performance on the Map Task (from G. Brown et al., 1984). This is a well documented communication task in which participants have to describe to each other a route on a map which can then be drawn by their partner. Success on the Map Task is clearly defined by an outcome score calculated by considering the accuracy of the final route that is drawn (see for example Anderson, Clark, & Mullin, 1994; Doherty-Sneddon et al., 1997). In order to evaluate the communication strategies which account for such performance Conversational Games Analysis was employed (Carletta, Isard, Isard, Kowkto, & Doherty-Sneddon, 1996; Kowtko, Isard, & Doherty-Sneddon, 1992). This constitutes a dialogue analysis which has been specifically designed to look at the interactional strategies used by participants in communication tasks such as the Map Task. The coding scheme allows researchers to look at the range of different communicative strategies of the participants by analysing the functions that these strategies serve in the communicative process. Amongst the normal population, there are clear developmental trends in the use of these functions (Doherty-Sneddon, 1996; Doherty-Sneddon & Kent, 1996) and certain functions have been demonstrated to be associated with better performance on the Map Task (Anderson et al., 1994; Doherty-Sneddon, 1996).

If the intervention is successful in improving the self-regulatory skills of the children, generalisation of these regulatory skills to other types of activities might be expected. In order to examine the extent of the generalisation of regulatory skills to activities outside the specific types of task used during the intervention, the children's reading ability and general cognitive ability (IQ) were assessed before and after the programme. If the children are able to generalise, a systematic pattern of change in performance across the Map Task, reading and IQ measures should be observed. Gains in self-regulatory or metacognitive skills should result in independent, reflective learning which would be demonstrated in better performance on these tasks.

3.2 Method

3.2.1 The intervention programme

The intervention programme comprised 12 weekly sessions each of which lasted about half an hour. The children worked with a different partner each week to ensure that improvements would not be due to particular dyads learning to work together but rather would be due to individual children's changes in regulatory processes. All pairs of children came from the same class. At each session the children completed one of the ten activities. All sessions were recorded on video-tape.

3.2.2 Participants

A total of 41 children, 14 females and 27 males (mean age 14.1 years, s.d. 0.79, range 13.0 - 15.8 years) participated in the intervention programme.

These children attended one of the two local schools for children with moderate learning difficulties which were used in the profile study. All spoke English as their first language. The majority of these children had been part of the profile study. However, the instability of this population and unpredictable attendance of many of the children in the study meant that some children failed to participate in all the sessions. For this reason, only those children who completed at least eight sessions of the intervention programme were included in the analyses. The thesis therefore reports on the effects of the intervention on 30 children with a mean age of 14 years.

3.2.3 Measures

The children were assessed before and after the intervention in communication (the Map Task), reading and IQ. The assessment tools for reading and intelligence were the same as those used in the profile study. For those children who were involved in both the profile and the intervention, parallel versions of the reading and IQ test were used.

Map Task procedure

To complete the Map Task, pairs of children sat facing each other across a table divided by a low screen which prevented them seeing each other's materials. Simple schematic maps were placed on gently sloping wooden blocks in front of the two children[3]. These were the same as the maps used

[3] An example pair of maps is shown in appendix B.

by Anderson and her colleagues in their work with aphasic individuals (Anderson, Roberson, Kilborn, Beeke, & Dean, 1996; Beeke et al., 1996). One child was assigned 'information giver' (IG) and the other 'information follower' (IF). The IG was told that is was their job to describe the marked route around the landmark features on the map in front of them so that the IF could draw the same route on their map. It was emphasised to the children that the route is the only *safe* route to take. Eight landmark features were common to both maps, four were present on the IG map but absent from the IF map (one of these being a duplicated feature) and three were present on the IF map but absent from the IG map. The children were told that their maps were different in some places, but were not told where these difference lay.

The researcher checked that both the children had understood what they had to do. Instructions were repeated where necessary and any questions asked by the children were answered, until the researcher was confident that the children were clear about their task.

Each child played both IF and IG roles in the same session, but with different pairs of maps. The children were always paired with a member of their own class. Pairs of children at pre-test were the same at post-test.

Map Task performance

A measure of success on the Map Task was achieved by considering the accuracy of the route drawn by the information follower. Previous studies have done this by calculating the area deviation of the IF route from the original (Anderson et al., 1994; Boyle, Anderson, & Newlands, 1994; Doherty-Sneddon, 1996; Doherty-Sneddon & Kent, 1996). However, in the current study this metric could not be used due to the large deviation between IG and IF routes on most of the maps. Instead, the number of correct landmark features visited by the IF route was considered. The total number of features passed by the route was counted and from this score, a deduction was made for each feature incorrectly revisited, each feature visited from the wrong direction and any visit to the one feature which was not on the IG route (see figure 3A). The maximum possible score was twelve. Several routes were drawn with considerable back-tracking such that the start, finish and route direction were not obvious. Such maps were given a score of zero. The maps were scored by two judges who attained 90% agreement.

Figure 3A: Calculating the Map Task performance score

Map Task Score	=	no. features visited by IF route from same direction as those visited by IG route	-	no. features visited by IF route but not visited by IG route in that order	-	no. features visited by IF route also visited by IG route but from a different direction	-	visit by IF route to feature not on IG route

Communication strategies

Conversational Games Analysis (Carletta et al., 1996; Kowtko et al., 1992) classifies utterances into functional groups known as 'conversational moves', some of which are initiating moves and others which are response moves. There are six 'conversational games' within the scheme which are defined by their opening move and represent the goal of a group of utterances. For example, if your goal is to request your partner to perform an action, then you would carry out an INSTRUCT game which is opened by an INSTRUCT move. Games can be embedded within games if a subordinate goal needs to be realised in order to accomplish the goal specified by the first game. For example, in an attempt to carry out an action in response to an INSTRUCT game, one may ask a question about that action before it can be accomplished. This QUERY game would therefore be embedded within the INSTRUCT game. Figure 3B shows the range of utterance functions used in the analysis.

Dialogue length (mean number of words and turns per dialogue per role) and turn length (mean number of words per turn) were also measured to give a basic indication of the children's performance and change in performance over time.

Transcription and reliability

All the Map Task dialogues were recorded on videotape and then transcribed by the author and an assistant. Overlapping speech, pauses, interruptions and unintelligible portions were marked (see appendix C for a key to transcription symbols) as were any non-verbal or para-linguisitic behaviours which served a communicative function. All transcripts were checked by the author.

For reliability of the Conversational Games Analysis, the author undertook training with an experienced user of the scheme. Post the training period, the author and trainer coded identical Map Task dialogues until 100% agreement

Figure 3B: Utterance functions (Kowtko et al., 1992)

Game types (these are also initiating moves)

INSTRUCT	a direct or indirect request for action e.g. "Go past the tree"
CHECK	a question which checks own understanding of a previous utterance from your partner by requesting confirmation of your interpretation e.g. "So I go past the tree?"
QUERY-YN	a yes-no question which requests affirmation or negation of something which has not been previously mentioned e.g. "Do I carry on going towards the tent?"
QUERY-W	an open answer question which requests more than just yes or no e.g. "What tree?"
EXPLAIN	freely offered information which has not been elicited by your conversational partner e.g. "I haven't got a tree"
ALIGN	a question which requests confirmation of your partner's understanding, attention, agreement or readiness e.g. "Can you see the tent?"

Response moves

CLARIFY	a clarification of what has previously been said which usually repeats information already mentioned e.g. "Go past the lake" INSTRUCT "The one to the left?" CHECK "Yes, the lake next to the fence" CLARIFY
REPLY-Y*	an affirmative response to your partner's utterance
REPLY-N	a negative response to your partner's utterance
REPLY-W	a reply y/n to a question from your partner which includes additional information e.g. "Have you got a lake?" ALIGN "Yes, it's a really big one" REPLY-W
ACKNOWLEDGE	an acknowledgement of having heard and understood your partner's previous utterance e.g. "Go past the lake" INSTRUCT "Yeah" ACKNOWLEDGE
READY	an utterance which indicates the intention to begin a new game e.g. "Right,....." READY

**For the purposes of this study, the three types of REPLY have been grouped into one category* was reached over several dialogues. See also Carletta, Isard, Isard, Kowkto & Doherty-Sneddon, (1997) for a discussion of reliability issues relating to Conversational Games Analysis.

Evidence of generalisation of skills

Reading. The children's reading was assessed by the author using the Macmillan Individual Reading Analysis and the New Macmillan Reading Analysis (Vincent & de la Mare, 1985a, 1985b). This test measures both reading accuracy and reading comprehension. The test was administered according to the manual with the exception of the comprehension measure which was adapted to suit the particular needs of this group of children (see section 2.2.2).

General cognitive ability. The abbreviated version of the Wechsler Intelligence Scale for Children, Revised (WISC-R; Wechsler, 1974) as used in the profile study, was administered according to the WISC-R manual by an experienced Educational Psychologist.

3.3 Results

3.3.1 Map Task performance

Scores on the Map Task were significantly higher at post-test ($\overline{X}$=5.87, *SD*=2.03) than at pre-test ($\overline{X}$=4.53, *SD*=3.20; t=2.30, df=29, p<.03).

On examination of the data, however, it was apparent that some children did not seem to benefit from the intervention by making gains on the Map Task.

The children were therefore split into two groups according to whether or not their Map Task score improved (improvers) or did not improve (non-improvers). Table 3A shows the means (and standard deviations) of Map Task scores for these two groups.

Table 3A: Intervention study: Means (SD) for Map Task performance scores across improvement groups

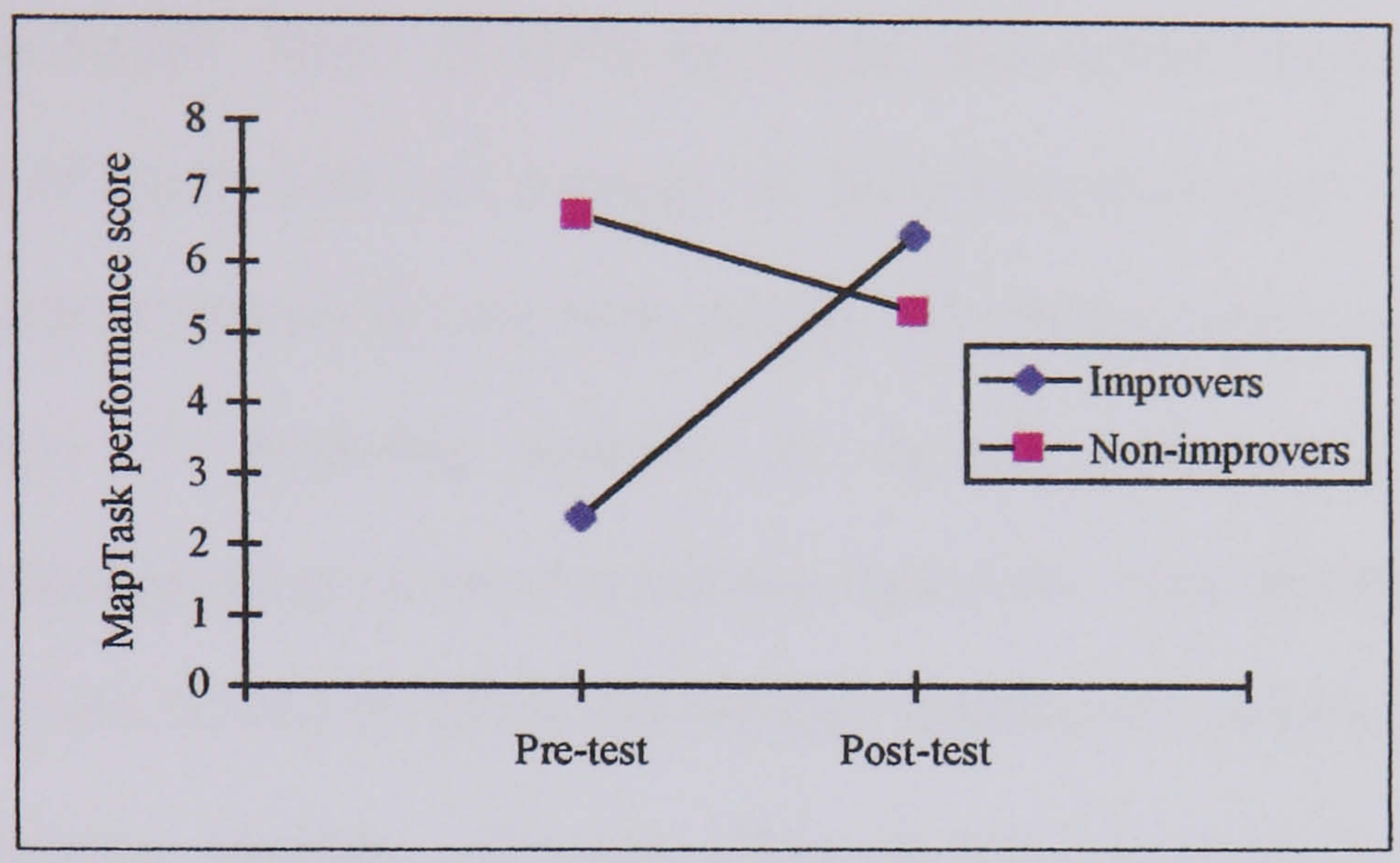
	Map Task	
	Pre	Post
Improvers	2.40 (2.23)	6.40 (1.68)
Non-improvers	6.67 (2.55)	5.33 (2.26)

A 2 x 2 analysis of variance[4] performed on this data using Map Task improvement group (improvers and non-improvers) and time (pre-test and post-test) as independent variables and Map Task score as the dependent variable indicated significant main effects of time $F_{1,28}$=18.82; p<0.001 and of group $F_{1,28}$=4.63; p=0.04. Map-task scores increased over time and children in the no-improvement group performed better than children in the improvement group.

[4] For this analysis the variances were heterogeneous. Given that the sample sizes are equal and of a moderate size, the analysis of variance is likely to be robust with respect to this violation of the homogeneity assumption (see Maxwell & Delaney, 1990, p110). Non-parametric analysis of the data revealed the same pattern of effects as the parametric analyses. This was also the case with the other analyses of variance reported in this chapter with heterogeneous variances.

There was also a significant interaction between time and group ($F_{1,28}$=75.29; p<0.001; see figure 3C).

Figure 3C: Interventions study: Interaction between Map Task improvement group and time for Map Task scores.



Simple main effects analysis of the interaction shown in figure 3C revealed significant differences in Map Task scores at pre-test ($F_{1,56}$=28.12; p<0.001) with non-improvers scoring higher than improvers. The analysis also revealed significant changes over time for both groups of children. By definition improvers made Map Task gains ($F_{1,56}$=28.12; p<0.001) but also non-improvers were shown to score lower at post-test than pre-test ($F_{1,56}$=9.41; p=0.005).

3.3.2 Communication strategies

Given the fact that only half the children made gains on the Map Task the data associated with the communication process measures was analysed taking into account these two groups.

Dialogue length. Table 3B shows the means (and standard deviations) of the number of words used per dialogue by the information giver (IG) and the information follower (IF) for both groups of children (improvers and non-improvers). A three-way analysis of variance was performed using communication group (improvers and non-improvers), time (pre-test and post-test) and role (IG and IF) as the independent variables and number of words as the dependent variable. A main effect of role ($F_{1,28}$=34.18, p < .001) demonstrated that information givers said more than information followers. The interaction between role and time approached significance ($F_{1,28}$=3.21, p = .084). Simple main effects analysis of this interaction indicated that the number of words used by IFs increased over time ($F_{1,56}$=5.31, p = .025).

Table 3B: Intervention study: Mean number of words (SD) per dialogue

	Pre-test		Post-test	
	IG	IF	IG	IF
Improvers	154 (102.29)	62.93 (53.22)	132.33 (61.56)	81.27 (54.22)
Non-improvers	108 (52.34)	60.88 (51.82)	141.93 (87.53)	111.93 (101.69)

Table 3C shows the means (and standard deviations) of the number of turns taken per dialogue for both the groups at pre-test and post-test. A three-way analysis of variance was performed with the above independent variables and with number of turns as the dependent variable. A main effect of time ($F_{1,28}$ = 4.21, p = .050) indicated that more turns were taken at post-test than at pre-test. No other effects reached significance.

Table 3C: Intervention study: Mean number of turns (SD) per dialogue

	Pre-test		Post-test	
	IG	IF	IG	IF
Improvers	20.27 (16.34)	17.40 (10.36)	22.33 (10.90)	19.40 (6.97)
Non-improvers	16.87 (9.46)	15.60 (8.97)	21.20 (8.05)	22.07 (10.67)

Calculating the number of words used per turn provides a measure of turn length. Table 3D shows the means (and standard deviations) of words per turn across the dialogues.

Table 3D: Intervention study: Mean number of words per turn (SD) per dialogue

	Pre-test		Post-test	
	IG	IF	IG	IF
Improvers	8.15 (3.51)	3.03 (1.40)	6.40 (2.10)	4.03 (2.01)
Non-improvers	7.10 (2.55)	3.70 (1.90)	7.18 (3.86)	4.47 (2.15)

A three-way analysis of variance using the same model as above[5] indicated a main effect of role ($F_{1,26} = 63.25$, $p < .001$) with IGs using longer turns than IFs. There was also a significant interaction between time and role ($F_{1,26} = 12.36$, $p = .002$; see figure 3D). Simple main effects analysis of this interaction revealed significant differences between the two roles at pre-test ($F_{1,52} = 74.60, p < .0001$) and at post-test ($F_{1,52} = 25.71, p < .001$).

There was also a simple main effect of time for the IF role ($F_{1,52} = 8.56$, $p = .005$). The IF's turn length increased over time (see figure 3D). There were no other significant effects.

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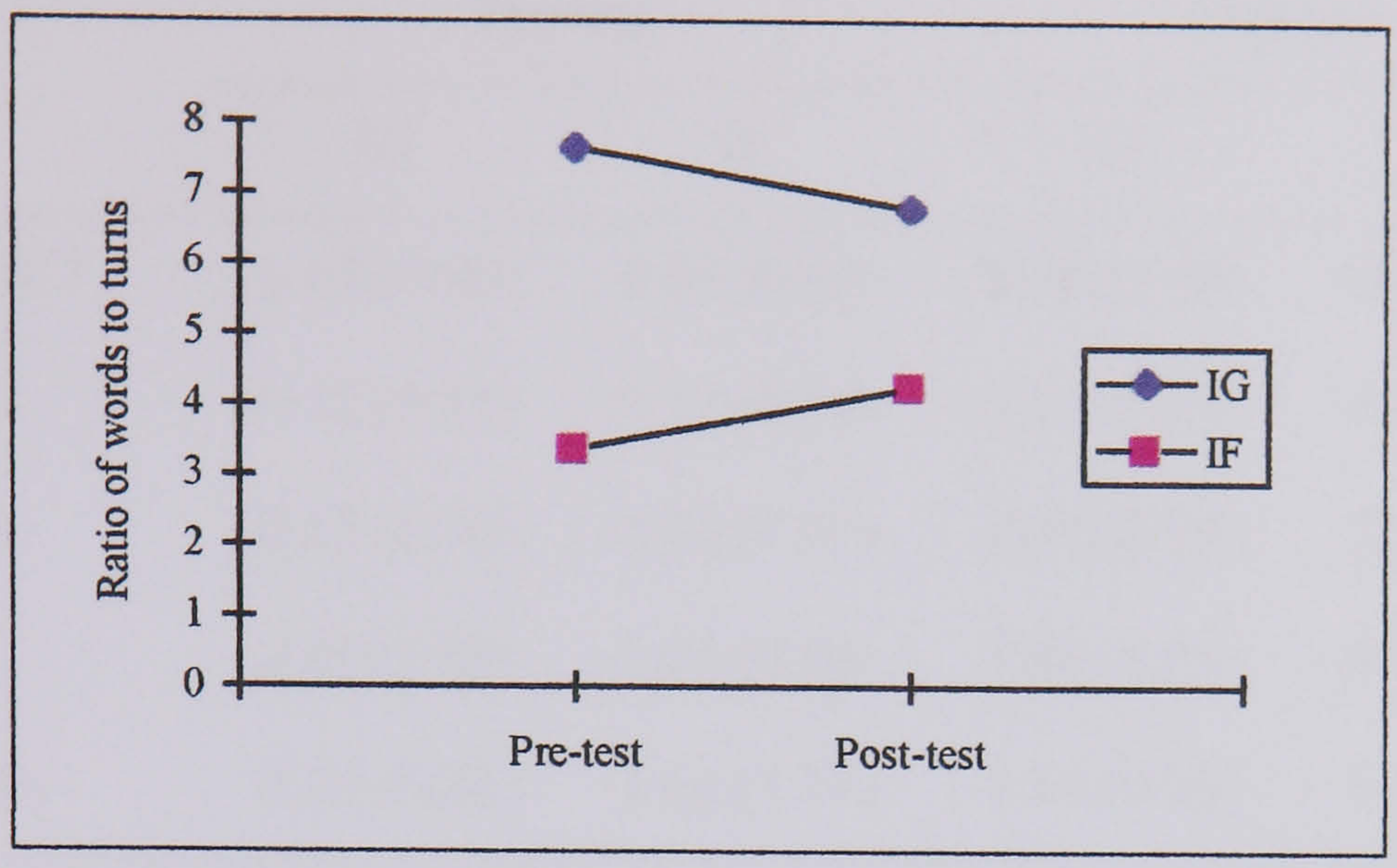
[5] One child from the group of non-improvers was removed from the analysis due to him taking no turns in the role of IF at pre-test.

Figure 3D: Intervention study: Interaction between role and time for turn length



Conversational Games Analysis. The number of different game and move types (see figure 3B) in each dialogue was divided by the number of words used by the speaker in that dialogue. Using the same three-way analysis of variance design as the previous analyses, each of the different game and move types was analysed. The dependent variables were the number of games and moves of each type per 100 words. CHECKs and ACKNOWLEDGEs were virtually never used by children in the IG role and ALIGNs were virtually never used by the IF. These three variables were therefore analysed using a two way analysis of variance (with independent variables of time and group). Tables 3E and 3F show the means (and standard deviations) for initiating utterance functions across the two groups of children. Tables 3G and 3H show the means (and standard deviations) associated with the response moves. Since one child did not say anything through the whole of one dialogue, the numbers are based on just 29 children; 15 improvers and 14 non-improvers.

Table 3E: Intervention study: Mean number of initiating games (SD) per dialogue for improvers

	Pre-test		Post-test	
	IG	IF	IG	IF
INSTRUCT	6.49 (3.49)	0.39 (0.91)	8.32 (5.58)	0.23 (0.63)
CHECK	0.12 (0.45)	0.12 (0.46)	0.21 (0.33)	4.42 (4.49)
QUERY	0.12 (0.36)	5.36 (7.20)	0.54 (0.79)	5.59 (6.75)
ALIGN	2.45 (1.90)	0.00 (0.00)	1.84 (1.84)	0.09 (0.25)
EXPLAIN	0.35 (0.44)	3.66 (3.11)	1.10 (0.88)	6.57 (4.97)

Table 3F: Intervention study: Mean number of initiating games (SD) per dialogue for non-improvers

	Pre-test		Post-test	
	IG	IF	IG	IF
INSTRUCT	7.92 (3.58)	0.27 (0.45)	7.87 (3.69)	0.15 (0.41)
CHECK	0.16 (0.42)	0.20 (0.56)	0.08 (0.22)	4.04 (3.08)
QUERY	0.58 (0.85)	4.94 (4.99)	0.61 (0.71)	5.59 (6.75)
ALIGN	1.27 (1.95)	0.23 (0.61)	2.27 (2.60)	0.00 (0.00)
EXPLAIN	1.35 (1.32)	3.98 (3.68)	1.41 (1.12)	4.14 (3.76)

Table 3G: Intervention study: Mean number of response moves (SD) for improvers

	Pre-test		Post-test	
	IG	IF	IG	IF
CLARIFY	2.57 (2.23)	0.24 (0.81)	3.28 (2.45)	0.51 (0.86)
REPLY	1.08 (1.40)	3.69 (5.27)	3.52 (4.11)	5.03 (6.87)
READY	1.99 (3.84)	1.28 (2.76)	0.41 (0.85)	0.93 (1.79)
ACKNOW-LEDGE	0.43 (0.66)	21.34 (25.21)	0.39 (0.53)	10.14 (7.23)

Table 3H: Intervention study: Mean number of response moves (SD) for non-improvers

	Pre-test		Post-test	
	IG	IF	IG	IF
CLARIFY	1.39 (0.88)	0.15 (0.56)	2.34 (2.23)	0.21 (0.77)
REPLY	2.21 (2.30)	8.15 (11.90)	2.01 (2.36)	3.65 (3.89)
READY	2.39 (3.94)	1.33 (4.17)	3.75 (5.76)	0.94 (1.35)
ACKNOW-LEDGE	0.39 (0.57)	13.95 (12.88)	0.30 (0.48)	11.10 (12.70)

INSTRUCTs were used more by the IG than the IF ($F_{1,27} = 174.79, p < .001$). There were virtually no CHECKs by the IG. However, IF CHECKs increased in frequency over time ($F_{1,27} = 30.74, p < .001$). QUERYs were used more by

IFs than IGs ($F_{1,27}$=37.4, p < .001). EXPLAINs were used more by the IFs than the IGs ($F_{1,27}$ = 46.41, p < .001).

The analysis of CLARIFYs showed main effects of improvement group ($F_{1,27}$ =4.57, p = .042) and role ($F_{1,27}$ = 49.46, p < .001). CLARIFYs were used more by the improvers and the IGs. There was also a trend for CLARIFYs to increase in frequency over time ($F_{1,27}$ = 3.97, p = .056). REPLYs showed a main effect of role ($F_{1,27}$ = 6.57, p =.016) with IFs using these more frequently than IGs. ACKNOWLEDGEs were not used by the IGs. IF ACKNOWLEDGEs decreased over time ($F_{1,27}$ = 4.73, p = .039). There were no other effects.

3.3.3 Evidence of generalisation of skills

A multivariate analysis of variance was performed on reading accuracy, reading comprehension and IQ assessment measures to examine the possibility that these measures changed in the same direction as the Map Task outcome scores. There was a significant multivariate main effect of time ($F_{3,25}$=4.47, p=.012). The univariate effects indicated that this effect was carried by reading accuracy ($F_{1,27}$=4.69, p=.039) and IQ ($F_{1,27}$=9.91, p=.004). Reading comprehension scores also increased but this difference failed to reach significance. Table 31 shows the means (and standard deviations) of these variables. These figures are based on 28 children's scores since two children failed to score on the test of reading accuracy.

Table 3I: Intervention study: Means (SD) for reading and general cognitive ability

	Reading accuracy		Reading comprehension		IQ	
	Pre	Post	Pre	Post	Pre	Post
Score	6.80 (1.23)	6.98 (1.24)	8.18 (1.09)	8.27 (1.05)	63.75 (11.55)	67.18 (11.76)

If it is the case that changes in regulatory skills are responsible both for changes on the Map Task and on the additional measures taken at pre-test and post-test, then we should actually see associated changes in scores in reading and IQ *only* for those children who improved on the Map Task. Gains in children's reading and IQ scores should not be observed for those children who made no improvement on the Map Task. Table 3J shows the means (and standard deviations) of the Map Task outcome scores and reading and IQ measures for the children who improved on the Map Task (improvers) and the children who made no such improvement (non-improvers). Again, these figures are based on 28 children's scores due to two children failing to achieve a score on the reading accuracy test.

Pre-test Map Task scores (as demonstrated above) were significantly lower for the improvers than the non-improvers ($t_{1,26}$=4.87, p<.001). There were no significant differences between the pre-test scores of the two groups on any of the other measures.

Table 3J: Intervention study: Means (SD) for all measures across improvement groups

	Map Task		Reading accuracy		Reading comprehension		IQ	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Improvers	2.61	6.38	6.69	7.26	8.06	8.41	62.85	67.85
n=13	(2.29)	(1.71)	(1.35)	(1.32)	(1.13)	(1.30)	(11.59)	(9.11)
Non-improvers	6.67	5.33	6.68	6.74	8.28	8.15	64.53	66.60
n=15	(2.54)	(2.26)	(1.14)	(1.17)	(1.08)	(0.81)	(11.87)	(13.96)

A multivariate analysis of variance was performed on reading accuracy, reading comprehension and IQ scores for the children who improved on the Map Task. There was a significant multivariate main effect of time ($F_{3,10}$=9.61, p=.003). The univariate effects indicated that this was carried by reading accuracy ($F_{1,12}$=7.77, p=.016) and IQ ($F_{1,12}$=13.54, p=.003). As was predicted, for the children who did not make gains on the Map Task, the same analysis revealed no significant effects of time.

An additional analysis looked at the overall pattern of change across the reading accuracy, reading comprehension and IQ measures. If a child failed to improve on any of these measures they were allocated to a group which was coded '- - -'. If a child improved on all three measures they were allocated to the '+ + +' group. Intermediary groups were constructed to cover all possibilities. Table 3K shows the numbers of children in each of the possible groups.

Table 3K: Intervention study: Observed frequencies for Map Task improvers and non-improvers across reading accuracy, reading comprehension and IQ assessment scores

	- - -	- - +	- + +	+ + +
Improvers	0	1	8	6
Non-improvers	4	3	5	3

'- - -' children who improved on none of the measures
'- - +' children who improved on one measure
'- + +' children who improved on two measures
'+ + +' children who improved on all three measures

For the children who did *not* improve on the Map Task, 7 out of 15 improved on, at most, one other measure, 5 improved on two other measures, and 3 improved on 3 other measures. On the other hand, of the children who *did* improve on the Map Task, 14 out of 15 improved on at least two of the other measures. Only 1 child in this group improved on only one other measure, 8 children improved on two other measures and 6 children improved on all the other measures.

Binomial probabilities (p=0.5) were used to examine the significance of these patterns. The first comparison was made between children who improved on one or less of the measures and those children who improved on at least two measures. Binomial probabilities indicated significantly more children improved on at least two measures (14 children) than on one or less of the measures (1 child) for the Map Task improvement group (p<.001). This difference was not significant for the non-improvers. Significantly more non-improvers (7 children) than improvers (1 child) made gains in one or less of the measures (p=.031), whereas there was no difference between the groups with respect to gains on at least two measures. Looking at those children who improved on none of the three measures, there was a trend for more of these children to be in the non-improvement group (4 children) than the improvement group (no children; p=.06). No other differences were significant.

3.4 Discussion

3.4.1 Changes in Map Task performance

The study set out to examine the effects of an intervention programme designed to promote children's self-regulatory abilities when involved in communicative interactions. Whilst the results of the analysis of the Map Task scores generally support the predictions, when the individual performances of the children are considered, it becomes evident that only half the children who took part in the intervention made the gains. This raises an interesting question. Why was the programme successful for some children and not others? It could be that the answer to this question lies in the different abilities of the children within each dyad.

On closer examination of the data it can be seen that the children whose performance on the Map Task did improve over time, started with significantly lower scores than those children whose performance remained the same. It appears, therefore, that the intervention was most beneficial for children who were initially struggling with respect to the task used in the study. This may be explained by considering the nature of the interactions between the children in each dyad and between the supporting adult and the children. From a Vygotskian perspective, it is unlikely that the children who initially demonstrated poor performance on the task would be able to provide the level of interaction required to create the appropriate 'zones of proximal development' (Vygotsky, 1978) for their partners during the intervention. If this is the case, then the pairings of the children for the initial Map Task ought to comprise an improver and a non-improver. On examination of the pairings, this occurred for 82% of the pairs. Whilst this could not have been planned in this study, it fits well with the theoretical explanation of the results.

It is also important to consider the level of support offered by the adult. The adult aimed to support each *dyad* during the intervention. It is possible, therefore, that this support was *below* the ZPDs of the more able children, who therefore were less likely to benefit from the experience.

3.4.2 Changes in communication strategies

Analysis of the communication strategies that were anticipated to affect Map Task performance, however, revealed little difference between the group of children whose performance improved and the group of children whose performance did not improve.

Differences between the two groups were observed for just one aspect of the communication process. Improvers made more overall use of the CLARIFY function which provides a solicited clarification of what has previously been said. The lack of evidence of group differences in the changes in the use of communication strategies is a surprising finding given previous research which has demonstrated associations between, for example, Map Task performance and question asking (Anderson et al., 1994; Doherty-Sneddon, 1996).

The analyses reported here suggest that the focus of the changes over time that are observed in the children's communication lies with the performance of children when in the information follower role. By post-test the turn length for children in the IF role had increased as had the frequency with which the IFs checked their own understanding of a previous utterance made by their partner. The low incidence of checking observed at pre-test mirrors findings reported by researchers such as Rueda (1980) and Abbeduto (1991) who demonstrated that when faced with an ambiguous message, their participants (adolescents with learning difficulties) were inclined to guess the referent being described rather that ask a question. The increase in checking strategies over the course of the intervention indicates improved attempts at repairing communication breakdowns.

There were two other changes over time in strategy use observed for children in both the improving and the non-improving groups. First, the frequency in the use of clarifications to reiterate what you have previously said suggests that the 'answering' strategy which the strategy training focussed upon, was promoted over the course of the intervention. The other change in use of a communication strategy over the period of the intervention was the decreasing frequency in the use of acknowledgements. This suggests that the children's contributions by the end of the intervention had become more task-related and that they were more likely to advise their partners of any misunderstandings; thus aiding progression of the task. High frequency of the use of acknowledgements was similarly observed in the conversations of adults with mild learning difficulties reported by Abbeduto (1980).

The analysis of the children's communication strategies also pointed to differences in strategy use between the children in the two roles of information giver and information follower. For instance, the amount of verbal effort invested by the two children differed between the roles. Information givers used more words and longer turns than information followers. This finding reflects the children's appreciation of the Map Task's inherent role structure. The IG holds all the information, and it is their job to describe the route to the IF. The IF needs to acknowledge this information and only contribute to the discussion if clarification is required.

As would be expected, contributions from the information givers and the information followers differed in function. This difference again reflects the nature of the task and the way the children understood the task. Information givers gave more requests for action (INSTRUCTs) and provided more clarifications of previous utterances (CLARIFYs). Information followers asked more questions (QUERYs), offered more unsolicited information (EXPLAINs) and made more replies (REPLYs). The range of utterance functions used by the children reflects general findings that, despite early delays, individuals with learning difficulties do develop proficiencies in using the range of utterance functions expected from individuals without learning difficulties (Abbeduto & Rosenberg, 1980; Owings et al., 1981).

Several interesting comparisons of strategy use can be made between these MLD children and normally developing children and adults by drawing on similar research which has looked at how these children and adults approach the Map Task. First, with respect to the differences in the verbal contributions of the children in the IG and IF roles, the pattern observed in the dialogues of the MLD children in the present study are similar to the eleven-year-olds reported in Doherty-Sneddon's doctoral thesis (Doherty-Sneddon, 1996) and the adults reported in Boyle (1994). Eleven-year-old normally developing children and adults, like the MLD children, characteristically use more words and longer turns in the role of information giver than in the role of information follower. This was not found for the normally developing six-year-olds who contributed equally to the dialogue whichever role they were playing (Doherty-Sneddon, 1996). As discussed above, it appears, that the children with learning difficulties are able to take advantage of the intrinsic characteristics of the Map Task, unlike younger children.

Comparing the pattern of MLD children's communication strategies with children and adults without learning difficulties also indicates differences in the proportions of strategies being used. For the children in the present study, at pre-test, giving instructions (INSTRUCTs) is the predominant strategy, followed by asking questions about something that has not already been mentioned (QUERYs). At post-test, giving instructions remains the dominant strategy, but checking one's understanding (CHECKs) comes to be used as frequently as question asking (QUERYs). This pattern of post-test strategy use is much more like the pattern observed in normally developing six and eleven-year-olds (Doherty-Sneddon, 1996) who tend to use approximately twice the number of INSTRUCTs (the most frequent strategy) to CHECKs (the next most frequent strategy). For adults, however, the checking strategy is used with almost equal frequency as instructions. The infrequent use by the MLD children of ALIGN strategies, which represent questions which serve to elicit feedback about your partner's progress or position, corresponds much more to normally developing six-year-olds' use of these strategies than older children and adults'. These findings support the conclusion that, like children without learning difficulties, the MLD children who took part in the present study are less likely than adults to engage in strategies which attempt to establish mutual knowledge, despite many of these strategies being available to them.

3.4.3 Evaluation of generalisation of regulatory skills

For the children who made significant gains on the Map Task, a task similar to those used over the course of the intervention, gains were also observed in reading and IQ test performance, suggesting that the promotion of self-regulatory skills brought about by the intervention programme generalised to different types of academic tasks. Although these gains are small, the increases are theoretically significant for this population of children for whom correlations between chronological age and reading age are near to zero (as reported in chapter two). From this result it would have been reasonable to expect no change in reading performance over the short period of the intervention programme in normal circumstances.

There are, of course, alternative explanations for the changes that were observed in the children's performance. It could be, for example, that the intervention programme was successful not in the promotion of regulatory strategies as predicted, but rather in increasing the time the children were prepared to spend on task, and their motivation and perseverance through the tasks. Increasing time on task may well be an indirect effect of the intervention but effort alone is not an adequate explanation for the processes that underpin learning and can not adequately explain the changes that were observed.

A second alternative explanation for the changes in the performance of the improving group could be that the children's scores have regressed to the mean. It is unlikely that this has occurred. With regression to the mean, the lower performing group would be expected to show greater variability in their scores than the group of children who did not improve. However, the data demonstrate no difference in the variability of these two groups (see table 3B). A further reason to believe that regression to the mean does not explain these results is the fact that the only measure where the improving children are significantly lower at pre-test is the Map Task and this is not the only measure that shows improvement.

3.5 Conclusions

This chapter has presented evidence that the intervention programme was successful for half the children who took part. It was predicted that involvement in the programme would lead to improved performance on the Map Task. This was observed for half the group. This group of improvers were also shown to make improvements on other tasks which did not directly require communication skills, suggesting that if the intervention has been successful in raising the self-regulatory skills of the children, then there may be evidence that these skills have been generalised to other tasks.

However, analysis of the communicative strategies thought to affect Map Task performance revealed no association between the use of these strategies and performance on the Map Task. What the data did demonstrate, however, was that where there was evidence of change in strategy use, this was the case irrespective of whether there was change in performance outcome. It appears then, that in order to explain exactly how the intervention is influencing the children's communication in a way that affects communicative performance, analysis has to go beyond the functional analysis reported here. The following chapter explores this issue.

Chapter 4: Further analysis of the communication process

4.1 Introduction

Chapter three raised the interesting issue that for this group of children with moderate learning difficulties, analysis of the communication strategies in terms of the functions that they serve in a dialogue fails to explain the difference observed between poor and better communicative performance. The purpose of this chapter is to further explore the process of communication in an attempt to delineate what constitutes competent communication for these children doing this task.

In order to address this issue, consideration needs to be given to the way the children in the study seem to be approaching the task. As discussed in the previous chapter, the standard criteria for assessing performance on the Map Task could not be used in the present study due to the large discrepancy between the information givers' routes and the final information followers' routes. The measure that was developed was based on assumptions made about how the MLD children were approaching the task. It seemed that they were viewing the aim of the task to get from the start to the finish passing the correct landmark features on the way, rather than attempting to create a path which matched precisely that on the information giver's map. In this way, the children seemed to place emphasis on providing information about which features to visit in turn rather than recreating a path around these features. It would seem, then, that instructions may be more or less effective, depending on what information is included. Conversational Games Analysis does not allow the researcher to look 'inside' the content of games and moves, hence information about the effectiveness of certain messages is not provided. If an instruction has not included useful information, in order to be communicatively successful, it would be sensible for the information follower to ask a question. On the other hand, if an instruction contains plenty of useful information, the information follower is less likely to need to ask a question. It may be that the differences in performance observed for the two groups at post-test can be explained by analysing the content of the instructions provided by the information givers and, at the same time, looking at how this relates to the nature of question asking by their partners.

Chapter three provided preliminary evidence of particular emphasis being placed on the role of the information giver to provide instructions (this was indicated by the high proportion of instructions over and above other utterance functions and the lack of question asking by the information follower). There are several possible reasons for this over-reliance on instruction giving. First, it may reflect an assumption being made by the children that questions only need to be asked if something has not been understood. This would explain the lack of questions used by the information givers (particularly ALIGNs) echoing the characteristic listener-blaming behaviour commonly observed in young children (see for example Lloyd, 1994; Robinson & Robinson, 1976). An alternative explanation is that the information followers are either not recognising ambiguities in the messages provided by their partners, or do not know how to request relevant information. Such 'passiveness' of listeners has been demonstrated to be another characteristic of young children (Lloyd & Beveridge, 1981) and also of adolescents with learning difficulties (Abbeduto et al., 1991; Reuda, 1990). The data presented in chapter three, however, suggests that information followers are able to request more information from the information givers (as demonstrated in their use of the QUERY function), and by the end of the intervention they increasingly check their own understanding (as demonstrated by their use of the CHECK function). However, the fact that these aspects of information follower behaviour did not capture the differences observed between the two groups on the Map Task outcome measure does not preclude questioning behaviour as being responsible for differences in performance. Rather it may suggest that the analysis of utterance function has not been fine-grained enough to pick up the different types of questions used by the children. Given that the intervention programme was specifically concerned with encouraging the children to employ regulatory strategies of asking and checking it would seem sensible to explore these strategies in more detail.

The remainder of this chapter provides the details and analysis of a further three coding schemes designed to provide more detailed information about instruction giving and question asking of this group of children in an attempt to explain the differences observed in their communicative performance.

4.2 Coding

The transcriptions of the 60 pre-test and 60 post-test Map Task dialogues produced for the analyses reported in chapter three were coded by the author and a second trained coder using the following three coding schemes:

1. Task-oriented information contained in IG instructions;

2. Responses to these instructions;

3. Clarification requests (from Lloyd, Boada, & Forns, 1992).

The first two coding schemes concentrated upon the behaviour of the information giver and the response of the information follower to the information giver's instructions. The schemes were developed specifically for this study and aimed to determine the extent to which (a) information givers recognised what was important to include in a message and (b) information followers were able to indicate the ambiguity of their partners' messages. Specifically, the schemes allow the researcher to look at the kinds of information that the information giver chose to include in his or her instructions and the effect that this had on the information follower's response. The third coding scheme allows the researcher to examine the requests for clarification used by the child in the information follower role (Lloyd et al., 1992). The coding system makes the distinction between two types of request; those which contain new task-related information within the request, and therefore have the potential to promote more task-related discussion and those which include no new information. On the basis of this classification, Lloyd (1992) has been able to discriminate between the referential communication skills of seven- and ten-year-old children.

4.2.1 Task-oriented information contained in instructions

To complete the task, the child in the information-giving role has to inform their partner about how to draw the route. Successful information-giving depends on the IG giving unambiguous instructions about where to draw the route. Unambiguous instructions typically involve giving information about (a) which direction to go in (*directional* information) (b) which feature comes next (*feature* information) and (c) how to navigate in relation to that feature (*prepositional* information). Instructions may contain none, one, or more of these elements of information (see figure 4A).

4.2.2 Responses to instructions containing task-oriented information

Instructions which contain less than three elements of information can be considered ambiguous. IF responses to these ambiguous instructions were categorised as 'beneficial' and 'ineffectual'. Beneficial responses from the IF include questions and statements about their own map since these inform the IG of a problem in understanding. Ineffectual responses include acknowledgements (which suggest understanding or successful completion of the instruction), giving no response (which implies the IF has not noticed the ambiguity or does not know how to deal with it) and other utterances which are unrelated to the task. Examples of these are given in figure 4B.

Figure 4A: Task-oriented information elements contained in IG instructions

Type of information	Example
Feature information: information about which feature to move to next	"go to the dog"
Directional information: information about which direction to go in	"go up"
Prepositional information: information about how to negotiate around a feature	"go over"
Feature + directional information	"go up to the dog"
Feature + prepositional information	"go over the dog"
Feature + directional + prepositional information	"go up and over the dog"

Occasionally task-oriented information is contained within two utterances, for example:

IG: Have you got a dog?

IF: Yes

IG: Well go over it then

The two IG utterances above combine to produce the general instruction which contains two elements of information - feature information (*dog*) and prepositional information (*over*).

4.2.3 Clarification requests

In their coding scheme adopted from McTear (1985), Lloyd, Boada & Forns (1992) describe two styles of clarification request: *potential* and *simple* requests. Potential requests are those in which the speaker draws attention to 'potentially available' information which was missing from the original utterance (Garvey, 1979). In the context of the Map Task, this information may only be perceived as potentially available by the IF because of differences

Figure 4B: Responses to instructions containing task-oriented information

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Question about information given:

IG: Go to the mountain

IF: *Which mountain?*

Statement about own map:

IG: Go to the gate

IF: *I haven't got a gate*

Acknowledgement of having understood or completed action:

IG: Go to the gate

IF: *Yeah*

No response:

IG: Go to the gate

IG: Go to the mountain

Others:

IG: Go to the sheep

IF: *Hang on my pencil's broke*

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between the maps. In this case, potential requests therefore offer new information to the IG. Simple requests contain no new information (see figure 4C).

4.2.4 Reliability

Agreement between the two coders was significant at the level of $p<.01$ for all the measures described above ($r_k = .85$ for 159 examples of task-oriented information contained in instructions; $r_k = .90$ for 159 responses to instructions; $r_k = .95$ for 93 requests for clarification).

Figure 4C: Clarification requests (from Lloyd et al., 1992)

Type of clarification request	Example
Non- specific request for repetition: A request for repetition of the utterance:	IG: Go to tent IF: *Pardon* IG: Go to tent, tent
Simple request for repetition: A request for repetition of a specific part of the utterance	IG: Go up to the cottages IF: *The what?* IG: Go up to, urm, the cottages
Simple request for confirmation: A request for confirmation of one's understanding of a part or the whole of an utterance without including any new information in the request	IG: Go to bridge IF: *Go to the bridge?* IG: Yeah
Simple request for specification: A request for the IG to be more specific about part or all of their utterance, without using new or different information in the request	IG: Where the top part of the, urm, thing is IF: *What thing?* IG: The top of where the...what you put your head on
Potential request for elaboration: A request for the IG to elaborate on what has just been said about what comes next	IG: Then you go down, near the steep bit, turn left IF: *Down to where?* IG: To the field, field
Potential request for confirmation: A request for confirmation of the IF's understanding which introduces new information or re-wording of the IG's previous utterance	IG: And you turn again. Turn all around IF: *That way? That way down?* IG: No that way
Potential request for specification: A request for specification when the IF introduces new information in an attempt to clarify the IG's utterance	IG: Around IF: *Which way's that, up or down?* IG: Towards the left

4.3 Results

4.3.1 Task-oriented information

The mean percentages of IG instructions containing different information elements and combinations of elements per dialogue for both groups are shown in table 4A.

Table 4A: Intervention study: Percentage means of task-oriented elements of information per dialogue

	Pre-test		Post-test	
	Improvers	Non-improvers	Improvers	Non-improvers
No elements	**15.5%**	**11.5%**	**9.6%**	**8.2%**
1 element:				
Feature	37.1%	58.1%	58.4%	66.6%
Directional	22.2%	8.8%	13%	6.6%
Prepositional	0%	0.5%	0.4%	0
Total 1 element	**59.2%**	**67.4%**	**71.8%**	**73.2%**
2 elements:				
Feature + directional	20.4%	16.7%	14.5%	10%
Feature + prepositional	3.8%	4.4%	3.4%	7.3%
Directional + prepositional	0.5%	0%	0%	0.4%
Total 2 elements	**24.7%**	**21.1%**	**17.9%**	**17.7%**
Total 3 elements	**0.5%**	**0%**	**0.7%**	**0.8%**

There were no significant differences between the groups or over time for the amount of task-oriented information contained in the instructions.

4.3.2 Responses to instructions containing task-oriented information

The majority of IG instructions contained less than three elements of task-oriented information and were thus ambiguous. IF responses to these ambiguous instructions are categorised as 'beneficial' and 'ineffectual'. Beneficial responses from the IF include asking the IG a question about their utterance:

Excerpt 4.1

IG:	Down near a flamingo
IF:	Where?
IG:	Near a flamingo
IF:	Which? Left or right?

or telling the IG something about their own map in order to draw attention to the ambiguous nature of the previous instruction:

Excerpt 4.2

IG:	Then to the letterbox
IF:	*There isn't a letterbox*

Examples of ineffectual responses given at pre-test are shown in excerpts 4.3 and 4.4:

Excerpt 4.3

IG: Right and there's like urm, go up another it's like a big hill if you get what I mean

IF: *Alright then*

Excerpt 4.4

IG: Then like, like there's another corner to go round

IF: *Hey?*

IG: Just go round the corner?

IF: *Alright then*

In excerpt 4.3, the instruction given by the IG is not clear with respect to where the IF should be drawing the route, and yet the response from the IF implies that he has understood and now awaits the next instruction. The same pair run into more difficulty later on. In excerpt 4.4, the IF initially tries to draw attention to the fact that he has not understood the previous IG instruction with his *Hey?*. However, the IG's response to this is no more clear than the original utterance, but the IF fails to persevere with his attempt at clarification, giving the impression he has understood with his *alright then.*

Table 4B shows the percentage responses to ambiguous instructions (containing less than three information elements) about landmark features which were present on both maps. At pre-test there was only one instruction which contained all three information elements. This was made by a 'non-improver' and was followed by no response from the IF. At post-test only three instructions (out of 240) contained all three information elements. One of these was made by a 'non-improver' and was followed by no response and two of these were made by 'improvers' and were followed by an acknowledgement in one case and no response in the other case. These responses have not been included in table 4B.

Table 4B: Intervention study: Percentage IF responses for features present on both maps

		Pre-test		Post-test	
Response type	Number of elements	Improvers	Non-improvers	Improvers	Non-improvers
	0	39.3% (of 28)	33.3% (of 27)	61.5% (of 13)	53.3% (of 15)
Beneficial	1	34.7 % (of 98)	23.4 % (of 77)	39.5% (of 86)	28.3% (of 85)
	2	38.1% (of 21)	20.8% (of 24)	18.2 % (of 22)	37.5 % (of 24)
	0	60.7% (of 28)	66.6% (of 27)	38.5% (of 13)	46.7 % (of 15)
Ineffectual	1	65.3% (of 98)	76.6% (of 77)	60.5% (of 86)	71.8% (of 85)
	2	61.9% (of 21)	79.2% (of 24)	81.8% (of 22)	62.5% (of 24)

If the IG mentions a feature which is not present on his or her partner's map, this ought to prompt even more queries from the IF. Table 4C shows the percentage responses to instructions about these features. There were no instructions about these features which contained all three elements of information either at pre-test or post-test. Three instructions contained no information elements at pre-test (one made by a 'non-improver' and two made by 'improvers'). These were all followed by a question. These responses have not been included in table 4C. Also, none of the instructions contained no information elements at post-test.

Table 4C: Intervention study: Percentage IF responses for features absent from IF map

		Pre-test		Post-test	
Response type	Number of elements	Improvers	Non-improvers	Improvers	Non-improvers
Beneficial	1	78.6% (of 14)	45% (of 20)	81.8% (of 22)	66.7% (of 18)
	2	75% (of 8)	42.9% (of 7)	57.1% (of 7)	100% (of 6)
Ineffectual	1	21.4% (of 14)	55% (of 20)	18.2% (of 22)	33.3% (of 18)
	2	25% (of 8)	57.1% (of 7)	42.9% (of 7)	0% (of 6)

Tables 4B and 4C illustrate that for the group of non-improvers, following instructions which refer to landmark features present on both maps and to those absent from the IF map, the number of beneficial responses to all ambiguous utterances increases over time whilst the number of ineffectual responses decreases. This is not the same pattern for the group of improvers.

Here the number of beneficial responses increases and the number of ineffectual responses decreases for instructions containing either no or just one element of information. When two elements of information are included in an instruction, the opposite pattern of results is observed; that is, they are less likely at post-test than at pre-test to offer a beneficial response and more likely at post-test than at pre-test to offer an ineffectual response.

The frequency of beneficial responses to instructions which refer to features that are absent from the IF map is greater than the frequency of beneficial responses to instructions mentioning features present on both maps.

4.3.3 Clarification requests

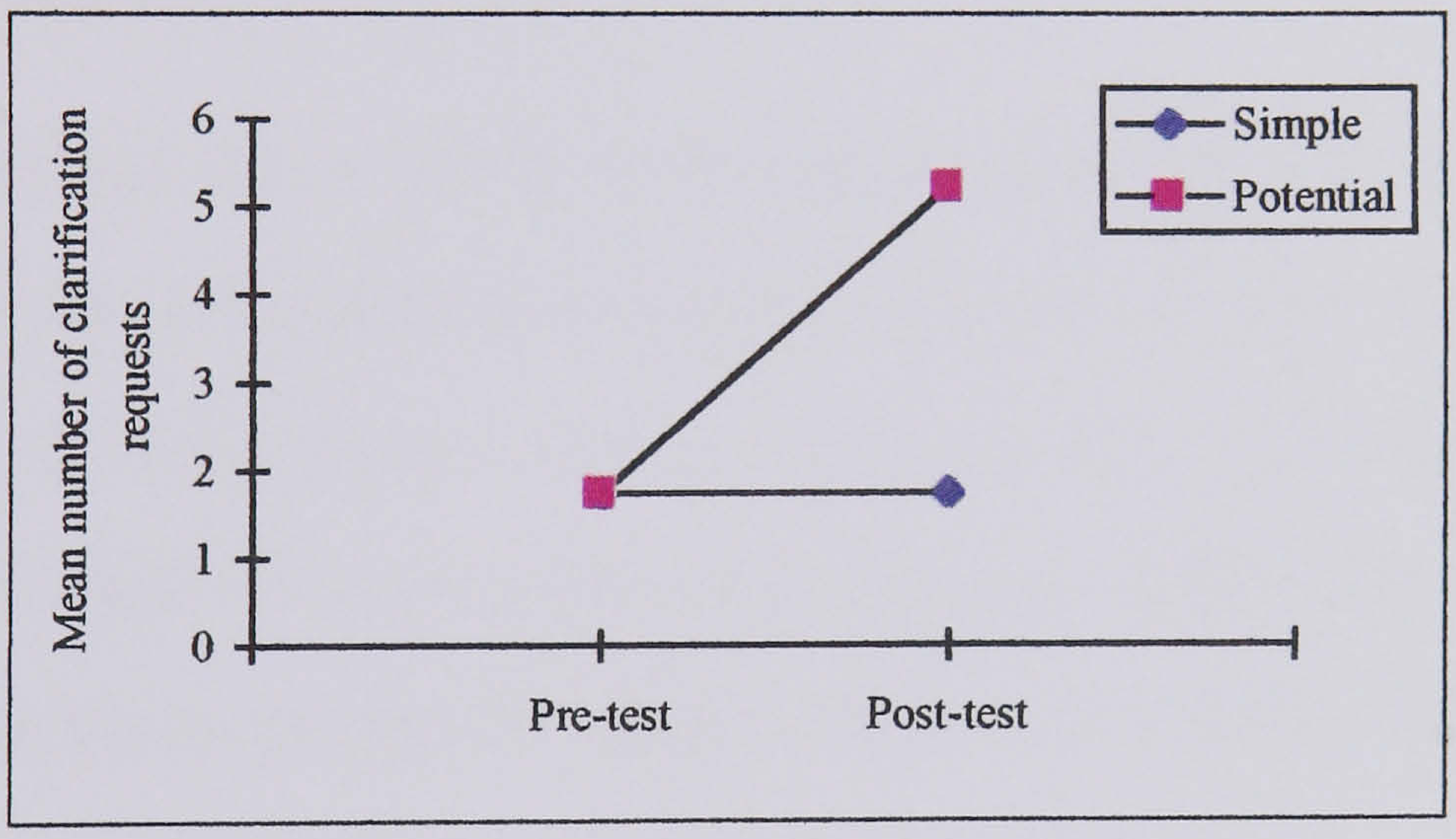
Table 4D shows the means (and standard deviations) of simple and potential request types used by the information followers at pre-test and post-test.

Table 4D: Intervention study: Mean number of clarification requests (SD) per dialogue

	Pre-test		Post-test	
	Simple	Potential	Simple	Potential
Improvers	1.47 (1.41)	1.13 (1.06)	2.20 (2.60)	4.20 (3.57)
Non-improvers	2.00 (2.00)	2.33 (2.02)	1.27 (1.39)	6.27 (7.32)

An analysis of variance[6] was performed on this data with improvement group (improvers and non-improvers), time (pre-test and post-test) and request type (simple and potential) as the independent variables. A main effect of time confirmed an increase in requests for clarification over time ($F_{1,28} = 8.96$, $p = .006$) A main effect of request type ($F_{1,28} = 10.82$, $p = .003$) indicated greater use of potential requests than simple requests. There was also a significant interaction between time and request type ($F_{1,28} = 11.06$, $p = .002$; see figure 4D below).

Figure 4D: Intervention study: Interaction between clarification request type and time



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[6] The test of homogeneity of variance was significant for this analysis. However, with two outliers removed and the data transformed, the effects remained the same. It is worthwhile to note that the two outliers were children whose potential requests at post-test far outnumbered their potential requests at pre-test. Non-parametric analysis of the data revealed the same pattern of effects (see Lamb, Bibby, & Wood, 1997).

Simple main effects analysis of this interaction demonstrated a simple main effect of request type at post-test ($F_{1,56} = 21.88$, $p < .001$). There were more potential requests than simple requests being used at post-test. Potential requests also significantly increased in frequency over time ($F_{1,56} = 19.79$, $p < .001$).

These results demonstrate that for both groups, the children's use of requests for clarification which introduce new information and are thus more likely to promote task-related discussion increase over time. Requests which offer no new information are used with the same frequency at post-test as at pre-test.

4.4 Discussion

The aim of this chapter was to provide additional analyses of the children's communication strategies in an attempt to unpick the dissociation between the measures of communicative process and performance observed in chapter three. The chapter focussed on two areas of interest: instruction giving by the information givers and question asking by the information followers.

4.4.1 Task-oriented information contained in instructions

For the task-oriented information measure there was no evidence of change over time. Neither was there a difference between those children who improved in their performance on the Map Task and those children who did not. These findings suggest that effectiveness of instruction giving is not responsible for the differential achievements on the Map Task. Of course, in interpreting these results, we need to bear in mind exactly what the intervention programme set out to do. Primarily it was concerned with providing opportunities for children to experience and practise managing their own understanding at a strategic level, particularly by encouraging them to ask themselves and their partners questions as they progressed through the activities. The aim of the study was not to promote the acquisition of specific linguistic forms such as the formation of unambiguous referring expressions and as such, any changes at this level would have been a bonus.

4.4.2 Responses to instructions

For the second measure, which examined the information followers' responses to instructions that were more and less ambiguous with respect to the information they contained, the information followers did seem to appreciate circumstances which required them to indicate a difficulty with their partners' instructions. This was indicated in the greater number of beneficial responses to instructions referring to landmark features which were absent from the IF map.

Generally these data suggest that over the course of the intervention the children become more willing to respond to ambiguities in instructions in a way that benefited the interaction. This finding mirrors the observation reported in chapter three of decreasing use of acknowledgements over time for the information followers. It would seem that this difference may be due to the information followers being more likely at pre-test to acknowledge that they have understood or followed their partner in response to an ambiguous message.

However, the data also suggest differences between the groups of improvers and non-improvers in their responses to task-oriented information contained in instructions. Over time, improvers seem to become less likely to indicate a difficulty when faced with an instruction containing two elements of information (as oppose to no elements or just one element), whereas non-improvers are more likely to indicate difficulties with all utterances which fail to include all possible elements of information at post-test. It would seem that by post-test, the group of improvers consider instructions containing two elements of instructions as adequate for the task and do not feel the need to indicate a difficulty. This finding suggests that one of the effects of the intervention on the group of improvers is the increasing appreciation that the more information that is provided by the information giver, the more able the information follower is to replicate the route. That is, two element instructions are regarded as providing an adequate amount of information whereas for instructions which contain only one or no elements of information, more information is required. What the children do not seem to appreciate is that this increase in information elements does not *necessarily* mean that the instructions are now unambiguous.

4.4.3 Clarification requests

Data presented in chapter three indicated an increasing use of strategies which serve to check children's own understanding. The results of the analyses of the children's requests for clarification indicate that the sophistication of this checking also improves over time, as illustrated by the growth in potential clarification requests at post-test. These requests for clarification contain additional information, over and above the information contained in the previous utterance. They can therefore be used as evidence for the children becoming more skilled, not only in repairing communication breakdown, but also in contributing to the task in a way that aids its progression. Abbeduto (1991) claims that although adolescents with learning difficulties may demonstrate an ability to produce certain clarification requests, this ability appears to be dependent on the type of clarification device. It would appear that what is happening here is that although the children are able to use potential requests before the study started, the intervention programme was successful in promoting the use of this kind of request. The significant increase in the use of such potential requests, and the beneficial responses like those illustrated in excerpts 4.1 and 4.2, are evidence that the intervention programme was successful in promoting strategies for handling ambiguities in communicative situations.

4.5 Conclusions

The communication process data presented in chapters three and four illustrate that where changes in communication strategies were observed, they were apparent for all the children in the study. By the end of the intervention the children were talking more, making more responses to ambiguous responses that can be considered beneficial, asking more questions in order to check their own understanding, clarifying more messages and asking more sophisticated types of question. The picture that these data provide illustrates that at the outset, the children were able to use a range of strategies which generally correspond to what we might expect children with moderate learning difficulties to achieve (Abbeduto & Rosenberg, 1980). However, by the end of the intervention, the quantity of these communicative behaviours increased. These improvements in communication skill support Brown's (1984) suggestions that rather than not possessing the strategies required for effective communication, some children have just not learned when and how to deploy these skills. She argues that with the right kinds of training, these aspects of communication can be improved. It appears that this is what the intervention programme has achieved.

However, what the data also demonstrate is that there is a dissociation between the children's communication performance and the communicative process. That is, on the vast majority of measures, there is no difference in the use of these communication strategies between the children whose performance improves and the group of children for whom this improvement does not happen. This similarity of the two groups remained the case when pre- to post-test changes were examined.

These findings call into question some of the assumptions that have so far been made when evaluating the communicative process of the MLD children who took part in the study. For adults without learning difficulties, competent communication for the purposes of the Map Task can be described in terms of the functions that their messages serve within the dialogue (Boyle et al., 1994). However, for the children with learning difficulties it would appear that the measures of communicative function (as demonstrated in the analyses of Conversational Games Analysis; clarification requests; responses to instructions) and task-oriented instruction giving might not be the most appropriate way of assessing what contributes to success on this task.

At this point it is worth reflecting on the theoretical motivation for the intervention programme presented in the earlier chapters of the thesis. The intervention set out to promote the use of self-regulatory strategies within communication tasks. It was argued that to be interpreted as regulatory, a strategy needs to act on one's own or another's cognitions (Flavell, 1987), (Baker, 1994). With respect to the Map Task, asking a question, for example, can only be considered a regulatory strategy if you have some evidence that the questioner has asked an *appropriate* question given the circumstances. Asking appropriate questions necessarily demands some monitoring of the situation and your own understanding.

Competent communication therefore, can be reflected in the appropriate use of a range of communicative functions and devices. For competent communicators participating in a task such as the Map Task, appropriateness of communication strategy may not be an issue. Efficient communicators may naturally take advantage of the interactional situation to ensure mutual understanding and task success. Using communication strategies appropriately in these circumstances is automatic. However, for children who are not such competent communicators, appropriateness of strategy use may turn out to be an important factor.

Another way of thinking about this is that a child may be taught 'superficially' to ask questions, and consequently demonstrate a high frequency of question asking during a communication task, but these questions can only be considered regulatory if they are appropriate given the circumstances in which they are being asked.

Apart from the task-oriented information measure, the coding schemes adopted in chapters three and four which were used to analyse the children's communicative strategies do not consider the appropriateness of how these strategies were being used. The claim to be tested here is that the dissociation observed between Map Task performance and the communicative process for the MLD children in this study may be due to the failure of the measures used to evaluate the process of communication to take account of the appropriateness of strategy use. The remaining four chapters of the thesis explore this claim.

Chapter 5: Analysing communicative interactions

5.1 The story so far

The research presented in this thesis primarily set out to examine the effects of an intervention programme designed to promote the children's self-regulatory strategies across a range communication activities. The intervention programme appears to have been successful in part. Half the children who were involved demonstrated improved performance not only on a communication task but also on a range of other measures which suggested that generalisation of self-regulatory skills may have occurred. These were the children who, at the start of the programme, performed least well on the communication task.

In an attempt to determine the precise nature of the changes in the children's communicative strategies which led to these children's improved performance a range of aspects of the communication process was analysed. It was hypothesised that for those children whose performance on the task improved associated gains would be observed for certain communicative strategies. However, this was not the case. Changes in the communication process, particularly those behaviours associated with the information follower role, were observed for *all* the children who took part in the study.

5.2 Alternative explanations

There are several alternative explanations of these apparently conflicting results. First, it could be that whatever is responsible for the gains in performance on the Map Task, and the associated gains on measures of IQ and reading, is independent from that which is responsible for the improvements observed in the children's communication. Second, additional changes in strategic functioning over and above those observed for communication may be required for gains to be made in post-test tasks. A third explanation is that the methods used so far to identify aspects of strategic functioning may not be adequately detecting the crucial elements of these behaviours. These three alternatives are discussed in turn below.

5.2.1 Alternative one: Changes in strategic functioning are unrelated to changes in communication skills

This explanation proposes that, although the intervention programme was successful in promoting the strategic or regulatory skills of half the children across a range of tasks, thereby affecting these children's performance on a range of post-test measures, the differences observed between pre- and post-test scores on measures of communication are unrelated to this change in strategic functioning. This, however, is unlikely given the theoretical assumptions presented in chapter one. Vygotsky's thesis about the role of social interaction and communication in the development of regulated strategic functioning has informed several studies which have explored how this relationship can be used to promote either communication skills (for example G. Brown et al., 1984) or 'higher order skills' such as problem-solving and reasoning (for example Brown & Campione, 1990). It has also been established that good performance on the Map Task specifically is associated with effective use of the types of communication functions measured in the present study (Anderson, Clark, & Mullin, 1991; Boyle et al., 1994; Doherty-Sneddon, 1993; 1996) and that improvements in performance on the Map Task as subjects get older is associated with improvements on these same communication measures (Doherty-Sneddon, 1996). It would appear, therefore, unlikely that changes in performance on the Map Task and the associated measures and changes in communicative competence are unrelated.

5.2.2 Alternative two: Additional changes in regulatory functioning are required for gains to be made in post-test tasks

Alternatively, the discrepancy observed may be due more to the range of strategic regulatory behaviours necessary to alter performance on tasks such as the Map Task or an IQ test. One aspect of this strategic functioning may be manifested in the measures of information-following abilities which changed over the course of the intervention programme. But this may only be one aspect. In order for performance on the Map Task and the reading and IQ tests to change, other aspects of regulatory behaviour might have to improve. If this were the case, we might expect to observe developments in certain communicative strategies for all the children but only those children who made additional gains in some other aspect or aspects of regulatory behaviour over and above those manifested in the changes in communication strategies presented in chapters three and four might be expected to improve in their performance on the Map Task and IQ test. Another way of looking at this is that improving your skills as an information follower is alone not enough to improve Map Task performance.

A prediction which stems from this argument is that for at least some children, and in particular those children who demonstrated significant gains on the Map Task and associated measures of IQ and reading, we ought to see other changes in their strategic behaviour above those already observed.

A starting point for thinking about these additional changes which we might expect to see over the course of the intervention is information giver performance. It has already been argued that the locus of change in the children's communication skills appears to lie with the information follower. This seemed not unreasonable. The explanation for this observation was that the intervention had essentially targeted the types of behaviour most relevant for children in the information follower role. But it is possible that the intervention did have some indirect effect on the information giver. The programme did not specifically address aspects of the IG role such as giving precise, unambiguous instructions and it should therefore be no surprise if this ability did not improve over the intervention period. However, other aspects of the IG role include such things as checking your partner's progress and their attention; being able and willing to repeat or reformulate an instruction if there has been a difficulty in understanding; and breaking down the information that you are providing into manageable chunks for your partner. These are examples of strategic IG behaviours which may well have been affected by an intervention aimed at promoting the use of questions and reflections on the children's own, and their partner's, performance.

If this is a valid proposal, we might have expected to see some evidence for it within the analyses of the children's communicative behaviour already presented in chapter three. For example, if checking attention, readiness and progress of your partner is an IG regulatory behaviour which affects Map Task performance, we should see improvements in this ability over time for those dyads where the Map Task score increased. Returning to the analysis of utterance functions presented in chapter three, ALIGN moves constitute just these kinds of checks and we should have therefore seen a marked increase in these moves pre-test to post-test for the hypothesis to be confirmed. However, this change was not observed in the analysis of utterance functions either for the whole group of children nor for the group of children who improved on the Map Task.

Results such as this suggest that in trying to capture the source of the change in behaviour which results in improved performance on the Map Task and the associated post-test measures, it is not enough just to look at individual IF or IG utterances using the methods that have been employed thus far.

5.2.3 Alternative three: Methodological limitations

Another way of looking at the problem is to reconsider the methods which have been used to analyse the children's communicative strategies. With the exception of the task-oriented information measure, the measures reported in chapter three focused on the children's use of a range of different types of functions served by the communication strategies employed by the IF and IG. Being able to use a range communicative functions is an important aspect of communicative competence (Rosenberg & Abbeduto, 1993). However, perhaps an even more important skill is being able to make *appropriate* choices about when and how to employ a range of functions. In order to make these appropriate choices, a competent communicator must pay attention to a range of factors associated with the specific communicative context in which the utterance is being made (Clark & Schaefer, 1987). In doing so, he or she will make certain choices about both the linguistic form of the message to be communicated and the content of this message (Abbeduto & Rosenberg, 1987). Similarly, for the communication to be successful, the information follower needs to decide what the information giver intended the message to mean within the communicative context in which it is offered (Abbeduto & Rosenberg, 1987). For example, consider the following hypothetical exchange:

Example 5A:

IG:	From there go up
IG:	Have you got a cat?

IF: Yeah

IG: Okay go down to the fence

In this example, the IG's utterances represent his attempt to inform the IF that she must move from her present position up to the cat, and then move to the fence. There are a number of choices that the IG has made in order to convey this message. First consider the choice of utterance function. Primarily the IG instructs the IF using the imperative statements *From there go up* and *Okay go down to the fence*. The second utterance *Have you got a cat?* is serving to check whether the IF has arrived at the cat. However, this utterance could also act as a question about whether the two maps contain the same cat feature. In this instance, not only has the IG chosen a specific form for the intended meaning, but the IF has had to select the appropriate meaning for this message given the different meanings that such a form could take (Abbeduto, 1991; Levinson, 1983; Robinson & Whittaker, 1987). As the IG and IF make these choices within the framework of the pragmatic rules governing the interaction, they are responding to the communicative context of this interaction. Specifically, they are having to monitor and evaluate their communications by taking into account such things as what has previously been said, the form of earlier messages, what happened in the previous dialogue and so on. In the example above, for the IF to interpret *Have you got a cat?* as meaning *You should have arrived at the cat*, it is likely that she has already experienced the use of this form to serve this function earlier on in the dialogue. Alternatively, this may be the form that she used when she was in the IG role to serve the same function.

Next consider the content of the utterances. In example 5A above, the IG has made a choice to refer to the second feature mentioned in the example as a fence. For the IF to stand a chance of correctly drawing the route, the content of this instruction needs to be accurate. For example, consider the case where the IG says *Okay go down to the fence*, when he really means go down to the *gate*. In this situation the IF is unlikely to be able to replicate the IG route successfully. Similarly, the IG might say *go down* but actually mean *go up*. This example clearly demonstrates the need to look beyond just whether certain communication strategies are being used or not. What is important is to recognise that strategies can be more or less effective depending on their content and how the utterances are constructed within any specific interaction.

5.2.4 Summary

In an attempt to account for the findings reported in chapters three and four, three alternative explanations have been proposed. The first makes the claim that gains in communication skill brought about by the intervention programme are independent from gains observed in post-test performance on the Map Task and tests of reading ability and IQ. Theoretical and empirical evidence suggest that this is an unlikely explanation. The second proposal relates to the types of change that have been focussed on by the analyses presented in the previous chapters. It is suggested that looking at these particular communicative behaviours may not be providing a complete picture of how the intervention has shaped the children's skills. The third proposal places even more emphasis on the methodological limitations of the approach used in the previous analyses. This explanation stresses the need to reconsider not just *what* behaviours need examining but also *how* this examination needs to progress. Specifically, it introduces the issue of appropriateness of communicative and strategic behaviours and claims that what is required is a methodology that takes into account this aspect of the communicative process.

5.3 Appropriateness of strategy use

In order to address the issues raised by the latter two alternative explanations, it would seem important to look beyond the individual utterances of the children in the IF role or the IG role as has been done thus far. Any analysis of strategy use needs to consider the appropriateness of a strategy given both the preceding and subsequent utterances and also both the general requirements of the Map Task and those aspects of the task which are specific to that particular dialogue or that particular pair of maps. As Lloyd and his colleagues (1992) suggest in their discussion of different approaches to analysing communication skills, it is necessary to give "recognition to the broader ecology involved" (p. 394). For example, if we are interested in whether participants ask questions, what we really need to know is not whether they ask just a few questions or ask many questions, but whether the questions they do ask are required, that is whether their use is *appropriate* given the particular situation. Appropriateness might vary from one interaction to another depending, for example, on what has occurred in that interaction before or the nature of the strategies the individual children are using. Any analysis of successful strategy use therefore, must take into account a range of factors related to how appropriate that strategy is within the particular context of the interaction.

5.3.1 General issues considered

Prior to discussing the specific aspects of the communicative context which are important to consider when making such an analysis, it is worth drawing attention to some more general considerations which also need to be made. These comprise the children's understanding of the task, the nature of the design of the study, issues of co-dependency and the children's non-verbal behaviour.

Children's understanding of the task

When observing the children who took part in the study as they complete the Map Task, it appears that the children view the aim of the task to be to get the information follower to draw the route from the start to the finish passing whichever landmark features happen to be on the way. In this way, unlike adults without learning difficulties who make careful attempts to describe the fine details of how the path skirts around the individual features (see for example Boyle et al., 1994), the children in the study have a tendency to restrict their discussions to determining which feature comes next. Indeed, this observation is supported by the evidence from the analysis of task-oriented information presented in chapter four (see table 4A). Future analyses, therefore, need to take account of the children's interpretation of the requirements of the task.

The design of the study

Second, it is also important that the children's communication strategies are judged with reference to both the dyad's earlier communications and their previous interaction (Bach & Harnish, 1979; G. Brown et al., 1984; Clark, 1979). At both pre-test and post-test, each child participated in two versions of the Map Task; taking on the role of IG in one version and IF in the other version. It is possible that the nature of the communication strategies employed when the children were completing the first of these pairs of tasks influenced the communicative behaviours during the second.

Issues of co-dependency

Third, the Map Task score is essentially the product of the performance of both the IF and the IG. Indeed it can be argued that this score is a simple measure of joint achievement. If the aim of analysis is to establish the effectiveness of an individual contribution to a collaborative interaction it is therefore necessary to determine, and to take into account, the co-dependencies of IF performance on IG performance and vice versa (see also the discussion by Elbers et al., 1992; Hoy & McKnight, 1977). For example, there are occasions in a typical Map Task interaction where the behaviour of one member of the dyad in one role actually depends on the behaviour of the other member in the opposite role. To illustrate, it was argued earlier that reformulating or repeating an instruction in response to a request from the IF is important for success at the task. However, if the child in the IF role does not actually ask a question when faced with a misunderstanding, then the IG cannot respond to it. In other words, few reformulations or repetitions of instructions by an IG should only be regarded as an indication of poor IG strategic behaviour if there are few *in response* to queries from the IF.

Non-verbal behaviours

Fourth, one of the aims of the approach advocated here is to attempt to explain why some interactions lead to high scores on the Map Task and others lead to lower scores. Given this, it would also seem important to look at aspects of the children's non-verbal behaviour which may contribute to performance on the Map Task (Duncan & Fiske, 1977). Included here would be aspects of non-verbal behaviour which are essentially communicative, such as nodding your head or looking puzzled and those which act in response to a communication from your partner, for example, drawing the path between the fence and the cat if you are told to do so.

5.3.2 Specific aspects of the interactions which require consideration

In addition to these general considerations, there are also some aspects of the specific interaction which need to be examined in order to take into account fully the appropriateness of strategy use.

Previously shared information

One aspect of the context which is likely to influence the form of a message is previously shared information. This information may have been explicitly agreed upon by the participants (Clark, 1996). For example, if the information giver and the information follower have already agreed that they are going to start at the cat, then the subsequent IG instruction *Go up,* is communicatively effective. Had there been no agreement between the participants about where to start, then the same IG instruction would have constituted a poor strategy. Another example might be the following; if the IG had already established that the first three features on the IF route were the same as the first three on the IG route by asking *Have you got dog, fence, swan at the start?*, going on to say *Go past the three things* would not be an ineffective strategy.

Alternatively, the information may not have been mutually and explicitly agreed as in the previous example, but instead one of the participants may have set a precedent in the way some aspect of the task was referred to either earlier on in the dialogue or in the dyad's previous interaction (Garrod & Anderson, 1987). For example, the IF may have referred to the hammock as *the net thing* when they were in the IG role. It is likely that when their partner came across the same feature on the route they were describing, they would also refer to it as *the net thing*, even if they recognised it as a hammock.

Perceptual salience

A second factor which may affect the IG's choice of form is the perceptual salience of aspects of the task (Clark, Schreuder, & Butterick, 1983). For the Map Task this may be relevant particularly when the IG is referring to one of the features which is duplicated on the IG map. Perceptual salience comes into play when, for example, the IG tells the IF to go *From the cat, to the mountain, to the wall.* When there are two mountains the IG can assume that the IF will proceed to the one which is placed between the cat and the wall rather than the one which is further away. So, although the double features have not been explicitly disambiguated in this example, the IF's route is still likely to match the IG route. Similarly, an IF's response to a seemingly ambiguous reference to a particular feature may be effective if he or she makes use of the maxim of antecedence (by drawing on information which has already been provided in an earlier utterance) or the maxim of quantity (by assuming the speaker will provide only as much information as necessary; Grice, 1975; Jackson & Jacobs, 1980; Surian, 1991).

Abbeduto and his colleagues (Abbeduto, Shor-Meyerson, Benson, Dalish, & Weissman, 1998) have explored the abilities of children and adolescents with learning difficulties to make use of these specific aspects of the interaction in order to communicate effectively. They frame their studies in Wilkes-Gibbs and Clark's (1992) concept of 'common ground' which refers to aspects of the physical and linguistic setting within which the speakers are communicating. These researchers demonstrate that children with learning difficulties are as able as their typically developing counterparts to use aspects of common ground to resolve ambiguity.

5.3.3 Summary

In order to provide a comprehensive picture which explains different children's improved performance on the Map Task, it is necessary to go beyond an analysis of the number of different strategies the children are using. The *appropriateness* of strategy use must also be considered. A strategy may be considered to be more or less appropriate depending on the context in which it is being used and this might vary from one interaction to another. In order to judge appropriateness it is necessary to pay attention to a range of factors. These include general issues to do with the nature of the study and the nature of the task, and more specific factors which are the result of particular types of interactions.

Given that the issues addressed above have relevance for both the information follower and the information giver, it is likely that the locus of change in Map Task performance for each dyad will vary from dyad to dyad. That is, different combinations of IF and IG performance may lead to different scores on the Map Task. It may be, for example, that for one dyad with a high Map Task score at post-test, performance of the IF improves significantly and yet aspects of IG performance do not change. For another pair, it may be that IG performance improves which results in a higher Map Task score regardless of the performance of the IF. By looking at the pattern of changes in this way, it becomes possible to determine the specific aspects of individual pairings of children which may be responsible for the improvement in Map Task performance for particular dialogues.

5.4 The second phase of analysis

In order to address the issues raised in this chapter, a second phase of analysis was undertaken. This phase of analysis has two related objectives. First, it aims to provide a more comprehensive picture of the range of factors which might be responsible for improvements made on the Map Task; and therefore does not assume that improvement in communicative performance for one child is necessarily due to the same changes in strategy use as another child. This means that a wider range of cognitive and metacognitive behaviours will be examined, and these will not just be restricted solely to the children's verbal behaviour. Second, the phase constitutes a more fine-grained analysis of the strategies which the children used to complete the Map Task by taking into account the appropriateness of strategy use within the specific context of each interaction as discussed in the previous section. The approach used represents an intense, micro-genetic examination of the children's behaviours (Siegler, 1996) and how these are seen to change over time using a combination of qualitative case-study methodology as advocated by Campione, Brown and Ferrara (1982) which is presented in chapter six and a series of quantitative procedures, informed by the findings from the case studies which are presented in chapter seven.

The remainder of this chapter begins to specify the precise aspects of the children's behaviour that are the focus for the second phase of analysis. Broadly, these can be divided into two categories. The first category constitutes those strategies which can be viewed as essentially cognitive, in that they serve to promote cognitive progress on the task (Flavell, 1987). The second category constitutes strategies which can be described as metacognitive or regulatory and involve some element of reflection on one's cognitive progress. Such discussion is motivated in part by findings from previous research and in part by speculation about likely candidates given the discussions presented thus far.

5.4.1 Cognitive strategies

Strategies used by the children which may serve to promote cognitive progress and thus have an effect on Map Task performance can be described as either task-focussed or communication-focussed. Task-focussed strategies comprise those which concern the provision of information and the use of information. Communication-focussed strategies comprise those behaviours which are necessary for competent communication over and above linguistic knowledge such as phonology, semantics and syntax (Abbeduto & Rosenberg, 1987). These behaviours, such as turn-taking (Sacks, Schegloff, & Jefferson, 1974), producing and comprehending utterance functions, or speech acts (Searle, 1969), clearly establishing referents so that a listener can identify precisely what is being talked about (Whitehurst & Sonnenschein, 1985) and dealing with failures in communication (Garvey, 1979), are dependent on aspects of underlying pragmatic knowledge about how to use language in "a contextually appropriate manner" (Abbeduto & Rosenberg, 1987, p.78 ; Levinson, 1983). These task-focussed and communication-focussed strategies are described as *cognitive* as oppose to metacognitive or regulatory as they do not act directly on the children's own cognitions However, changes in the choices that the children make about these three issues may represent changes in the way the children are monitoring and evaluating the communicative situation in which the strategies are being used or responded to, particularly when appropriateness of strategy use is being taken into account.

Task-focussed strategies

Provision of information. For accurate route drawing, the IG can provide feature information, direction information and preposition information (see figure 4A). Given the children's interpretation of the task seems to be to get from the start to the finish, rather than re-creating the exact route as it weaves around the various landmark features, feature information is likely to be considered as the most important element of information to include in an instruction and therefore the most used. However despite this, the more information that is provided, the more likely the IF will be able to reproduce the route correctly even if this extra information is not used in the way that it would typically be used by participants without learning difficulties. To illustrate, say the IG provides prepositional and directional information such as *From the fence go down and round to the cat.* Even if the IF has interpreted their aim solely to be to get from the fence to the next feature, the *down and round to* may result in the IF spending time considering, for example, where the cat may be in relation to the fence. This may reduce the chance that they proceed to the incorrect cat if it were a duplicated feature. Similarly, if the IF had anticipated that the route was about to take an upward trajectory, this additional information may also reduce the chances of the IF proceeding to the wrong feature altogether.

Obviously, instructions need to be accurate and unambiguous for the IF to be able to correctly reproduce the route. The greater the number of landmark features present on the IG route that are mentioned by the IG, the greater the likelihood that the completed IF route will match the original. At the same time, these landmark features need to be appropriately described using the label provided on the map or a suitable alternative (see also section 5.2.3 above). They must also be presented in the correct order. Since the IG does not know that the duplicated feature present on his or her map is not duplicated on the IF map, an effective strategy is to make some attempt to specify to which of these features he or she is referring, unless the IG is making use of the perceptual salience of the relevant feature and assumes that the IF will do so too.

As well as issues to do with *what* information is provided in instructions, the *manner* in which this information is presented may also have an effect on the ability of the information follower to carry out the instructions, and thus may affect the final Map Task score. The IG needs to provide information at a rate at which it can be followed and allow the IF an adequate amount of time to complete each instruction before receiving the next one, for example.

With respect to the IF role, the extent to which the IF shares appropriate information about the IF map with the IG, especially when they have identified a feature missing from the IG map, is likely to contribute to the Map Task score. At the same time, providing the IG with information about IF progress or readiness for the next instruction is likely to ensure information-provision proceeds at a rate at which the IF can successfully follow.

Use of information. Since the Map Task is a co-operative task which requires the participants to share information about their maps, in order for the IF to be able to reproduce the route correctly it is important that the information that the IF provides about their map is considered by the IG *and acted upon.* Because of the nature of the task, this information typically consists of information about the fact that a specific feature to which the IG has just referred is missing from the IF map. When the IF provides information about such a missing feature, there are three likely responses from the IG. The most effective strategy is to acknowledge the information offered by the IF and respond by making an attempt to change the instruction to take this information into account. A less effective strategy is for the IG to acknowledge that he or she has taken on board the information and go on to explicitly tell the IF to move on to the next feature, without providing an alternative description about that part of the route. Given that the children's interpretation of aim of the task is to get from the start to the finish, this is a reasonably effective strategy. However, this strategy is unlikely to result in an accurate reproduction of the IG route. Alternatively, the IG may totally ignore any information provided by the IF and move on to describing the next feature with no acknowledgement of the IF's utterance.

With respect to IF behaviours, the accuracy with which the IF follows the IG's instructions to draw the route will also affect subsequent communications.

Communication-focussed strategies

Turn-taking. The extent to which the exchange of the speaker role is managed smoothly is likely to affect the successful transmission of information (Sacks et al., 1974). Communicative interactions which are scattered with overlapping speech and interruptions may limit the children's ability to reach mutual understanding and thus affect Map Task performance.

Production and comprehension of utterance functions. The range of utterance functions used by the children in the present study has already been established and is reported in chapter three. As discussed above, the second phase of analysis looks beyond the range of functions employed by the children and comments on the choices made by the children with respect to the content and the form of these utterances given the context in which they are occurring. Difficulties in producing appropriate utterance functions as a speaker and making appropriate interpretations of these as a listener affects both the transmission of information and the way in which two communicative partners evaluate each other's performance (Abbeduto & Benson, 1992) and is thus likely to influence performance on the Map Task.

Some utterance functions obligate the listener to respond if the communicative situation is to be effective (Abbeduto & Rosenberg, 1980; Levinson, 1983). The simplest example of this is the obligating nature of a question. Take, for example, the hypothetical utterance from an information giver *Have you gone past the cat?* Here, the information follower needs to respond to this question in order for progress on the task to be made. Not only, then, is Map Task performance likely to be affected by the information follower's appreciation of the obligating nature of certain functions, but also the information giver's recognition that a response is required and time is needed for the information follower to provide that response (Abbeduto & Rosenberg, 1987).

Establishing referents. Successful interactions depend on the speaker making it clear precisely what is being referred to (Beveridge & Tatham, 1976; Bowman, 1984; Lloyd, 1994; Longhurst, 1974; Rueda & Chan, 1980; Whitehurst & Sonnenschein, 1985). With respect to the Map Task, the information giver needs to pay particular attention to providing unambiguous reference to the features on the route. This may be achieved in some cases, not by specifying precisely the intended feature, but relying on the salience of that feature, given the context in which it is being referred (see above, section 5.3.2; Clark, Schreuder, & Buttrick, 1983).

Dealing with communication failure. If either participant of the interaction has not heard, attended to, or understood a previous utterance from their partner, they need to use a repair device in order that the communication process does not breakdown (Abbeduto, 1991; Gallagher, 1981; Garvey, 1979). In the case of the Map Task, the consequences of not indicating that a repair is needed, not responding to such an indication, or not pursuing the problem, means that a portion of the route may be drawn incorrectly, and will thus affect Map Task performance.

5.4.2 Regulatory strategies

The second phase of analysis also comprises an examination of the nature of the regulatory behaviours that are proposed to drive the changes in performance on post-test measures of reading and intelligence. Broadly these regulatory strategies involve behaviours which serve to regulate the interaction and those that serve to regulate one's own behaviour. Again, these strategies are examined within the framework outlined in this chapter, that is, taking into account the specific contexts in which they are being used. Information about the children's use of these strategies should enhance our picture of the nature of strategic change in this population[7].

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[7] There is obviously some overlap between the strategies listed here and some of the communicative functions already discussed in chapters three and four. What is important about this phase of the analysis is that the effectiveness of these strategies is now being considered within the context in which the strategies are being used.

Regulating the interaction. Information-giving behaviours which might be considered to provide evidence that a child is monitoring the effectiveness of the interaction include occasions where the IG repeats, reformulates or returns to a previous utterance in order to clarify its meaning. Similarly, strategies which attempt to check your partner's attention or readiness before you give the next instruction or which check your partner's understanding or accomplishment of an instruction (Kowtko et al., 1992) can also be considered as evidence that the speaker is making an attempt to move the interaction smoothly forward.

Information-following strategies which provide a similar function include drawing attention to potentially available information missing from an IG's previous utterance (Lloyd et al., 1992) and checking the route once it has been completed. These two behaviours demonstrate that the IF appreciates that co-operative effort is required for task success and is taking some responsibility for ensuring shared understandings.

Regulating one's own behaviour. Included here are those strategies which demonstrate that a child is monitoring his or her own understanding, for example, asking questions when something needs repeating or clarifying and informing your partner if your partner if something has not been understood. (Palincsar & Brown, 1984; Puustinen, 1998). Also included are strategies which can be interpreted as serving a self-guiding function. These self-guiding comments may act to aid memory for some aspect of the task that has gone before (Meacham, 1979); serve to analyse what has happened or plan an appropriate next course of action (Bouffard-Bouchard, Parent, & Larivée, 1993; Fuson, 1979); label or describe characteristics of the task in hand (Frauenglass & Diaz, 1985); serve to question oneself (Puustinen, 1998) or act to evaluate the progression of the task (Bouffard-Bouchard et al., 1993).

5.5 Summary

In order to determine the strategic behaviours which may account for the differences in performance on the Map Task for different dyads at pre-test and post-test further analysis was required. This chapter has highlighted methodological limitations of the analyses conducted thus far. It has discussed in particular the issue of appropriateness of strategy use, emphasising how the specific context of an interaction and more general considerations must be examined in order to determine the effectiveness of children's strategy use.

The aim of the second phase of analysis is to develop these ideas. Specifically, the analysis will look beyond those aspects of communication which were the focus of attention in the first phase of analysis, and pay particular attention to the cognitive and regulatory strategies used by the children, bearing in mind that there may be different changes in strategy use for different children, which may lead to similar changes in the measure of communicative performance. Second, the analysis will take into account the appropriateness with which these strategies are used within the general and specific communicative contexts. Figure 5A summarises the factors which have been discussed in this chapter which may potentially contribute to a Map Task score. For all but the communication-focussed factors, the strategies associated with the particular roles of information giver and information follower have been differentiated according to the differences afforded by these two roles. As stated earlier, for any one dialogue, the score on the Map Task is necessarily the product of information giver and information follower performance. A high or low score could be more or less influenced by the strategic behaviour of the IG and/or the IF.

The next chapter presents a set of case studies which are used to assess whether these issues can successfully explain Map Task performance for a sample of dialogues, with the longer term aim of being able to use the evidence provided in the analysis to develop a coding frame which can be used to explain the changing performance for the remaining dyads.

Figure 5A: Factors potentially contributing to Map Task score

		Information giver	Information follower
Cognitive strategies	**Task-focussed: Provision of information**	• The type of information contained within instructions • The accuracy of information-giving • The number of features mentioned • The order in which feature information is provided • The extent to which double features on IG map disambiguated • The manner in which information is provided	The extent to which the IF provides the IG with information • about the IF map • about IF progress
	Task-focussed: Use of information	• The extent to which the IG makes appropriate use of information provided by the IF to promote task success	• The extent to which the IF: uses IG information correctly to draw the route
	Communication-focussed	The extent to which the IG: • takes turns • appropriately manages utterance functions • establishes clear referents • indicates, responds to and pursues communication failures	The extent to which the IF: • takes turns • appropriately manages utterance functions • establishes clear referents • indicates, responds to and pursues communication failures
Regulatory strategies	**Regulating the interaction**	• repeating/reformulating the message to make meaning clearer • checking attention, agreement and readiness of the IF • checking IF understanding or accomplishment of an instruction	• drawing attention to potentially available information missing from an IG utterance • checking the route once it has been completed
	Regulating one's own behaviour	The extent to which the IG uses self-guiding comments, e.g.: • to remind themselves what has been previously said • to evaluate progress • to plan future action	The extent to which the IF monitors own understanding by: • asking appropriate questions when something needs clarifying or repeating • informing the IG when something has not been understood The extent to which the IF uses self-guiding comments, e.g.: • to remind themselves what has been previously said • to evaluate progress • to plan future action

Chapter 6: Second phase of analysis: Part 1: The case studies

6.1 Aims of the second phase of analysis

The aims of the second phase of analysis are:

1. to demonstrate that there may be different explanations of the effects of the intervention for different pairs of children by:

    a. considering the range of cognitive and regulatory strategies used by both the information giver and the information follower (outlined in chapter five) which may potentially explain Map Task performance and;

    b. analysing the appropriateness of the use of these strategies by taking account of the specific contexts in which they are taking place and general features of the situation;

2. to place particular emphasis on analysis of regulatory strategies within this framework;

3. to assess the utility of this approach by making case studies of a sample of dialogues to determine in detail the extent to which appropriate use of strategic behaviours explain the associated Map Task scores;

4. to use this evidence alongside the theoretical motivation presented in chapter five to put together a set of factors which can be used to explain the differences in Map Task performance for the remaining dyads.

The second phase of analysis therefore constitutes two parts. Part 1 (presented in this chapter) presents a set of case studies based on a sample of the children's dialogues. These in turn inform the design of a coding frame which is used to examine the children's strategy use in the remaining dialogues. This forms part 2 of the second phase of analysis, the results of which are reported in chapter seven.

6.2 Case study method

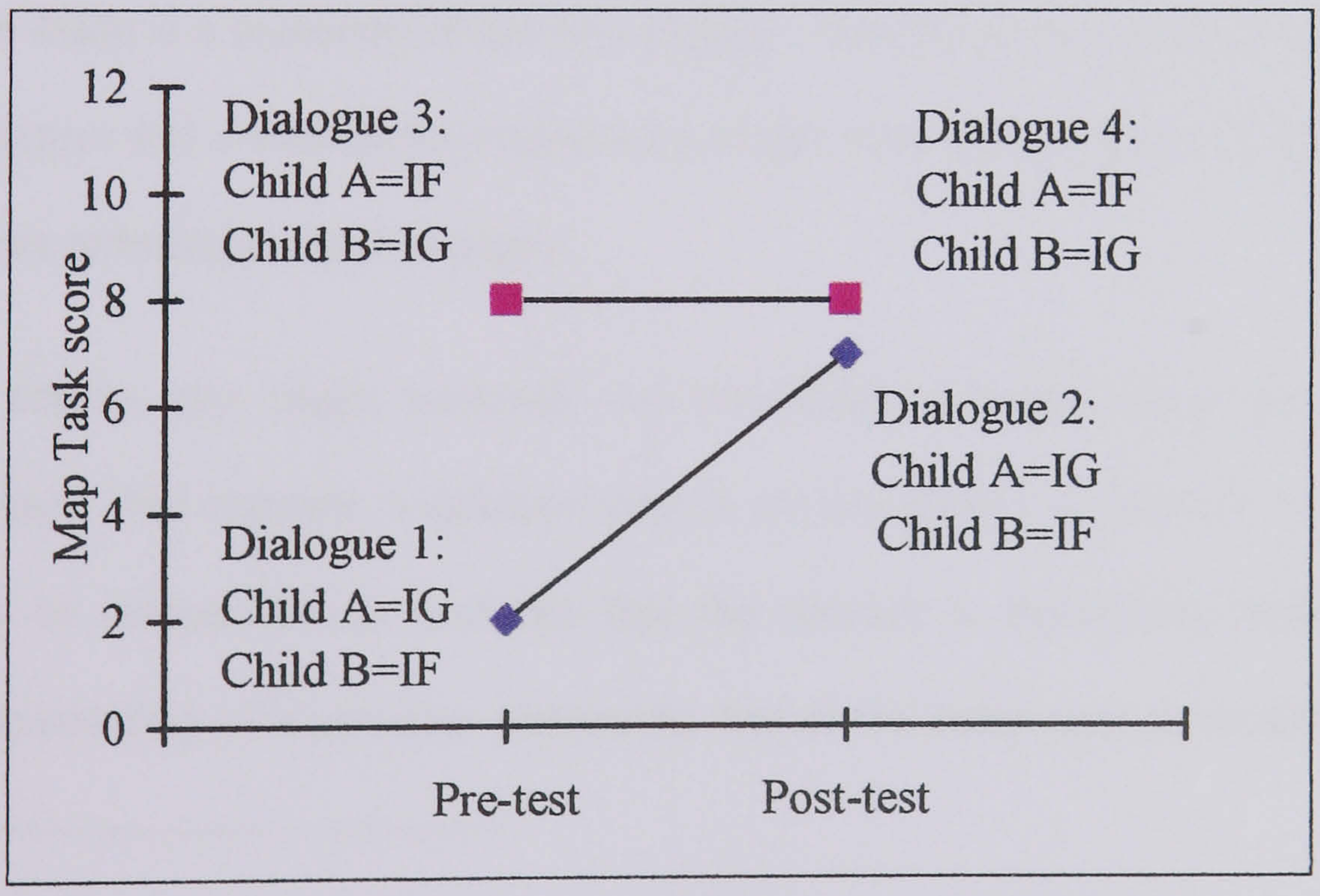
Three sets of dialogues were selected for further examination to produce three case studies. These dialogues constituted the pre- and post-test Map Tasks for six children who took both the IF role and the IG role. Twelve dialogues were therefore examined. The pattern of performance for these dyads corresponded to the typical pattern of performance discussed in chapter three. That is, when one child took the role of IF at pre-test, the Map Task score was significantly lower than when the other child took the role of IF. However at post-test, when the former child took the role of the IF, the Map Task score increased whilst the score associated with his or her partner did not change significantly.

The dialogues were analysed according to the issues raised in the previous chapter and summarised in figure 5A. The appropriateness of the children's communication strategies were considered within the specific context of the interactions, taking into account both verbal and non-verbal behaviours through the close analysis of the dialogue transcripts and video recordings.

6.3 Structure of case studies

Each case study consists of four dialogues, two pre-test dialogues (referred to as dialogues one and three) and two post-test dialogues (referred to as dialogues two and four). At pre-test, dialogue one was the first of the two Map Tasks attempted and at post-test dialogue four was the first of the two. This is illustrated in the graph shown in figure 6A which shows the dialogue labelling for two hypothetical children; child A and child B, taking the roles of information giver (IG) and information follower (IF).

Figure 6A: Hypothetical graph illustrating dialogue labels.



At the beginning of each case study, details of which roles the children played at which occasion, and the order in which this happened is presented. The scores associated with the Map Tasks which make up the four dialogues of each case study are then represented graphically. Transcripts of each dialogue and a reproduction of the information giver and completed information follower maps are provided before each section of case study. The four dialogues are then considered in turn. The analysis of strategy use generally follows the order in which the strategies are summarised in figure 5A. For each dialogue, strategies employed by the information giver are considered first, beginning with cognitive strategies (task-focussed and communication focussed[8]) followed by information giver regulatory strategies (regulation of the interaction and regulation of one's own behaviour). Information-following strategies are then considered in the same way. To conclude each case study is a summary of the key changes observed in the children's use of strategies and a subsequent explanation of the observed changes in Map Task scores referring to these changes.

Of course, any single utterance can potentially represent more than one strategy. For example, a question such as *do you mean I go down to the cat?* may be categorised as evidence that the speaker is monitoring their own understanding of a previous instruction and at the same time as evidence of

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[8] In the case studies, the extent to which the speaker establishes clear referents is discussed in the sections addressing task-focussed strategies, rather than those addressing communication-focussed strategies, so that specific reference to features can be more appropriately made.

the speaker offering their partner information about their own map. Attention is drawn in the case studies to these overlaps. Excerpts from the transcripts or transcript line numbers are provided as illustration where relevant.

Emphasis throughout is placed on analysis of strategies within the context in which they occur, paying attention to the children's understanding of the task, aspects of the interaction that have gone before and the children's non-verbal communications.

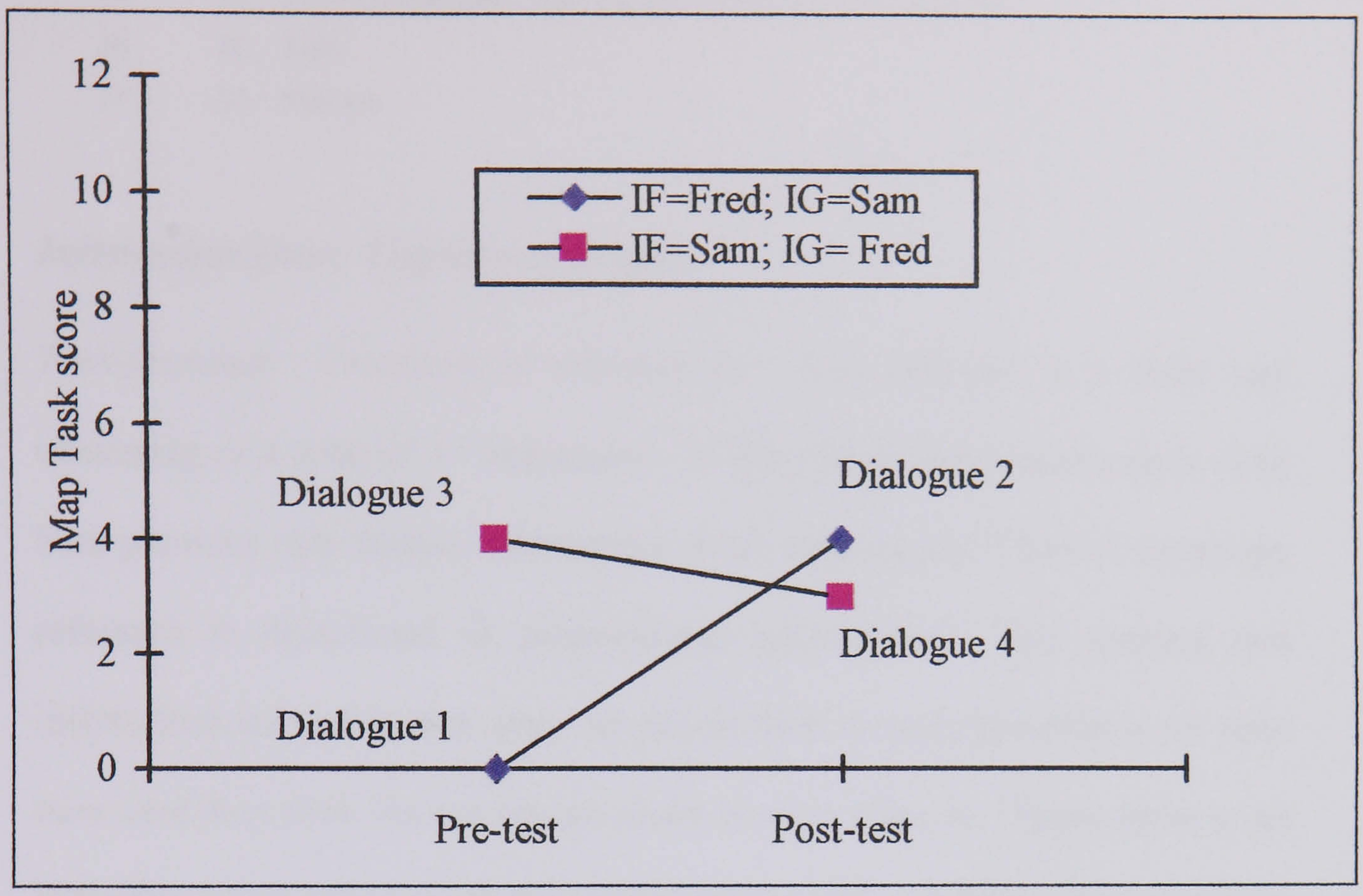
To preserve anonymity the names of the children in the case studies have been changed.

6.4 Case study 1: Sam and Fred

Table 6A: Case study 1 details

	Time	Information giver	Information follower	Order in which Map Tasks were completed
Dialogue 1	Pre-test	Sam	Fred	First
Dialogue 2	Post-test	Sam	Fred	Second
Dialogue 3	Pre-test	Fred	Sam	Second
Dialogue 4	Post-test	Fred	Sam	First

Figure 6B: Case study 1 Map Task scores



6.4.1 Case study 1: Dialogue 1 (pre-test)

Transcript 6A: Case study 1: Dialogue 1

Information giver = Sam; Information follower = Fred

1. IG: Draw six places.
2. IF: Yeah.
3. IG: Then draw a cat, then turn, and from the cat you go fourteen steps.
4. IF: Yeah.
5. IG: And from there you go to a wall.
6. IF: Yeah.
7. IG: Urm # slug.
8. IF: Yeah.
9. IG: Then you go to a flower, flower.
10. IF: Yeah.
11. IG: Then to a fence.
12. IF: Yeah.

13. IG: Then a, urm, like a bed, a net bed.

14. IF: Yeah.

15. IG: Go to a dog kennel. Then you go to a car then you've finished.

16. IF: Yeah.

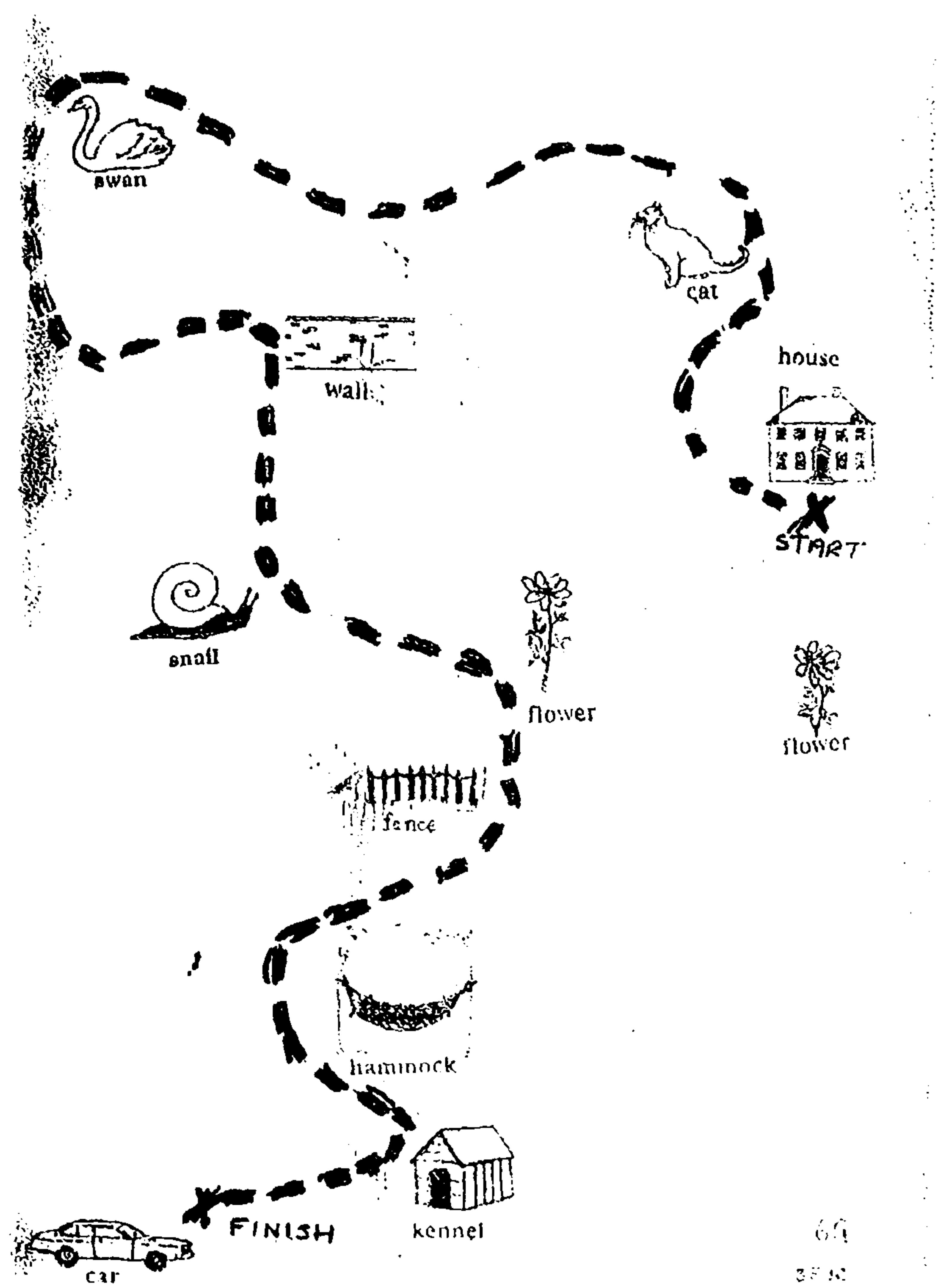
17. IG: That's it

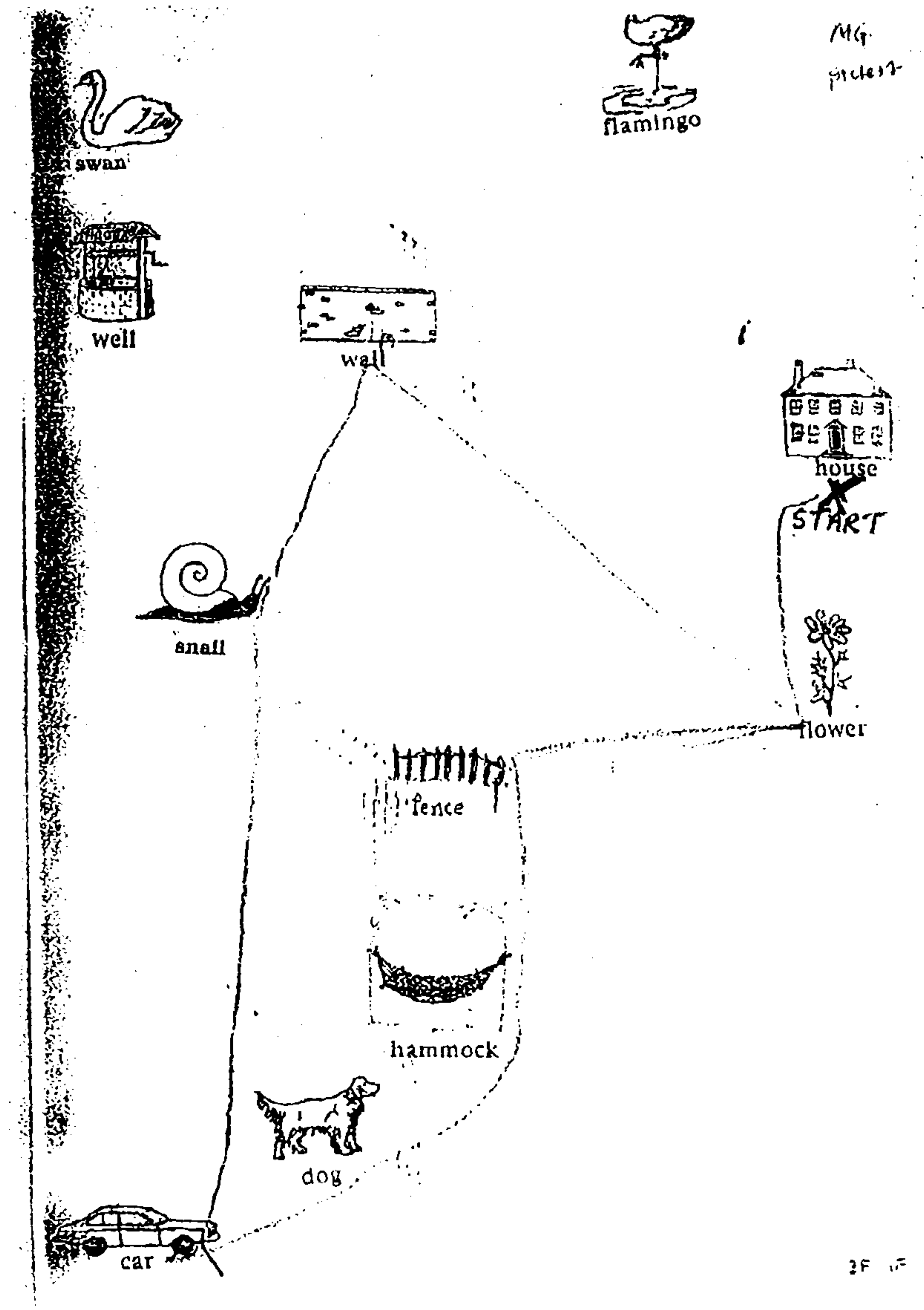
Information giver: Cognitive strategies

Task-focussed: Provision of information. This dialogue is a short one, consisting of a total of 17 utterances. In the role of information giver (IG), Sam provides only feature information in his instructions. There is never any reference to directional or prepositional information. The opening two instructions are ambiguous; *draw six places* (line 1) and *then draw a cat, then turn, and then from the cat you go fourteen steps* (line 3). These seem to be indicative of an initial misunderstanding of the task. There is one inaccuracy in the order in which Sam mentions features (at line 5, Fred is told to go to a wall, therefore potentially missing out the swan). All features are appropriately labelled and are described by Sam one at a time. There is no attempt to define which one of the duplicated features on the IG map (the flower) Sam is referring to although he may be assuming that Fred will proceed to the one nearest the previous feature (an example of the effect of perceptual salience, see section 5.3.2).

Task-focussed: Use of information. Fred proffers no information about his own map, so there is no extra information for Sam to take into account when providing his instructions.

Figure 6C: Case study 1: Dialogue 1: Information giver (Sam) and completed information follower (Fred) maps.





Communication-focussed. The dialogue is characterised by Sam giving an instruction and Fred responding with an acknowledgement, apart from on one occasion when Sam tells Fred to go to the dog kennel which is missing from the IF map (line 15). Here, Fred looks up at Sam as if he knows something is wrong, but does not say anything. Sam pauses but then goes straight on to describing the next feature. On all but this occasion Sam waits for an acknowledgement that Fred has completed the previous instruction. Generally, however, the dialogue flows smoothly with both members of the dyad taking appropriate turns.

Information giver: Regulatory strategies

Regulating the interaction. There is no explicit attempt by Sam to check that Fred has understood the instructions (although the feedback from Fred would imply that there are no problems). Sam also fails to use any devices which attempt to check agreement, attention or readiness to continue.

Regulating own behaviour. There is no explicit indication that Sam is monitoring his own performance. Neither is there evidence of any self-guiding comments made by Sam.

Information follower: Cognitive strategies

Task-focussed: Provision of information. Fred, in the role of information follower, responds to each instruction, whether ambiguous or not, with an acknowledgement, saying no more than *Yeah* throughout the dialogue. This includes the opening ambiguous utterance outlined above (line 1) and both references by Sam to features which are not present on Fred's map (the cat on line 3 and the dog kennel on line 15). The first of these is responded to by *Yeah* (line 4) the other is not responded to at all, although, as mentioned above, Fred does look up to Sam without having drawn anything, there is a long pause but then Sam gives the next instruction and any potential attempt to sort the problem out is abandoned (line 15).

Task-focussed: Use of information. Fred seems to interpret the initial ambiguous instruction *draw six places* (line 1) as meaning *draw the route past six features*. After the second ambiguous instruction *then draw a cat, then turn, and from the cat you go fourteen steps* (line 3) he proceeds back up the map to a new feature entirely. However, for the final four instructions, he correctly follows the feature information provided by Sam.

Communication-focussed. Fred takes conversational turns appropriately and acknowledges all Sam's instructions.

Information follower: Regulatory strategies

There is no evidence, spoken or behavioural, of any kind of comprehension-monitoring by Fred. There are no questions, no attempt to check the route at the end of the dialogue and no self-guiding comments.

6.4.2 Case study 1: Dialogue 2 (post-test)

Transcript 6B: Case study 1: Dialogue 2

Information giver = Sam; Information follower = Fred

1. IG: Okay. Start, start at the volcano.
2. IF: Where did you say go?
3. IG: You start at the volcano don't you? Put a line from the volcano.
4. IF: Yeah.
5. IG: Then go down. I mean left, left curve. Then another curve, going left.
6. IF: Yeah. Where to?
7. IG: To the tent, going straight.
8. IF: There's no tent.
9. IG: Skip that. Then you turn left and go straight up and do another corner to the right, and then.
10. IF: Yeah.
11. IG: And then go down from there and turn a corner, go straight up turn another one and another.
12. IF: Yeah.
13. IG: Then you turn, go down.
14. IF: Yeah.
15. IG: Turn right curve down and then you get to a bird of some kind.
16. IF: Hmmm?
17. IG: Some kind of a bird.
18. IF: N n nothing there.
19. IG: What?
20. IF: There's nothing there.
21. IG: Oh. Skip that. Then you go to the mountain.
22. IF: Yeah.
23. IG: Yeah? From the wall you go to the mountain.
24. IF: Yeah, I've done that.
25. IG: Then you go to a windmill.
26. IF: Yeah.
27. IG: Then you go from a dot, then you go, do a curve # then to a darker mountain.
28. IF: Hmmm?
29. IG: Darker mountain. Same as the other mountain, but even darker. It's got dark patches on it.
30. IF: Yeah.
31. IG: Come down from there and you go to the pig.

32. IF: Yeah.

33. IG: Then across a little bit more.

34. IF: Yeah.

35. IG: And then you've finished Oh yeah yeah yeah. Did you go to the erm bench?

36. IF: No.

37. IG: Cos you've got one there.

38. IF: Yeah.

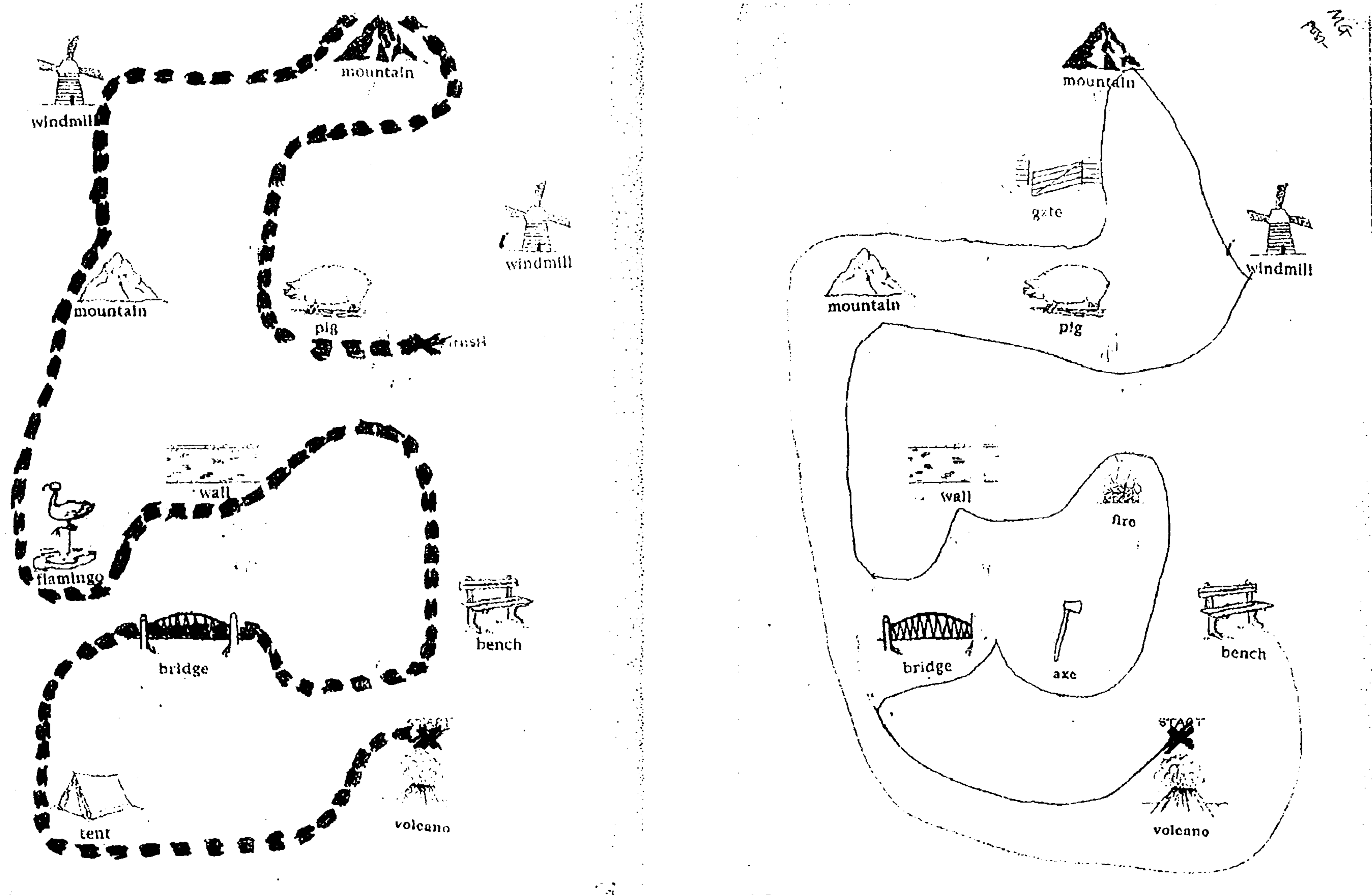
39. IG: That's it.

Information giver: Cognitive strategies

Task-focussed: Provision of information. This dialogue has a much more confident start, *Okay start at the volcano* (line 1) which indicates a better understanding of the requirements of the task. There is now much more attention to information about which direction to go in, sometimes to the detriment of clear, unambiguous instructions. In fact, all but two of Sam's instructions to go to the next feature are accompanied by directional information. For example, the utterance *Then you turn left and go straight up and do another corner to the right, and then you get to the bridge* gives both directional and feature information and provides lots of cues for Fred to proceed to the correct destination.

There is one inaccuracy, where Sam misses out a feature (after line 9). This is, however, noticed later on (see commentary below). All the features are appropriately labelled. Sam breaks down the majority of his instructions into small parts and waits until he has confirmation from his partner about whether these have been achieved or not.

Figure 6D: Case study 1: Dialogue 2: Information giver (Sam) and completed information follower (Fred) maps.



Sam makes no attempt to define which one of the duplicated features on his map (the windmill) he is referring to.

Task-focussed: Use of information. Sam's response to finding out that there is a missing feature on Fred's map is to say, *Skip that* and to go on to providing an instruction about the next feature (see lines 9 and 21). In this way, both members of the dyad are happy to agree to move on to the next feature once they have established between themselves that there is a missing feature on the IF map.

Communication-focussed. Sam takes appropriate conversational turns. Turns generally comprise instructions to Fred about what to do, with one turn towards the end of the dialogue which serves to check whether a particular feature has been visited (line 35).

When Fred asks a question or suggests that he has not understood or not heard the previous utterance, Sam responds by repeating the utterance or, on one occasion, reformulating the utterance to provide extra information (line 29).

Information giver: Regulatory strategies

Regulating the interaction. An example of Sam explicitly making sure that his partner has fully understood what to do comes after Fred has explained that there is no flamingo on his map. After confirming this information, Sam tells Fred to skip it and go on to the mountain instead. This is followed by an utterance which is used to check Fred has followed the 'change of plan' *Yeah? From the wall you go to the mountain* (line 23).

Regulating own behaviour. Evidence of Sam monitoring his own performance comes right at the end of the dialogue, after Sam has told Fred that he has finished. Sam is suddenly concerned that he has not told Fred to go to one of the features. He tries to correct this by asking Fred whether he has been to the bench (line 35). When Fred replies that he has not, Sam attempts to tell him to do so. However to do this, he uses the phrase *'Cause you've got one there* (line 37) rather than attempting to explain where the bench should be along the route. This instruction is incorrectly interpreted by Fred who responds by agreeing that there is a bench there - presumably referring to his own map rather than the route taken.

There are no explicit self-guiding comments made by Sam although he does start the dialogue by focusing his own or Fred's attention with *Okay.*

Information follower Cognitive strategies

Task-focussed: Provision of information. Reference by Sam to features which are missing from the IF map are responded to by Fred with an explanation of what his map looks like, for example, *There's no tent* (line 8) and *nothing there* (line 18). Fred also makes the comment *Yeah I've done that* (line 24) which is an example of him explicitly telling Sam that he has understood and completed the instruction and is therefore waiting for the next instruction.

Task-focussed: Use of information. Fred correctly follows Sam instructions about which features to go to. In fact this information often takes precedent over the information about which direction to go in which is sometimes ambiguous; Fred waits to hear the next feature name before proceeding.

Communication-focussed. Fred takes appropriate conversational turns. He provides information about his own map (see above 'provision of information') and he asks questions in various circumstances; when it appears he either did not catch the previous utterance from Sam (for example line 28); when he requires more information (for example line 6); and when he requires confirmation of the instruction after noticing a potential difference between the two maps (for example line 16). Typically these demonstrations of not being clear about what to do next are articulated by a general, rather than specific, indication of uncertainty as in the *hmmm?* on line 16.

Information follower: Regulatory strategies

Regulating the interaction. On one occasion Fred draws attention to potentially available information missing from the previous IG utterance (*where to?* line 6). We may have expected to see this device used more than once, however, there is very little need to do so due to the quality of Sam's utterances. There is no attempt by Fred to check the route after it has been completed

Regulating own behaviour. There are no explicit self-guiding comments made by Fred.

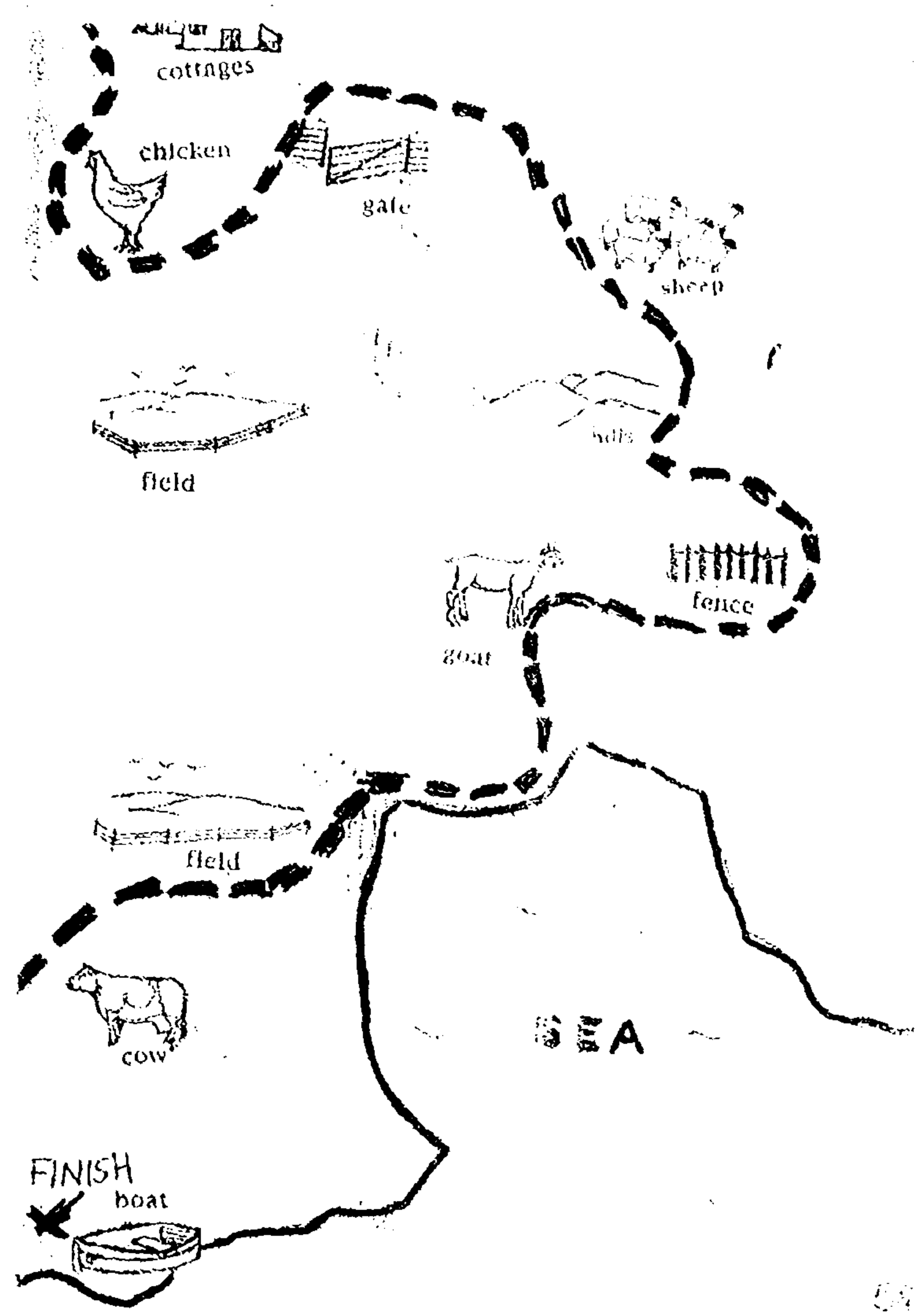
6.4.3 Case study 1: Dialogue 3 (pre-test)

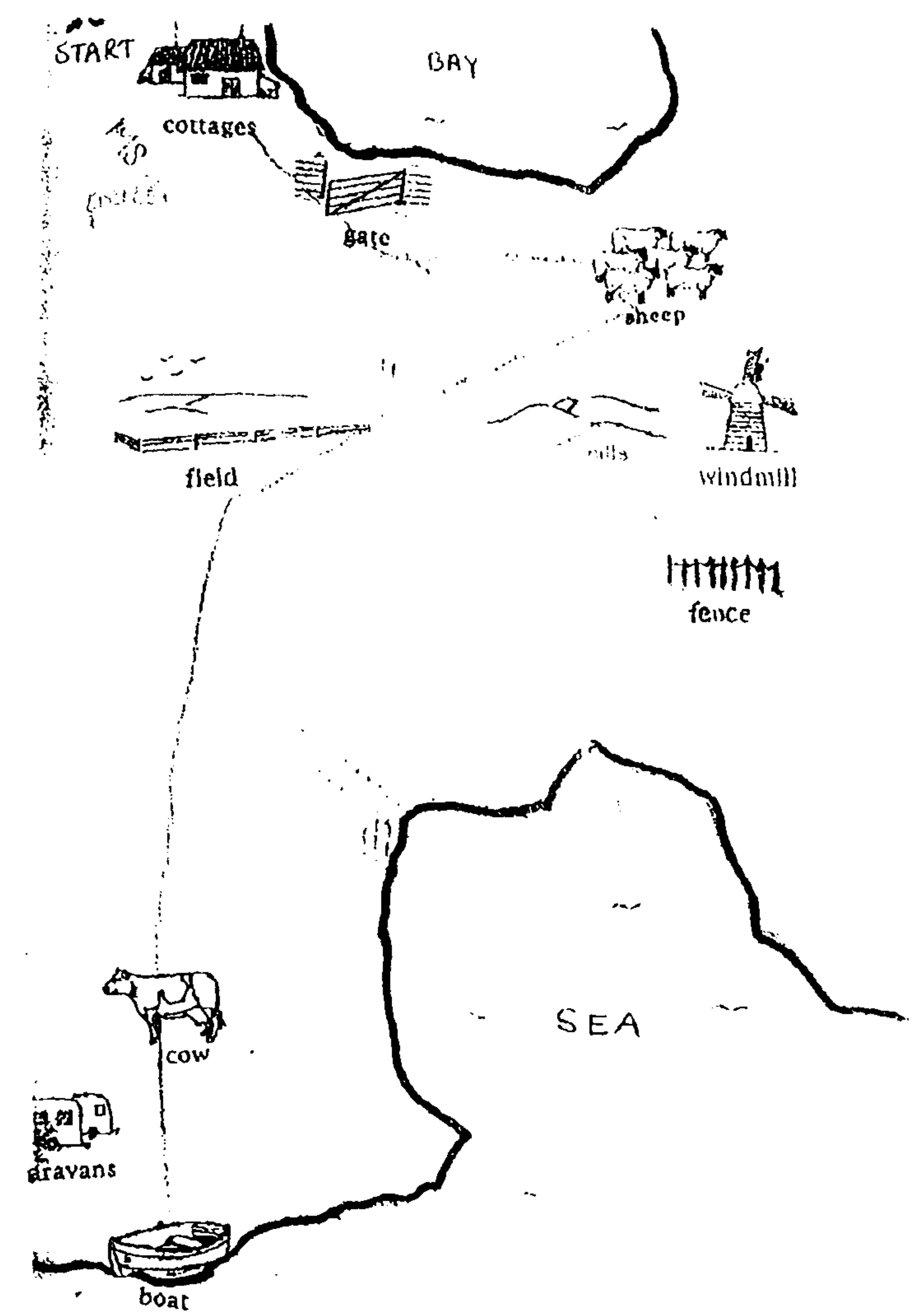
Transcript 6C: Case Study 1: Dialogue 3

Information giver = Fred; Information follower = Sam

1. IG: Start at the cottage.
2. IF: Yeah.
3. IG: Then go down to the chicken.
4. IF: Chicken. Yeah.
5. IG: Then to the gate.
6. IF: Yeah.
7. IG: Then you go up to some sheep.
8. IF: Yep.
9. IG: To some hills.
10. IF: Yep.
11. IG: Then to the fence.
12. IF: Yeah.
13. IG: Then to the goat.
14. IF: D'you mean cows?
15. IG: Goat.
16. IF: How do you, oops, where does it say that?
17. IG: Next to the goat, the goat.
18. IF: I don't think I've got no goat on this.
19. IG: Have you found some fields?
20. IF: A field. Yeah.
21. IG: Then to a cow.
22. IF: Yeah, right, yeah.
23. IG: Then to a boat.
24. IF: Yeah.
25. IG: Boat
26. IF: Hmm?
27. IG: Boat at the finish.
28. IF: Mmm boat. Done it. Now what?
29. IG: Finished?
30. IF: Yeah.

Figure 6E: Case study 1: Dialogue 3: Information giver (Fred) and completed information follower (Sam) maps.





Information giver: Cognitive strategies

Task-focussed: Provision of information. The majority of Fred's instructions as information giver in this dialogue consist solely of feature information. There are just two occasions where directional information is included (lines 3 and 7), although one of these actually provides inaccurate advice about direction (line 7: *go up to the sheep*, should have been *go **down** to the sheep*). All but one instruction is clear and unambiguous with respect to information about which feature to proceed to (line 17, see commentary in next section).Fred provides information about one feature at a time and waits for an acknowledgement from Sam that the previous instruction has been completed before giving the next one. Fred fails to define which of the duplicated features (the field) he is referring to.

Task-focussed: Use of information. The single ambiguous instruction comes after Sam has indicated that he has been asked to go to a feature (a goat) which is missing on his map (line 18). Fred responds to this information by abandoning that instruction (with no explanation) and telling Sam to go to the next feature. However, he does this, not by making a straightforward instructional move, but by asking whether Sam has *found some fields?* (line 19) This appears to be interpreted by Sam as a query about whether he has come across some fields along the route, so he answers *Yeah* (line 20). Of course, this in turn is interpreted by Fred as confirmation that his partner has moved to the next feature, so he gives the next instruction

Communication-focussed. Fred takes appropriate conversational turns. As stated above, the majority of these turns constitute instructions to Sam about where to go next or repetitions of instructions in response to questions from Sam. His question *have you found some fields?* (line 19) would be an appropriate response to Sam's indication that he does not have a goat on his map if it had been followed with some statement about the relationship between the fields that he is referring to and the position of the goat that his partner is querying. This does not happen.

Information giver: Regulatory strategies

Regulating the interaction. Fred gives accurate and unambiguous instructions one after the other. He only strays from this path if his partner indicates that there is a problem. That is, he is *assuming* that his partner is being successful. He makes no attempt to check this is the case.

Regulating own behaviour. There is no explicit indication that Fred is monitoring his own performance and the effect that this is having on Sam. Neither is there evidence of any self-guiding comments.

Information follower: Cognitive strategies

Task-focussed: Provision of information. There are two occasions where Fred instructs Sam to go to a feature which is missing from Sam's map. On one of these occasions, Sam appears to fail to notice the discrepancy and responds by an acknowledgement which indicates completion of that instruction (line 4). The second time a missing feature is referred to, Sam makes several attempts to work out which feature Fred is referring to before finally informing Fred of the difference between the maps (lines 14 to 18). (see also discussion below; 'regulatory strategies').

Task-focussed: Use of information. Sam generally correctly follows Fred's instruction about which features to proceed to when they are present on Sam's map, apart from one occasion when rather than proceeding to the fence as instructed, Sam drew the route to the field. This error, however, is understandable given that on the picture of the field shows it surrounded by a fence. When Fred provides incorrect directional information as part of an instruction which also contains information about which feature to go to, Sam moves to the correct feature.

Communication-focussed. Sam appropriately follows the pattern of conversational turns. His turns generally constitute acknowledgements that Fred's instruction has been carried out and occasionally questions that serve to clarify what Fred means or to ask where to head to next. There are two occasions where Sam explicitly informs Fred that he has completed the instruction and awaits the next (lines 21 and 28).

When Sam does demonstrate an awareness of a problem (lines 14 to 18) he does make an attempt to sort the difficulty out but it is not adequately resolved.

Information follower: Regulatory strategies

Regulating the interaction. Lines 14 to 18 illustrate Sam's response to an IG instruction which talks about a feature which is not present on Sam's map. At his first attempt to clarify what Fred means, he introduces potentially available information by suggesting that Fred might have meant a cow rather than a goat. At the second attempt he tries an alternative strategy by asking where the goat is on the map (unfortunately, as mentioned previously, Fred interprets this question literally, which does not help Sam).

There is no attempt to check the route once it has been completed.

Regulating own behaviour. Sam is generally monitoring his own understanding of the task as it progresses, as indicated by the questions he is asking in response to ambiguous information. There is however, no evidence of any self-guiding comments.

6.4.4 Case study 1: Dialogue 4 (post-test)

Transcript 6D: Case Study 1: Dialogue 4

Information giver = Fred; Information follower = Sam

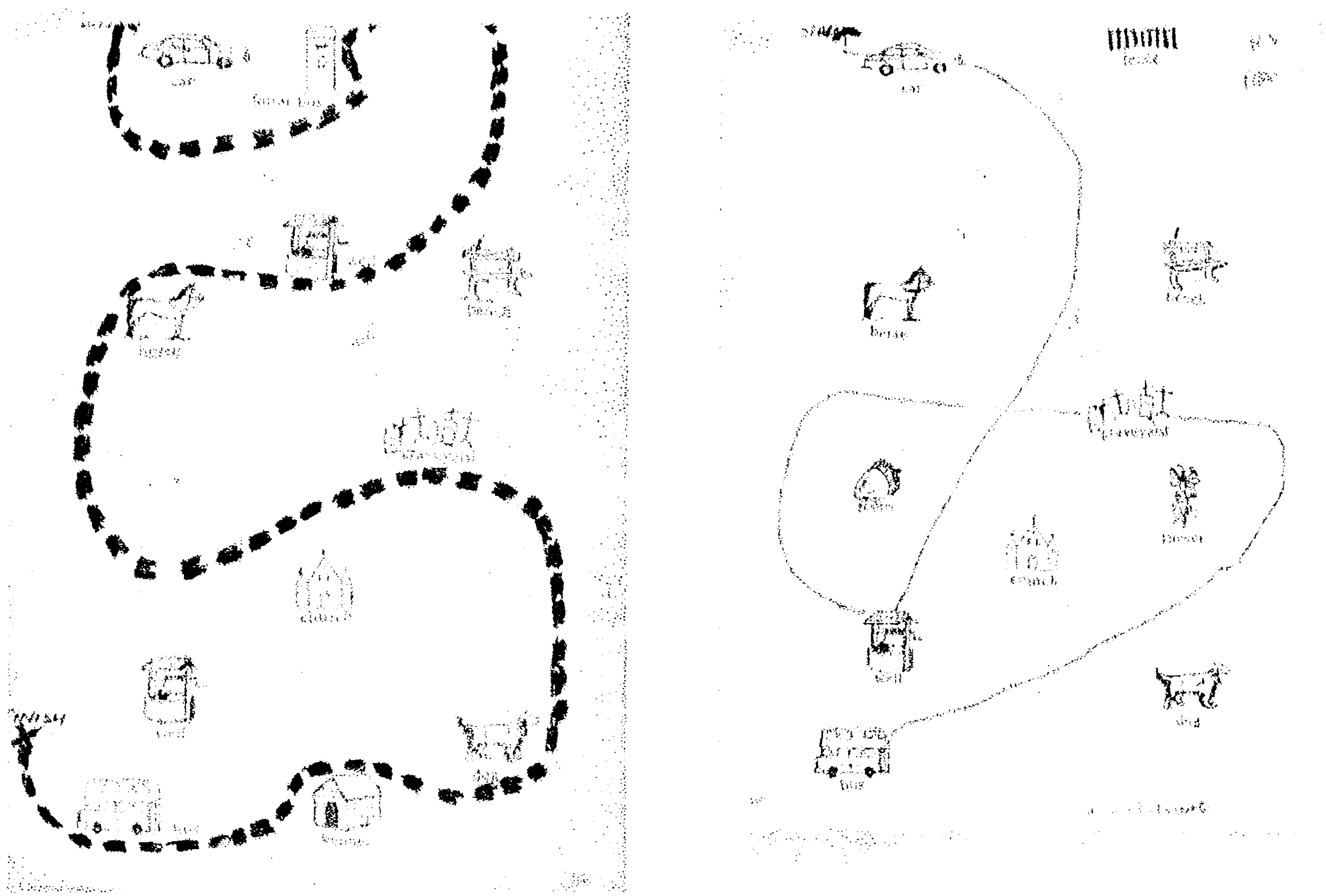
1. IG: Have you got a car at the top of the picture?
2. IF: Mmmhm.
3. IG: On the back of it put the line curving to the right.
4. IF: Yeah.
5. IG: It goes straight up # and there's a letterbox.
6. IF: No. Not on mine. To the gate though.
7. IG: And turn # right. Right again. Draw a big curved path.
8. IF: Where to?

9. IG: A well.
10. IF: Where?
11. IG: A well.
12. IF: Big curved path.
13. IG: And then from the well.
14. IF: Mmm.
15. IG: Draw the line going left.
16. IF: Mmmhm.
17. IG: And curved and then # left again, then turn right to a graveyard.
18. IF: Yeah.
19. IG: Then turn right.
20. IF: Yeah.
21. IG: And there's a small straight path.
22. IF: Eh?
23. IG: There's a small straight path from the graveyard.
24. IF: No.
25. IG: Put a curve right.
26. IF: Yeah. Yeah?
27. IG: Then a small straight.
28. IF: Mmmhm.
29. IG: Then turn left a bit, and draw a curved line to a kennel.
30. IF: Got no kennel.
31. IG: Then turn left, like a half circle.
32. IF: Yeah. Where to?
33. IG: To the bus. And # it's finished, just draw a small curved line.
34. IF: To the bus, innit?
35. IG: Yeah, and then there's a small curved bit.

Information giver: Cognitive strategies

Task-focussed: Provision of information. In this dialogue, Fred attempts to provide Sam with detailed directional information as part of each instruction about which feature to head to next. Although this extra information should help Sam correctly reproduce the route, this is only going to be the case if the directional information is given clearly and unambiguously. In this dialogue,

Figure 6F: Case study 1: Dialogue 4: Information giver (Fred) and completed information follower (Sam) maps.



most mentions of features are accompanied by ambiguous directional information which could be interpreted in several different ways (for example lines 3, 12, 25, 27).

It appears then, that in this case the directional information is actually providing Sam with no more information to reproduce the route successfully than if Fred had just given feature information. Indeed, in the process of providing this directional information, Fred actually misses out reference to two features along the way. Fred attempts to break down his instructions into small chunks for Sam and then waits for confirmation that these chunks have been understood or acted upon (for example, lines 13 to 15 and 19 to 21).He fails to define which of the duplicated wells he is referring to.

Task-focussed: Use of information. There are two occasions where Sam informs Fred that the feature which he has just referred to is not on Sam's map (lines 24 and 30). Following these utterances, Fred appears to ignore their content and moves on to giving information about how to proceed to the next feature.

Communication-focussed. Fred takes conversational turns appropriately. The majority of his utterances are instructions to Sam about what to do next. There are three occasions where Sam queries some directional information that Fred has provided (lines 8, 22 and 32). All of these are appropriately responded to by Fred, usually by him reformulating his instruction slightly or providing additional information (for example, lines 9 and 33). At line 22 when Sam informs Fred twice that he has not understood an instruction, Fred's response to this first is to reformulate the instruction immediately preceding the indication of difficulty (line 23) and when this does not solve the problem, to go back to the beginning of this instruction and start again (from line 25).

Information giver: Regulatory strategies

Regulating the interaction. The dialogue starts with Fred checking that both members of the dyad have the same starting point, *Have you got a car at the top of the picture?* (line 1). Apart from this first utterance there are no explicit attempts by Fred to check his partner's readiness or that Sam has understood the instructions being given. Of course, given the acknowledgements provided by Sam it may be that Fred felt that this was unnecessary. Lines 19 to 28 provide a clear demonstration of Fred regulating the interaction in order to deal with a difficulty highlighted by Sam. Although, you might expect that after this interaction where Sam obviously had difficulty following a set of instructions, Fred might have checked that it had finally been understood.

Regulating own behaviour. As with the pre-test dialogue (dialogue three) there is no explicit indication that Fred is monitoring his own behaviour. Neither is there evidence of self-guiding comments by Fred.

Information follower: Cognitive strategies

Task-focussed: Provision of information. On the two occasions where Fred refers to features which are not on Sam's map, Sam informs Fred that these are missing (lines 6 and 30).

Task-focussed: Use of information. Sam accurately follows Fred's instructions about which features to head to. He also makes good attempts to follow the sometimes ambiguous directional information. For instance, when Fred tells him to *draw a big curved path* (line 7) to the well, he tries to do so.

Communication-focussed. Sam takes conversational turns. He responds to Fred's instructions with acknowledgements that the instruction has been carried out or with queries about what Fred means, but when Fred ignores information about the two missing features, Sam fails to pursue the difficulty which he has noticed. In line 26 Sam indicates that he has completed the first part of the instruction (the first *yeah*) and goes on to indicate to Fred that he is now ready for the next part of the instruction (the second *yeah*).

Information follower: Regulatory strategies

Regulating the interaction. Evidence that Sam is monitoring the progress of the interaction comes from his queries about information provided by Fred. These are characteristically when Fred is giving directional information in 'chunks' and Sam wants to know information about which feature he is supposed to be heading to. This is demonstrated in lines 8 and 32.

There is no final check of the route by Sam at the end of the dialogue.

Regulating own behaviour. There is one occasion which might be considered as evidence of self-guiding by Sam when he mumbles to himself part of Fred's instruction as he draws a section of the route (line 12).

6.4.5 Case study 1: Summary

In dialogue one at pre-test, Fred, the information follower, is particularly poor, responding to each instruction with an acknowledgement regardless of its accuracy or level of ambiguity. His partner, Sam, gives limited instructions which are solely concerned with feature information and does not obviously employ regulatory behaviours. The low score seems likely to be due primarily to the poor information-following strategies of Fred which are not helped by the lack of regulatory strategies by Sam in the IG role.

In dialogue two at post-test, Fred's information-following strategies have noticeably improved; there are more questions and more attempts to give information about the IF map. That is, he is taking more responsibility in the interaction. Sam as IG now gives correct directional information alongside feature information. There is also evidence of regulatory behaviour by Sam. The higher score here seems likely to be due to the *combination* of improved information-following strategies by Fred, an increase in the amount of information provided by Sam and the extent of Sam's helping strategies.

The improvement in the Map Task score for dialogue two (post-test) over dialogue one (pre-test) therefore appears to be due to the change in performance for both children in the dyad. As information follower, Fred began to take more responsibility for the task, asking questions in response to his partner's instruction giving and providing information about his own map. At the same time, in the role of information giver, Sam's instructions became more detailed; offering a range of information for his partner to work with. At post-test, Sam also seemed much more aware of the needs of his partner and used several helping strategies.

In dialogue three at pre-test, Fred gives clear information about features but there is no evidence of regulatory behaviour. His partner asks questions in response to what he considers to be ambiguous information. The final Map Task score seems likely to be due to the *combination* of reasonable instruction giving by Fred and questioning behaviour by Sam. Of course one reason why the children's strategies were more effective in this dialogue than they were in the other pre-test dialogue (dialogue two) may be that they had already had one attempt at the task and learnt something from that attempt.

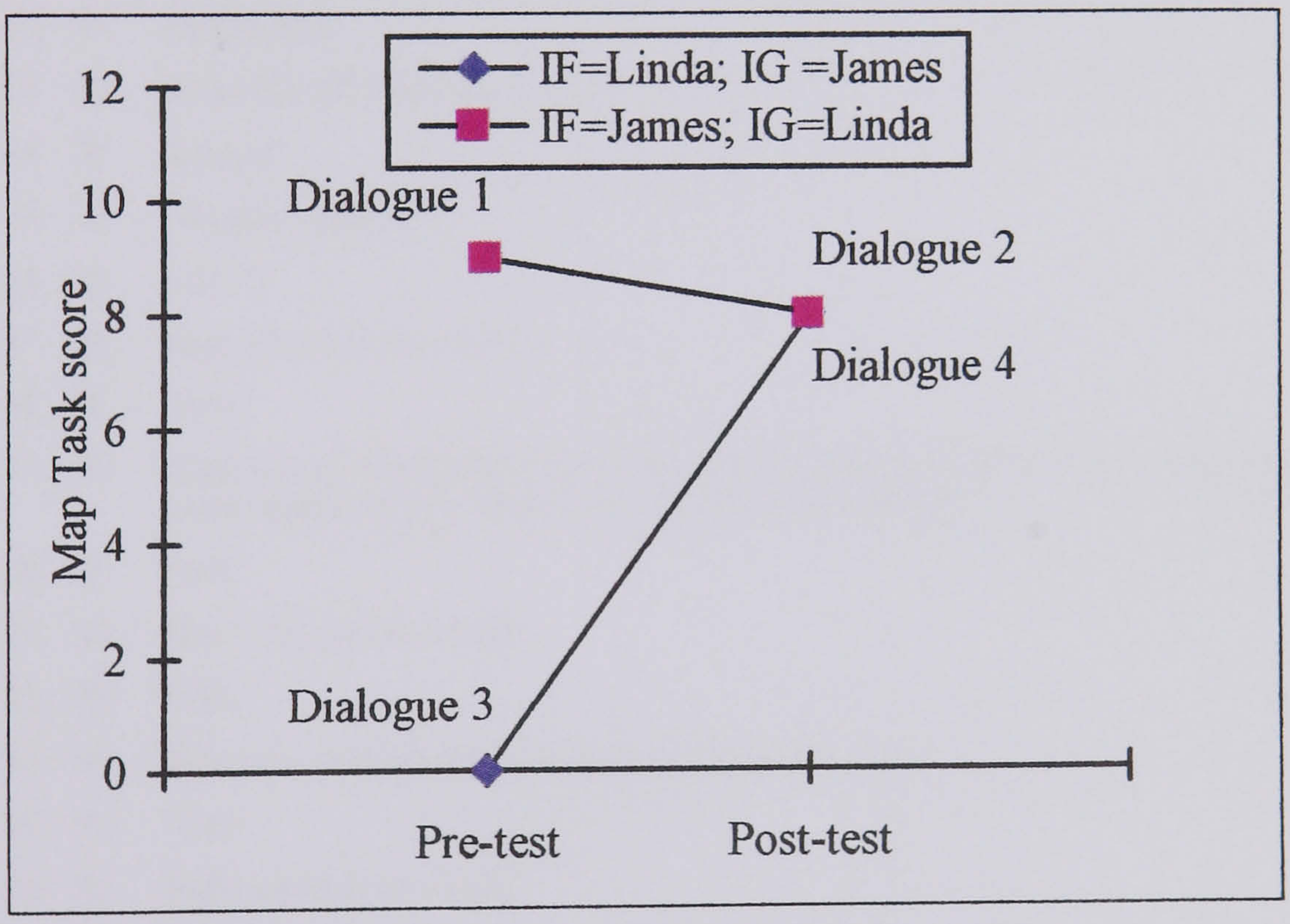
In dialogue four at post-test, Fred as IG now gives more directional information, but because a lot of this is ambiguous, having this information does not necessarily help his partner reproduce the route. Sam asks questions and provides information about own his map. In comparison with dialogue three at pre-test, both children seem more likely to pursue difficulties that they become aware of and Fred as IG reformulates as well as repeats instructions or parts of instructions after queries from Sam. So, although in this dialogue, there is more discussion here than in dialogue three, Fred's errors in his instruction giving will have affected the final Map Task score and therefore may explain the similarity in level of score with that of dialogue three.

6.5 Case Study 2

Table 6B: Case study 2 details

	Time	Information giver	Information follower	Order in which Map Tasks were completed
Dialogue 1	Pre-test	Linda	James	First
Dialogue 2	Post-test	Linda	James	Second
Dialogue 3	Pre-test	James	Linda	Second
Dialogue 4	Post-test	James	Linda	First

Figure 6G: Case study 2 Map Task scores



6.5.1 Case study 2: Dialogue 1 (pre-test)

Transcript 6E: Case study 2: Dialogue 1

Information giver = Linda; Information follower = James

1. IG: Right, there's an 'ouse, right, and you have to like go up, turn.
2. IF: Hang on, yeah, turn.
3. IG: And there's like a cat there can you see it?
4. IF: Where? No.
5. IG: Right, well anyway. There's a cat right and you have to keep going round this corner. Then go up again.
6. IF: Oh my God.
7. IG: Round the corner.
8. IF: Oh my God. Which way?
9. IG: Down.
10. IF: Thank you. I'm going down.
11. IG: Stop. Right and there's like urm, go up another it's like a big hill if you get what I mean.
12. IF: Alright then.
13. IG: Go up this hill, round the corner.
14. IF: Hang on!
15. IG: You got to keep up!
16. IF: I can't.
17. IG: Stop. Can you see a swan?
18. IF: Yeah.
19. IG: Right you go round that corner, come down, keep going down, stop. Then you go like round another corner. Have you gone round the corner yet?
20. IF: Yeah.
21. IG: Stop. Can you see a wall?
22. IF: Yeah.
23. IG: Right now go down there that road, whatever you call it.
24. IF: Yeah.
25. IG: Right, can you see a snail?
26. IF: Yeah.
27. IG: Right carry on going.
28. IF: What down?
29. IG: Yeah.
30. IF: Yes.
31. IG: Then, like, like there's another corner to go round.

32. IF: Hey?

33. IG: Just go round the corner.

34. IF: Alright then.

35. IG: Stop. Right you gone round the corner yet?

36. IF: Yeah.

37. IG: Right stop. Can you see a flower?

38. IF: Yeah.

39. IG: Right, right, just move about three inches <not far> [>].

40. IF: <Done it.> [<]

41. IG: Done that?

42. IF: Yeah.

43. IG: Right, now, can you see a fence?

44. IF: Yeah, just there.

45. IG: Right, now go down.

46. IF: Yeah.

47. IG: Right now you have to go round another corner.

48. IF: oooh.

49. IG: Have you done that?

50. IF: Yeah.

51. IG: Right. There's like a thing in't there that's like tied to two trees.

52. IF: Yeah.

53. IG: Right, go down, round that corner, right there's like a ....stop. Can you see a kennel? A kennel? A dog's kennel?

54. IF: No.

55. IG: Right.

56. IF: Hey?

57. IG: Keep going down.

58. IF: Yeah.

59. IG: Can you see a car?

60. IF: Yeah.

61. IG: Now what? Have we finished? (to adult)

62. Adult: Have you got to where it says finish?

63. IF: Where's finish?

64. IG: Well if you follow the path what I've just told you +/

65. IF: You just told me to go to the car.

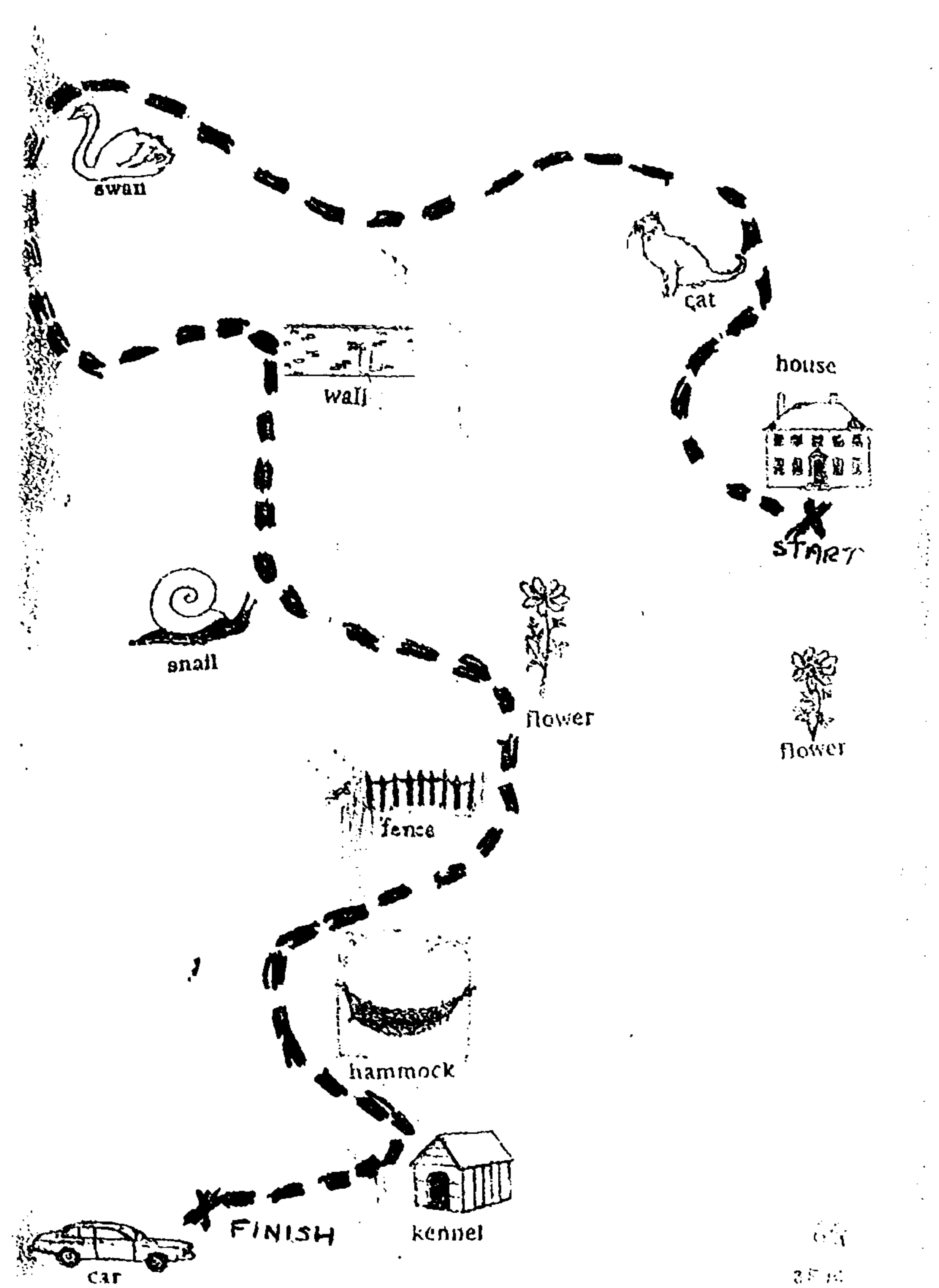
66. IG: Yeah.

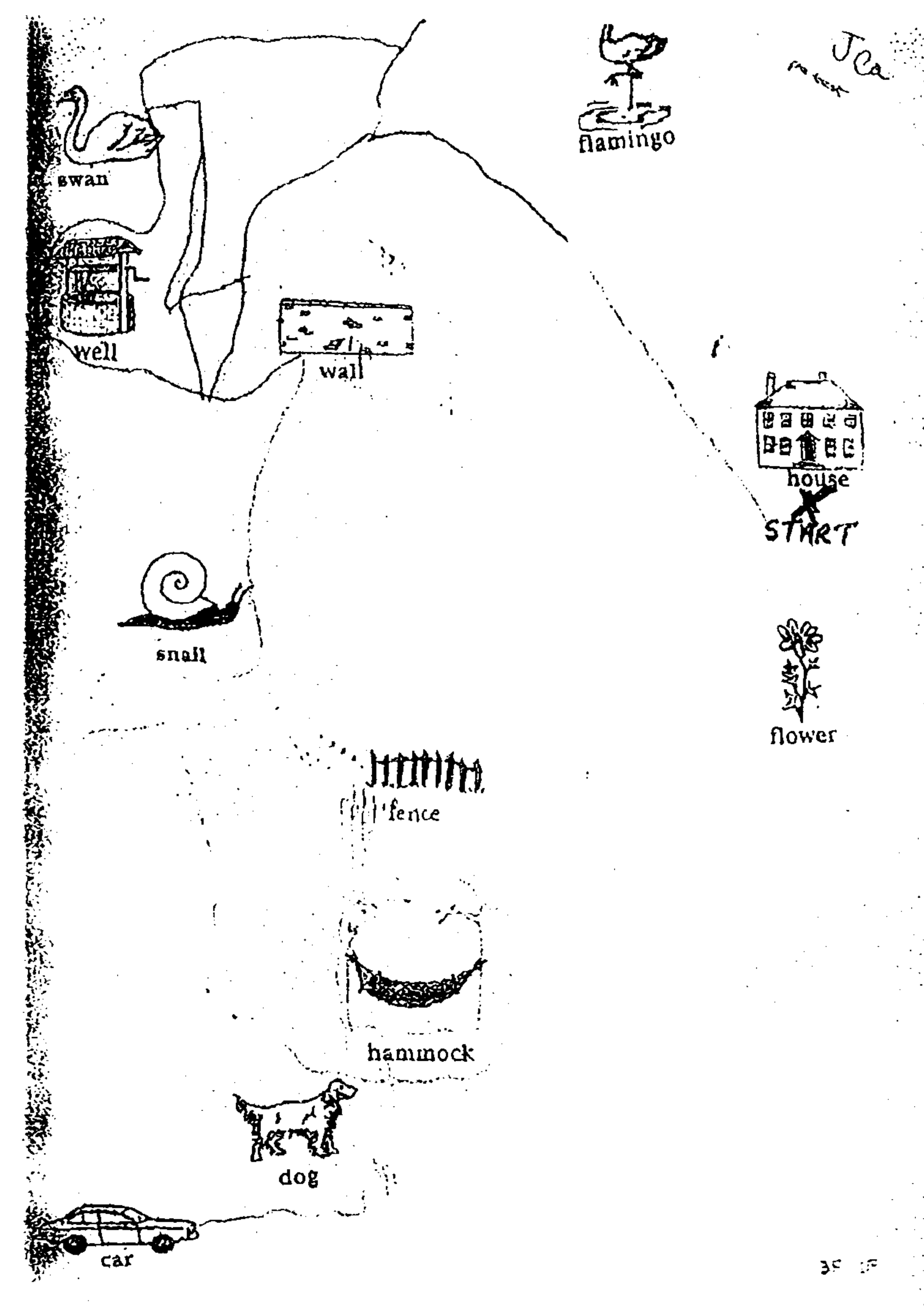
67. IF: So that's what I've done.

68. IG: And it says finish.

69. IF: It don't here.

Figure 6G: Case study 2: Dialogue 1: Information giver (Linda) and completed information follower (James) maps.





Information giver: Cognitive strategies

Task-focussed: Provision of information. After describing how the route passes the first two features, Linda uses a strategy of providing directional information in the form of instructional utterances and feature information in the form of questions. She first describes what the section of route looks like and then asks whether James can now see a particular feature. This strategy is illustrated in, for example, lines 13 to 17; lines 35 to 37 and lines 39 to 43 and is used for more than half the instructions. For most of the remaining instructions directional information alone is provided and is ambiguous in the majority of cases, for example *Round the corner* (line 7); *Right carry on going* (line 27); *Then like there's another corner you have to go round* (line 31). No prepositional information is provided. All features present on Linda's route are mentioned, are labelled appropriately and are described in the correct order.

A less effective strategy also used by Linda is her tendency to give an instruction, pause, and then say *Stop* (lines 11, 17, 21, 35, 37) assuming she can tell how much of the route has been drawn by James. Here she seems to be making a judgement about the length of time it takes to draw a section of the route.

Three out of the first four instructions provided by Linda are given in chunks of at least two pieces of directional information at a time. Each of these instructions would have been longer, had James not interrupted. After this, Linda either gives one piece of information at a time, or stops to check James has been following (as in line19).

Linda does not make an explicit attempt to disambiguate the flower which is duplicated on her map. However, the mention of this feature is preceded by a detailed attempt to provide directional information about how to get there from the previous feature (lines 27 to 37).

Task-focussed: Use of information. There are three mentions of features present on Linda's map but absent from the IF map. On each of these occasions the dyad establishes the fact that the maps are different in this respect, but Linda fails to provide an alternative description for that part of the route. The first of these incidents happens at lines 3 to 5. Here Linda acknowledges that the maps are different and yet makes no explicit attempt to provide information about the exact position of the cat nor offer alternative information about the route to overcome the problem.

The second reference to a missing feature on the IF map comes towards the end of the dialogue when Linda asks whether her partner can see a kennel (line 53). In this instance, Linda reformulates her description of the feature (*a kennel* becomes *a dog's kennel*). However, when James informs Linda that he cannot find the feature, once again, rather than attempting to describe where it is or providing alternative information about where the route goes, Linda acknowledges the difference and then moves on to describe the next section of the route.

The final reference to a feature present on Linda's map but absent from James' map comes at the end of the dialogue where Linda is attempting to get James to draw the route to the finish (from line 64). Once Linda is told by James that there is no finish marked on his map, she abandons the instruction.

Communication-focussed. Linda takes conversational turns appropriately through the dialogue. She makes use of a range of utterance functions when explaining the route to James. As discussed above, when James indicates that he has not been able to follow an instruction, Linda acknowledges the problems raised although does not provide alternative explanations (for example lines 5 and 55).

Regulatory strategies

Regulating the interaction. The manner in which Linda provides feature information (as described above) may be interpreted as regulatory. First she gives directional information and then checks that James has arrived at the correct feature by asking a question.

Regulating own behaviour. A characteristic of Linda's utterances is her tendency to start instructions with *Right.* This is often interpreted as an indication, either to oneself or to one's partner, of your intention to give a new instruction (for example Doherty-Sneddon, 1996). However, in this situation they may be idiosyncratic of Linda's information-giving.

Information follower: Cognitive strategies

Task-focussed: Provision of information. When the features missing from the IF map are mentioned, James informs Linda of the discrepancy, as demonstrated in line 4 and line 56.

Task-focussed: Use of information. James correctly follows Linda's instructions about which features to proceed to and makes an attempt to follow the ambiguous directional information provided by Linda (see below; 'regulatory strategies').

Communication-focussed. Generally James follows an appropriate turn-taking pattern, interrupting Linda occasionally. James asks many questions to clarify difficulties and provides responses to all Linda's utterances. These include replies to questions, acknowledgements that the last instruction has been carried out and interruptions requesting Linda to slow down. After having informed Linda of differences between the two maps, however, James does not go on to attempt to resolve the discrepancies after Linda has told him to proceed to the next feature.

Information follower: Regulatory strategies

Regulating the interaction. Three out of the six questions posed by James which function as attempts to indicate an ambiguous instruction from Linda or a miscomprehension or difficulty with the task, specifically ask for more information and indicate the type of information required: *oh my God which way?* (line 8); *what down?* (line 30); *where's finish?* (line 65).

Also, there are two occasions where James explicitly tells Linda to slow down (lines 2 and 14). James fails to check the route taken once it has been completed.

Regulating own behaviour. When Linda provides ambiguous instructions which contain only directional information, James commonly fails to indicate this, responding to the instruction with an acknowledgement rather than a request for further information. It seems that James believes he is able to follow these instructions correctly. These occasions are shown in the following excerpts:

Excerpt 6.1:

Line 1.	IG:	Right there's an 'ouse right and you have to like go up, turn.
Line 2.	IF:	Hang on, yeah turn.

Excerpt 6.2:

Line 11.	IG:	Stop. Right there's like urm, go up another it's like a big hill if you get what I mean.
Line 12.	IF:	Alright then.

Excerpt 6.3:

Line 19.	IG:	Right you go round that corner, come down keep going down, stop then you go like round another corner. Have you gone round the corner yet?
Line 20.	IF:	Yeah.

Excerpt 6.4:

Line 23. IG: Right now go down there that road whatever you call it.

Line 24. IF: Yeah.

Excerpt 6.5:

Line 31. IG: Then like like there's another corner you have to go round.

Line 32. IF: Hey?

Line 33. IG: Just go round the corner.

Line 34. IF: Alright then.

Excerpt 6.6:

Line 39. IG: Right, right just move about three inches <not far> [>].

Line 40. IF: <Done it> [<].

Excerpt 6.7:

Line 45. IG: Right, now go down.

Line 46. IF: Yeah.

Line 47. IG: Right, now you have to go round another corner.

Line 48. IF: Ooh. *(as he draws)*

In excerpt 6.5, James does indicate that he has not understood (*hey?*) but when given an equally ambiguous response, he fails to pursue the problem.

A particular feature of this dialogue is James's explicit reference to his own understanding and his own progression, shown in the lines 2 and 10. Here

James is commenting to himself on his progress as he repeats part of Linda's previous utterances; *yeah turn* and *I'm going down.*

6.5.2 Case study 2: Dialogue 2 (post-test)

Transcript 6F: Case study 2: Dialogue 2

Information giver = Linda; Information follower = James

1. IG: You see some mountains, right.
2. IF: Yeah.
3. IG: You go across there.
4. IF: Yeah.
5. IG: And round some'at and you see a pine tree don't you?
6. IF: No. I haven't got one.
7. IG: Well go up there a bit, go round a little bit 'till you see a tent don't you?
8. IF: Yeah.
9. IG: Well go past the tent and up a bit. Then round and then up a bit and round.
10. IF: Then round.
11. IG: Stop. You see a igloo don't you?
12. IF: Yeah.
13. IG: Well come round that bend.
14. IF: Just like I have done.
15. IG: You see an eskimo. So you go up and over.
16. IF: What?.
17. IG: Up and round.
18. IF: I've gone.
19. IG: Oh right.
20. IF: Right, wait. Wow wo wo. So, I've gone across the mountains and I didn't have a tree so I went past the tent.
21. IG: Yeah.
22. IF: You said go up.
23. IG: Yeah.
24. IF: Stop.
25. IG: Yeah.
26. IF: Then go down. Stop. Then up and round and stop.
27. IG: Excuse me. You know them stops you didn't leave a gap did you?
28. IF: No.
29. IG: That's alright then. Right so. Right you've gone past the Eskimo haven't you.

30. IF: Yeah.

31. IG: Come round and down then you see a dog don't you?

32. IF: Yeah.

33. IG: Right go round that bend.

34. IF: Yeah.

35. IG: Come down a bit. Then go round the other bend.

36. IF: Yeah.

37. IG: Go up.

38. IF: Eh?

39. IG: Just carry on following that line and go up. Right you come round the bend yet?

40. IF: Yeah.

41. IG: Can you see an axe?

42. IF: Yeah.

43. IG: Right come down there.

44. IF: Yeah.

45. IG: Over a bend.

46. IF: Yeah.

47. IG: Up a bit and stop. See some hills?

48. IF: Wait there. Yeah.

49. IG: Right, well come round that bend and go straight down and there's the finish. You see a axe or whatever it's called. An anchor.

50. IF: Done.

51. IG: Right.

52. IG: Come on.

53. IF: Right shut up. You said go across to some hills, past some hills, didn't you?

54. IG: Mountains yeah.

55. IF: Well mountains then. Didn't you?

56. IG: Right.

57. IF: Now I didn't have a tree so I went straight up to the tent. Right? Then I crossed. Now I went up then down. Then round past the igloo. I went round the dog right?

58. IG: Yeah.

59. IF: Went round the aeroplane, well helicopter. Now I went to the axe.

60. IG: Helicopter?

61. IF: Now I went down to the hills. Then I turned and went to that funny thing.

62. IG: Yeah, I know what you mean, excuse me I haven't got the helicopter.

63. IF: What, I don't get that. How come I've got one and you haven't?

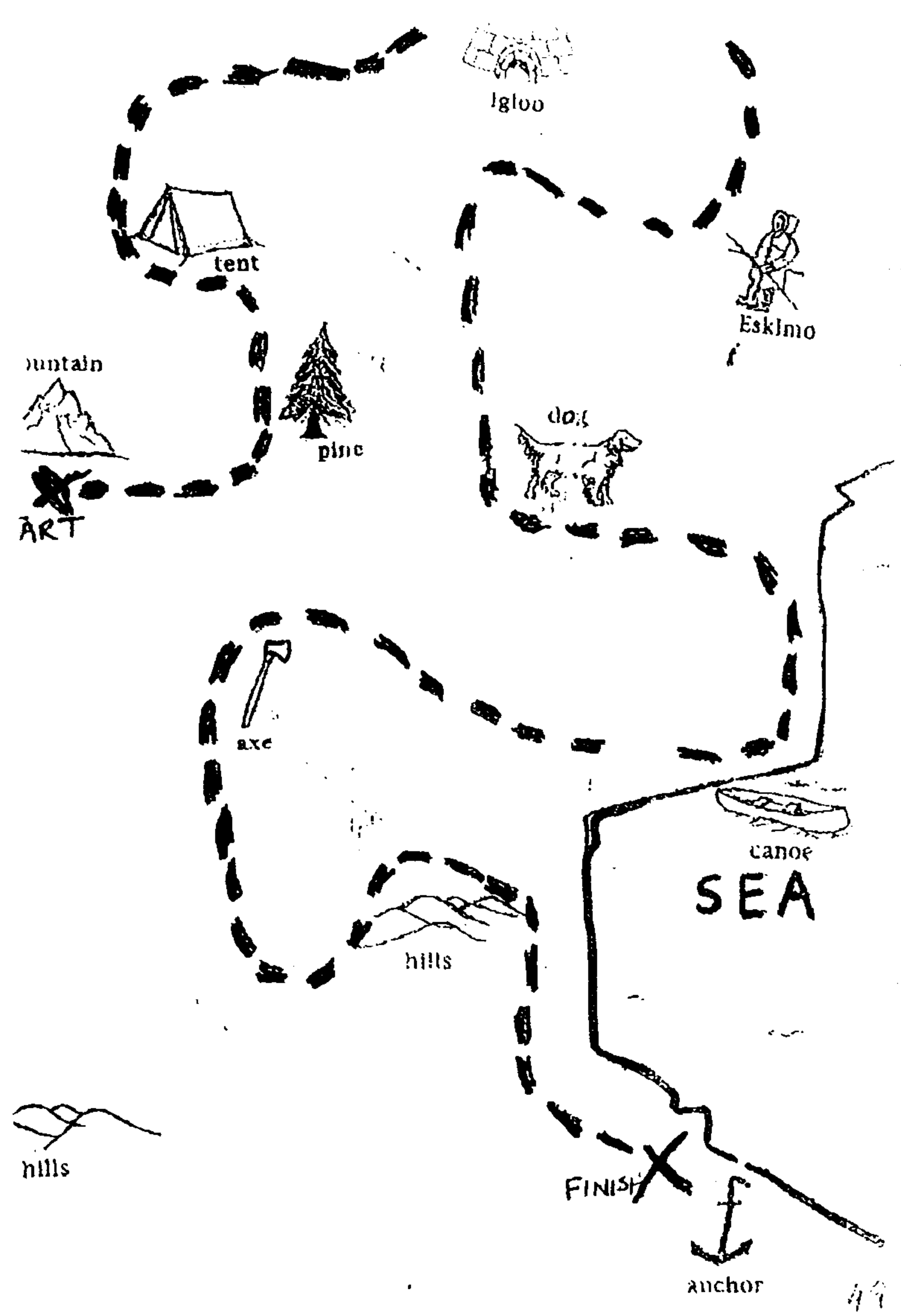
64. IG: I don't know, you must have put it there.

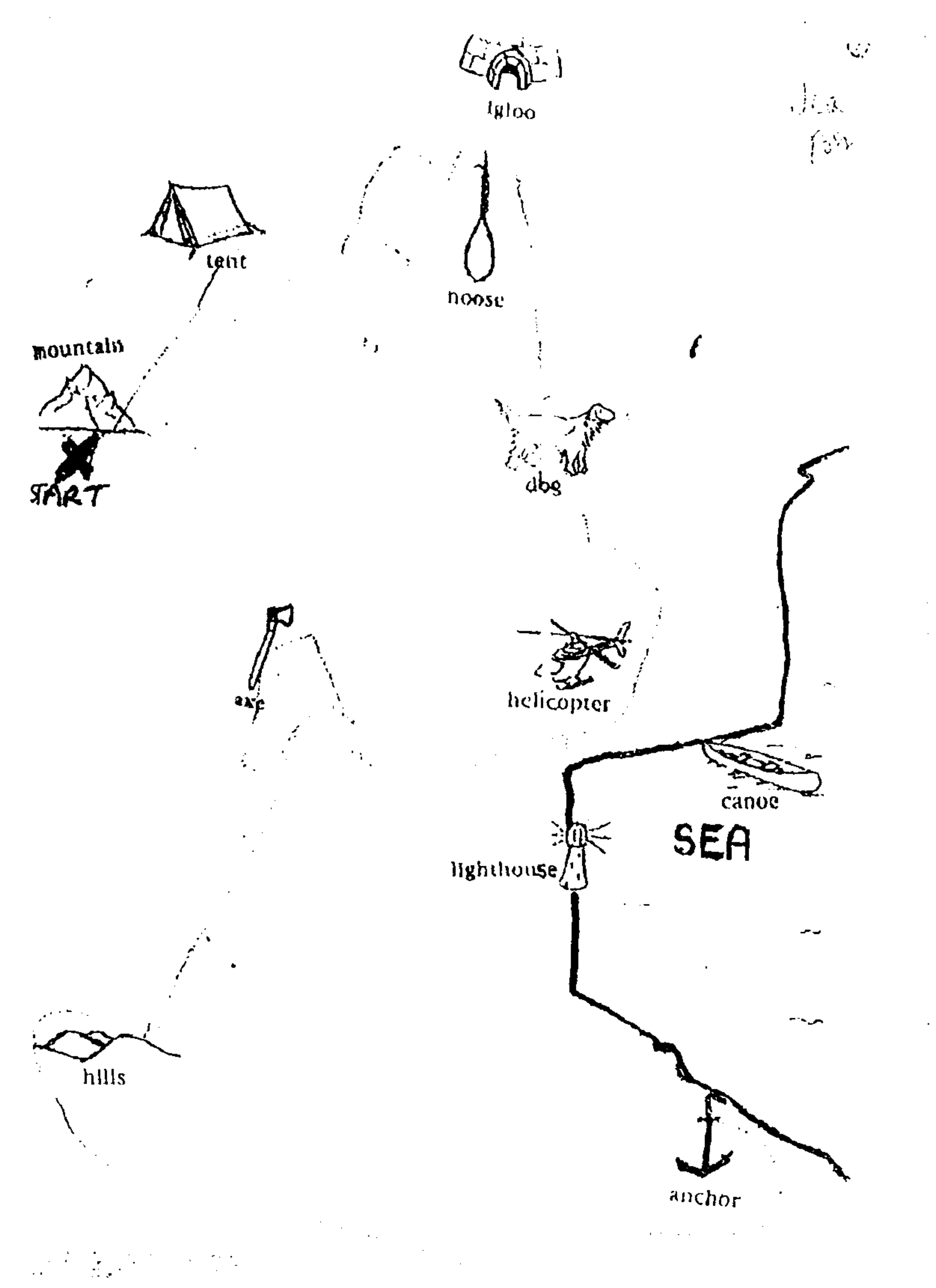
65. IF: No. That isn't fair man.

66. IG: Alright then. Don't matter. Fold your sheet up.

67. IF: Yeah.

Figure 6H: Case study 2: Dialogue 2: Information giver (Linda) and completed information follower (James) maps.





Information giver: Cognitive strategies

Task-focussed: Provision of information. Linda provides accurate information with respect to the labeling of features and the order in which they appear on the route. Two features are missed from her description. As in the pre-test dialogue (dialogue one), she continues to provide directional information in the form of instructions and feature information in the form of questions which function as checking devices, for example, *And round some 'at, and you see a pine tree don't you?* (line 5) and *Well go up there a bit go round a little bit till you see a tent don't you?* (line 7). Nine of the instructions combine directional and feature information in this way. Five instructions contain only directional information (lines 33, 35, 37, 43 and 45). All but one of these are ambiguous. On one occasion she provides prepositional information: *You see an Eskimo so you go up and over* (line 15).

Linda generally provides no more than two chunks of information in any one instruction and waits until she has some sort of acknowledgement from James that the instruction has been acted upon before proceeding to the next one.

As in dialogue one, the duplicated feature on Linda's map (the hills) is not explicitly disambiguated but Linda does provide directional information leading to this feature (lines 43 to 47). There are also several occasions where Linda tells James to *Stop* as if she knows how far or how fast James is drawing the route (lines 11, 24, 26 and 47).

Task-focussed: Use of information. When Linda mentions the first feature missing from James map (the pine tree; line 5), James responds by telling Linda that he does not have one on his map. In response to this information Linda makes some attempt to provide alternative information about the route (line 7). In this example, although Linda does seem to appreciate the need to provide some alternative instruction about how to get from the previous feature to the tent, her instruction still fails to take into account James's point of view, *Well go up there*. Later, when the same feature is mentioned by James, Linda misses two opportunities to attempt to improve this same section of the route (see lines 20 to 21 and lines 57 to 58).

At the mention of the second feature missing from James map (the Eskimo; line 15), James does not explicitly inform Linda that it is missing but does ask *What?* indicating some difficulty. This is responded to by Linda by reformulating the original instruction: *up and round* (line 17): Here Linda seems to have interpreted the *What?* as a request for the instruction to be repeated rather than an indication that James might have noticed a difference between the maps.

Another example where Linda has an opportunity to make use of information provided by James is illustrated in lines 11 to 15. Here Linda is providing a description of the next part of the route which has so far not been mentioned. James's response *Just like I have done* indicates that he has interpreted this as an instruction to do something he has already done. Linda appears to fail to recognise the implications of this for accurate route drawing.

The final utterances of the dialogue constitute James repeating the whole route back to Linda. Here Linda again misses several opportunities which indicate that the map that James has drawn may be incorrect. An example of this is shown in line 57: *Now I didn't have a tree so I went straight up to the tent. Right? Then I crossed. Now I went up then down. Then round past the igloo. I went round the dog right?* In this excerpt, Linda first ignores the opportunity to describe the direction of the route as it approaches the tent, even though she has been informed that the tree was missing from James map. Second, the description of the route by James *I went up then down* is inaccurate and is not picked up on by Linda. Third, on Linda's map, there is an additional feature between the igloo and the dog. Linda fails to determine whether the route has been drawn accurately despite this feature being absent from the IF map.

Communication-focussed. Linda follows the pattern of turn-taking throughout the dialogue. She uses a range of utterance functions; instructions and questions to provide James with information about where the route goes and replies to questions from her partner. In response to indications that James has not understood what Linda intended him to do, she generally acknowledges these and makes some attempt to clarify the problems (see above).

Regulatory strategies

Regulation of interaction. As in dialogue one, the manner in which Linda provides feature information can be described as regulatory. There are nine occasions where Linda asks a question which both checks that her partner is at the same point and provides information about the next feature, for example, *And round some 'at and you see a pine tree don't you?*; (line 5) *Well go up there a bit, go round a little bit till you see a tent don't you?* (line 7). Linda also checks that her partner has drawn sections of the route correctly in the following utterances; *Excuse me you know them stops you did leave a gap did you?* (line 27) and *...right so right you've gone past the Eskimo haven't you?* (line 29).

Regulation of own behaviour. There is one obvious occurrence of an indication in Linda's utterance of her intention to give a new instruction, *That's alright then. Right so. Right you've gone past the Eskimo haven't you?* (line 29). In this utterance Linda is establishing that she has correctly understood the current position of James. The *right so* can be interpreted as evidence of her focussing either her own or her partner's attention before providing the next instruction.

There are no explicit examples of utterances serving a self-guiding function for Linda.

Information follower: Cognitive strategies

Task-focussed: Provision of information. In response to mentions of features which are missing on James' map, in the first incident, James informs Linda that the feature being described is absent from his map, but he fails to pursue this when Linda continues with her instruction (for example at lines 6 to 8).

At the mention of a second feature absent from James map (the Eskimo), James has two opportunities to inform Linda of the difference between the maps. At the first there is some indication of confusion when he says *What?* (line 16) although this is not developed. At the second opportunity, just a few utterances later, James makes no attempt to inform Linda about the difference between the two maps even though Linda has been quite explicit about asking whether James has followed correctly:

Excerpt 6.8:

> Line 29. IG: That's alright then. Right so, right you've gone past the Eskimo haven't you?
>
> Line 30: IF: Yeah.

Although on examination of the completed IF map, it seems that James may have misinterpreted this instruction and thought Linda was referring to the noose.

As in the pre-test dialogue (dialogue one), the ambiguous instructions from Linda containing only directional information are responded to by acknowledgements and attempts to draw the relevant sections of the route.

Task-focussed: Use of information. James manages to follow some of the instructions containing just directional information reasonably well. When faced with the ambiguous instructions such as *come round that bend* (line 13) he appears to take into account the nearest feature to which the route may be heading. In this way, James' route manages to stay relatively close to Linda's route. A useful strategy for James to use in the dialogue would be to take more responsibility for checking whether the feature he thought the route was heading to was the correct one. He only comes near to doing this at the end when he describes his route back to Linda (see below; 'regulatory strategies').

Communication-focussed. On several occasions James interrupts Linda in order to check something, or to give himself time to complete an instruction. However, generally the conversational rules of turn-taking are followed. James uses a wide range of utterance functions in order to establish what Linda wants him to do although as discussed below, breakdowns in understanding are not always resolved.

Information follower: Regulatory strategies

Regulating the interaction. James acknowledges that he has completed each instruction which he has understood and indicates where he has not understood. However, these attempts are not always explicit enough (for example, *ey?* (line 38) and *what?* (line 16) to prompt further appropriate information from Linda, and the problems do not get resolved.

At approximately a third of the way through the dialogue, James stops Linda and checks his route so far by saying *Right wait. Wow wo wo. So I've gone across the mountains and I didn't have a tree so I went past the tent* (line 20). This is an example of regulatory behaviour from James as he requests a break from the instructions whilst he checks his understanding. It is also evidence that James is making his own interpretations about the route in the light of inadequate information from Linda. Later in the dialogue there is another request from James for Linda to halt the information-giving while he completes the previous instruction; *Wait there, yeah* (line 48).

At the end of the dialogue, James checks the accuracy of the route he has drawn by describing his route back to Linda. He breaks this checking into chunks of information and explicitly checks each one (for example lines 53 and 57). On one occasion, James gets so involved in this checking strategy that he does not appear to notice Linda querying his mention of a helicopter which is missing from Linda's map (line 60).

Regulating own behaviour. Evidence of James monitoring his own understanding has been referred to above. There are no explicit examples of utterances serving a self-guiding function for James.

6.5.3 Case study 2: Dialogue 3 (pre-test)

Transcript 6G: Case study 2: Dialogue 3

Information giver = James; Information follower = Linda

1. IG: Right go # there's start.
2. IF: Yeah.
3. IG: Go down past the car.
4. IF: What d'you mean? Whats +/?
5. IG: There's a car in't there?
6. IF: Yeah.
7. IG: At the start.
8. IF: Yeah.
9. IG: Go past that.

10. IF: Where to?

11. IG: To the letterbox.

12. IF: I an't got one of those, ooh, carry on anyway.

13. IG: Alright? Go round the corner.

14. IF: What to?

15. IG: To the well.

16. IF: How' m I s'posed to get down there?

17. IG: I mean to the bench.

18. IF: Oh right, where it says fence?

19. IG: Bench.

20. IF: Alright then.

21. IG: Have you done it?

22. IF: Yeah, but you missed some # yeah.

23. IG: What?

24. IF: Yeah.

25. IG: Go past the bench to the well

26. IF: How 'm I s'posed to get round there?

[IG asks adult for help]

27. IG: Come on.

28. IF: I can't though, can I, 'cos I'm like missing things out.

29. IG: No.

30. IF: I am.

31. IG: You should have the same map as me.

32. IF: Humph! Go on.

33. IG: Right go past the well.

34. IF: Yeah.

35. IG: Go to the horse.

36. IF: You're missing things out, you are James.

37. IG: No I'm not.

38. IF: Go on.

39. IG: I'm not missing nowt out. Go round the corner.

40. IF: Right, gone round the corner.

41. IG: Go up.

42. IF: Yeah.

43. IG: Go to the graveyard.

44. IF: I thought I'd already been there. Go on.

45. IG: Then go round another corner. Go to the dog. You done it?

46. IF: Yeah.

47. IG: Go to the dog kennel. You done it? You done it? Oh my God.

48. IF: There in't one here, I haven't got one.

49. IG: Go down to the bus.

50. IF: Oh I can see it. Where from, the dog?

51. IG: From the dog kennel.

52. IF: I an't got one of those dog kennels.

53. IG: Well just go from the kennel.

54. IF: Alright then.

55. IG: Go round the corner.

56. IF: Hold on, yeah.

57. IG: Have you got a finish?

58. IF: You've missed four things out.

59. IG: No I haven't. No I have not.

60. IF: You have.

61. IG: I an't missed nowt out.

62. IF: You've missed a flower.

63. IG: I aven't got a flower for one start.

64. IF: You've missed a church.

65. IG: Oh yeah, I forgot about that.

66. IF: An acorn.

67. IG: A what?

68. IF: Acorn.

69. IG: I ain't got that.

70. IF: And you missed a fence.

71. IG: I ain't got that.

72. IF: Oh. Where d'you want to go to the church?

73. IG: Right. Go from the horse.

74. IF: Yeah.

75. IG: Round the corner +/

76. IF: Oops hang on my pencils broken. What?

77. IG: Go to the horse, round the corner.

78. IF: What?

79. IG: And there's a church, int there?

80. IF: Yeah I'm there.

81. IG: You there?

82. IF: Yeah.

83. IG: Then go round again, round a corner.

84. IF: Weeeeee.

85. IG: Go to the dog, you done it?

86. IF: Been there.

87. IG: Go to the dog kennel.

88. IF: I an't got a dog kennel.

89. IG: Go to the bus.

90. IF: Weee. I've been there twice now.

91. IG: And go to the finish. Ave you done it?

92. IF: I aint got a finish down here.

93. IG: Oh Christ. Well I'm finished.

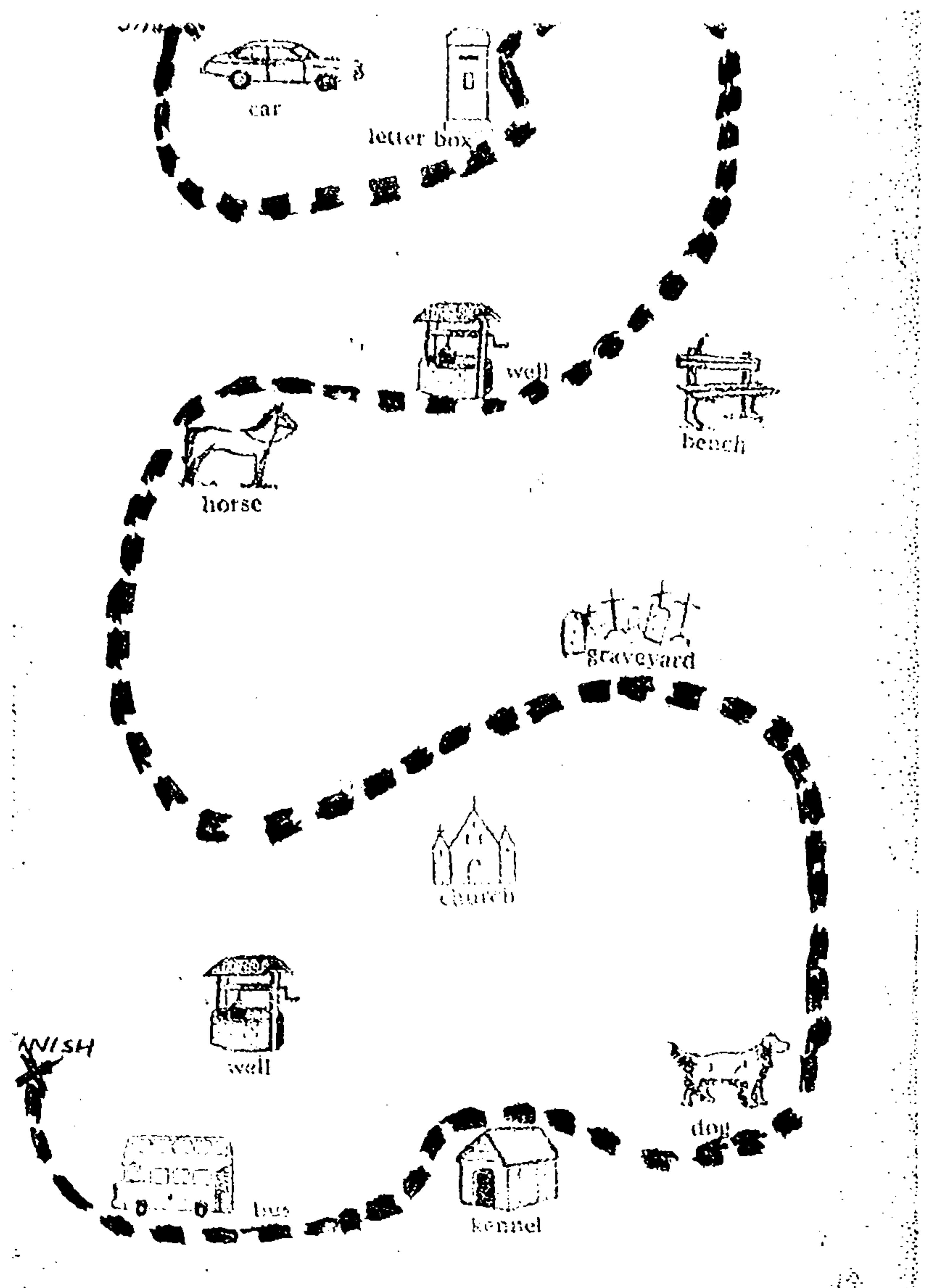
94. IF: Alright then.

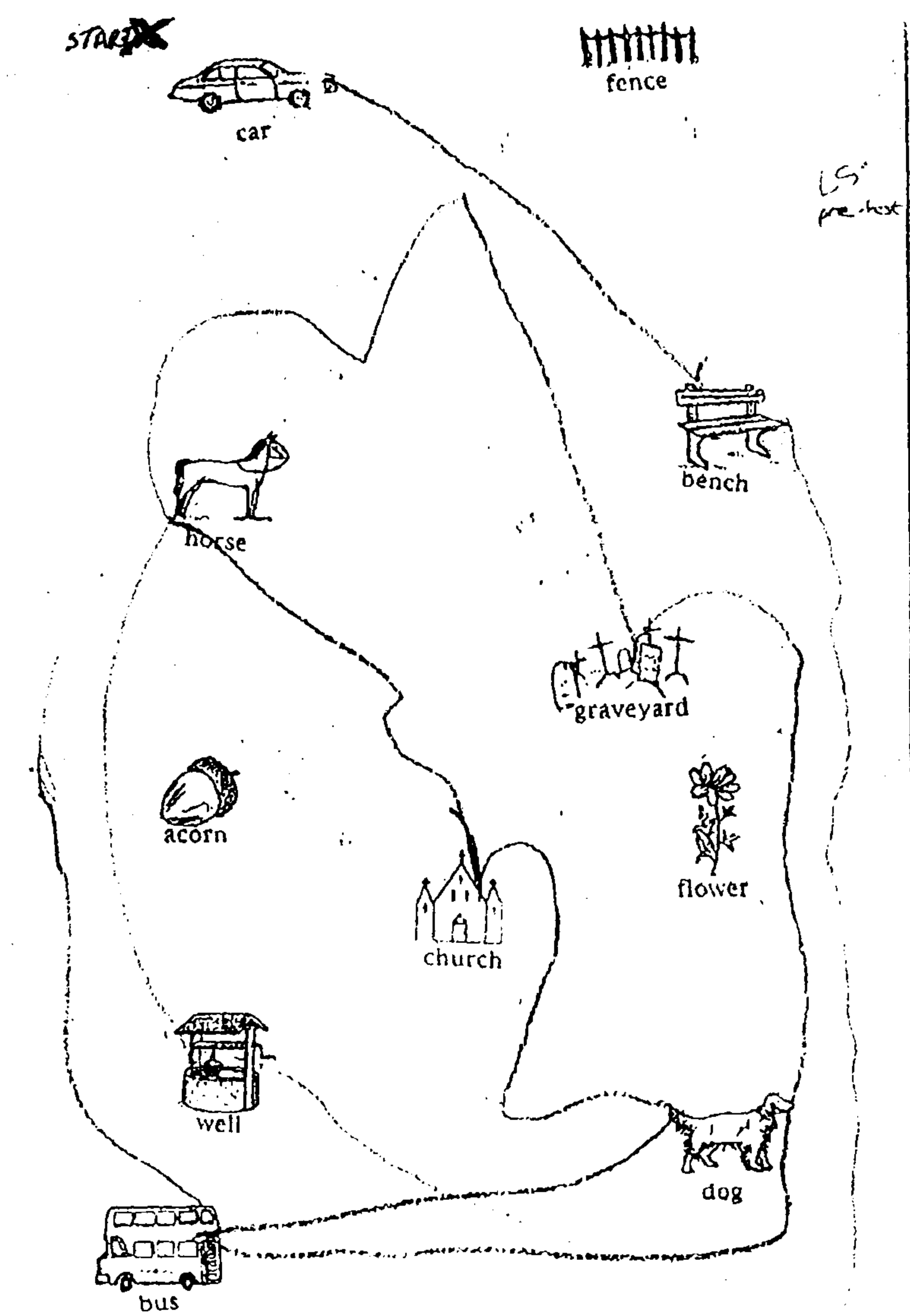
This dialogue naturally splits into three parts. In the first part, James (as information giver) essentially provides information about the features present on his route (lines 1 to 57). The second part of the dialogue constitutes Linda telling James about the features on her map that have been missed (lines 58 to 71). In the third part, James, in response to a concern raised by Linda, describes the second half of the route again (lines 72 to 94). The analysis of the dialogue considers these three parts in turn.

Information giver: Cognitive strategies

Task-focussed: Provision of information. In the first part of the dialogue, James mentions, in correct order and with appropriate labels, all but one feature which is present on his route. On two occasions this information is accompanied by directional information *go down past the car* (line 3) and *go down to the bus* (line 49). On one occasion in this period directional information alone is given, *go up* (line 41), and there are four occasions where James attempts to describe the shape of the route by telling Linda to *go round the corner* (lines 40, 45, 55 and 77).

Figure 6I: Case study 2: Dialogue 3: Information giver (James) and completed information follower (Linda) maps.





James provides information about the route one feature at a time, waiting for acknowledgement from Linda that this has been completed before moving on to the next feature. Occasionally, he breaks the instruction down into smaller units, particularly if he is including directional information (for example lines 39 to 43).

When referring to one of the duplicated features (the well), James does not define which well he is talking about. In response to the mention of this feature, Linda says *how 'm I s'posed to get down there?* (line 16) which seems to be interpreted by James as a request for information about the previous feature on his route which he had failed to mention rather than cueing him into the fact that this may indicate a difference between the two maps.

Task-focussed: Use of information. On the two occasions when James mentions a feature which Linda cannot see on her map and Linda informs him of this, James moves onto the next feature with no acknowledgement of this information (lines 12 and 49). When Linda tells James that he is missing features out, James initially refutes this and moves on to providing information about the next feature (for example lines 25 and 39). On one occasion Linda says *I thought I'd already been there* (line 44) which might have indicated to James that there was a problem with the map that had been drawn but James ignores the comment and moves onto the next feature. Although, this utterance was immediately followed by Linda telling him to *Go on* (line 46).

In the second part of the dialogue where Linda informs James about various missing features, in three of the four cases, James' response is to tell Linda that that feature is not on his map, and this is not acted upon or pursued. In the other case, James's response is *oh yeah I forgot about that* (line 65). It is after this stretch of dialogue that James goes back describes the last section of the route again. His behaviour in this section of the dialogue follows a similar pattern to the first part of the dialogue. He provides instructions which for the most part contain just feature information and sometimes contain directional information.

In this third section of the dialogue, like the first section, James makes no attempt to use the information provided by Linda to try to improve the accuracy of Linda's route.

Rather than *change* the route that had originally been drawn, Linda actually adds to the map another route to cover the information provided in this final section. On two occasions in this process Linda, albeit implicitly, informs James that this is what she is doing by saying *Been there* (line 86) and *I've been there twice now* (line 90). James acts on neither of these two utterances.

Communication-focussed. The dyad appreciate the turn-taking requirements of the task, and despite some rather heated debate at times, generally both members of the pair respond appropriately to each other's utterances. James' utterances generally comprise instructions about what to do next and responses to Linda's queries. However, towards the end of the dialogue, he does begin to ask questions about Linda's performance. There is also one occasion when James gets frustrated with Linda's commentary and turns to the adult for help. Although generally James acknowledges Linda's indications that she has not understood, or has a different map, these are, as discussed earlier, only rarely resolved adequately by James.

Information giver: Regulatory strategies

Regulation of the interaction. At the beginning of the dialogue, James changes his utterance from one that is about to be an instruction about where to go, to one in which he confirms the starting point. A few utterances later, James checks that his partner has understood him (see excerpt 6.9; line 5):

Excerpt 6.9:

Line 1. IG: Right go # there's start.

Line 2. IF: Yeah.

Line 3. IG: Go down past the car.

Line 4. IF: What d'you mean what's +/?

Line 5. IG: There's a car i'n't there?

Line 6. IF: Yeah.

Line 7. IG: At the start?

Line 8. IF: Yeah.

Line 9. IG: Go past that.

James also requests information about the presence of a feature in the final utterance of the first section of the dialogue when he asks *Have you got a* *finish?* (line 57) On several other occasions James checks that Linda has completed the last instruction by asking *You done it?* (for example lines 21 and 45) or *alright?* (line 13).

In the final section of the dialogue where the final six features on Linda's map are described, there are four IG utterances which check that her partner has a similar feature or that he has understood and successfully carried out her previous instruction; *and there's a church i'n't there?* (line 79); *you there?* (line 81); *you done it?* (line 85); *'ave you done it?* (line 91).

Regulating own behaviour. There is no evidence of explicit monitoring or self-guiding comments by James in the dialogue.

Information follower: Cognitive strategies

Task-focussed: Provision of information. In all three sections of the dialogue, Linda asks a question or tells James about her map if she has been told to go to a feature which is missing from her map. During the first and third parts of the dialogue, Linda makes three utterances that inform James that the route she is taking is resulting in features from her map being missed out. James informs Linda that three of these features are not present on his map and Linda does not pursue these. On the fourth occasion when James responds by admitting that he had missed out that feature, Linda requests more information about the route from that point *Oh, where d'you want me to go to the church?* (line 72). The second section of the dialogue takes the form of

Linda providing specific information about which features on Linda map that have not been mentioned in James's description of the route.

Task-focussed: Use of information. Linda uses feature information correctly to draw the route around the map. When directional information is unambiguous, she also makes use of this correctly.

Communication-focussed. Linda generally adheres to the pattern of conversational turn-taking. A range of utterance functions are employed in an attempt to achieve mutual understanding, although breakdowns in understanding are frequently not pursued. For example, in the third section of the dialogue, Linda does not pursue the fact that she has noticed and informed James that features on her map have been visited twice on her route (line 86 and line 90). Neither does she pursue a discrepancy observed about the presence of the final feature (lines 92 to 94).

Information follower: Regulatory strategies

Regulating the interaction. As already discussed, when Linda provides James with information about missing features, although she generally does not pursue the apparent discrepancy, she does employ a strategy with ensures the progression of the interaction by telling James to proceed, for example *I an't got one of those ooh carry on anyway* (line 12) and also excerpts 6.10 and 6.11 below.

Excerpt 6.10:

Line 28. IF: I can't though 'cause I'm like missing things out.

Line 29. IG: No.

Line 30. IF: I am.

Line 31. IG: You should have the same map as me.

Line 32. IF: Hmph! Go on.

Excerpt 6.11:

Line 36. IF: You're missing things out you are James.

Line 37. IG: No I'm not.

Line 38. IF: Go on.

Line 39. IG: I'm not missing nowt out. Go round the corner.

Regulating own behaviour. Linda asks questions for clarification when she requires something repeating, where she wants to confirm her own understanding and when James has provided an ambiguous instruction such as *Go round the corner.* In response to these instructions on all but one occasion, Linda moves the dialogue forward by asking *What to*? (for example lines 10 and 14). On the one occasion when Linda does not request feature information, it may be because James is providing his instructions at such a speed that Linda knows that information about which feature to proceed to will be immediately forthcoming (line 41).

At line 50, Linda mumbles to herself *oh I can see it.* This can be interpreted as serving a self-monitoring function.

6.5.4 Case study 2: Dialogue 4 (post-test)

Transcript 6H: Case study 2: Dialogue 4

Information giver = James; Information follower = Linda

1. IG: Have you got the start?
2. IF: Yes.
3. IG: Yeah?
4. IF: Yeah.
5. IG: Right. Turn, go down only a bit.
6. IF: Till you come to a cottage?
7. IG: I don't believe this. From the cottage, right?
8. IF: Right.
9. IG: Down to, alright now turn.
10. IF: I have turned.
11. IG: Eh?
12. IF: I have turned.
13. IG: Go up.
14. IF: I can't go up or I'd go back to the start again.
15. IG: No you # have you turned right round?
16. IF: Yeah I've come to the gates.
17. IG: Yeah, well go up then.
18. IF: I can't go up or I'd go up +/
19. IG: Why?
20. IF: Because I can't.
21. IG: Yeah you can. Now go up.
22. IF: I can't go up.
23. IG: Course you can.
24. IF: I can't.
25. IG: Yes you can.
26. IF: I'll go into the gates.
27. IG: Just go on.
28. IF: I can't come up right 'cause the gates are in the way.
29. IG: Go straight across.
30. IF: There's some sheep.
31. IG: Go down. Turn +/
32. IF: To the windmill?

33. IG: What?

34. IF: I've missed the field and the hills out.

35. IG: Why have you? You've got to the hills now?

36. IF: Yeah but I've got to go over to the field, haven't I? You know where the windmill is right? There's some hills isn't there?

37. IG: Oh yeah great, I haven't even got a windmill.

38. IF: I have.

39. IG: Right. Go down from the hills down to a fence.

40. IF: Yeah.

41. IG: Then go down, turn and go down to a goat.

42. IF: A goat?

43. IG: Yeah.

44. IF: Yeah.

45. IG: Then go to a, some fields. Turn and go down to some fields.

46. IF: That boy, honestly.

47. IG: Go across the fields. Come on.

48. IF: It should have gone like that and then down and then there right.

49. IG: Done that?

50. IF: Yeah.

51. IG: And then go, turn, go down then across a bit. There you've finished

52. IF: Some caravans.

53. IG: I don't think so

54. IF: Right. Let me describe right. I started from the cottage, right?

55. IG: Yeah.

56. IF: I come to some gates then I went down and come to some sheep.

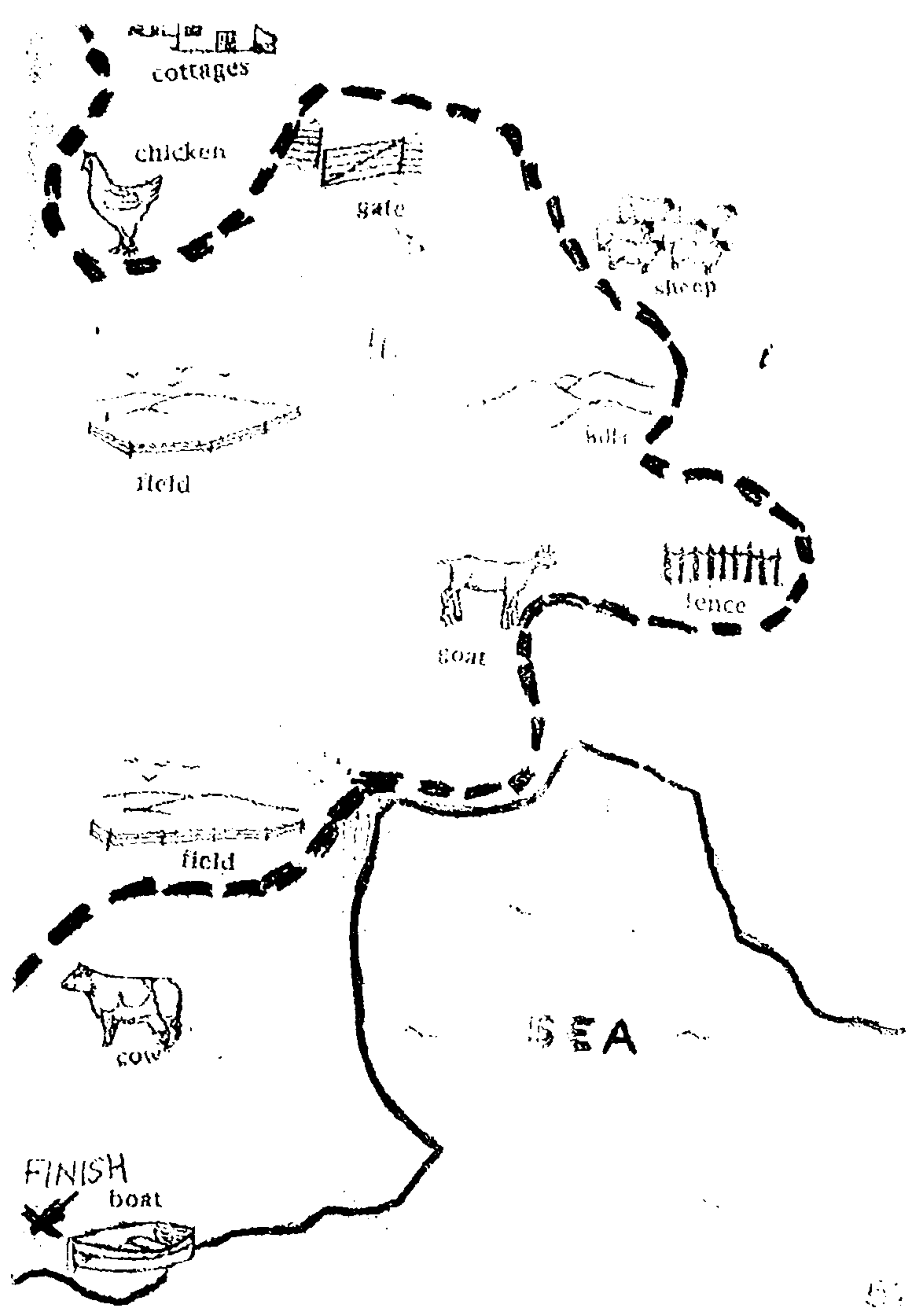
57. IG: Mm.

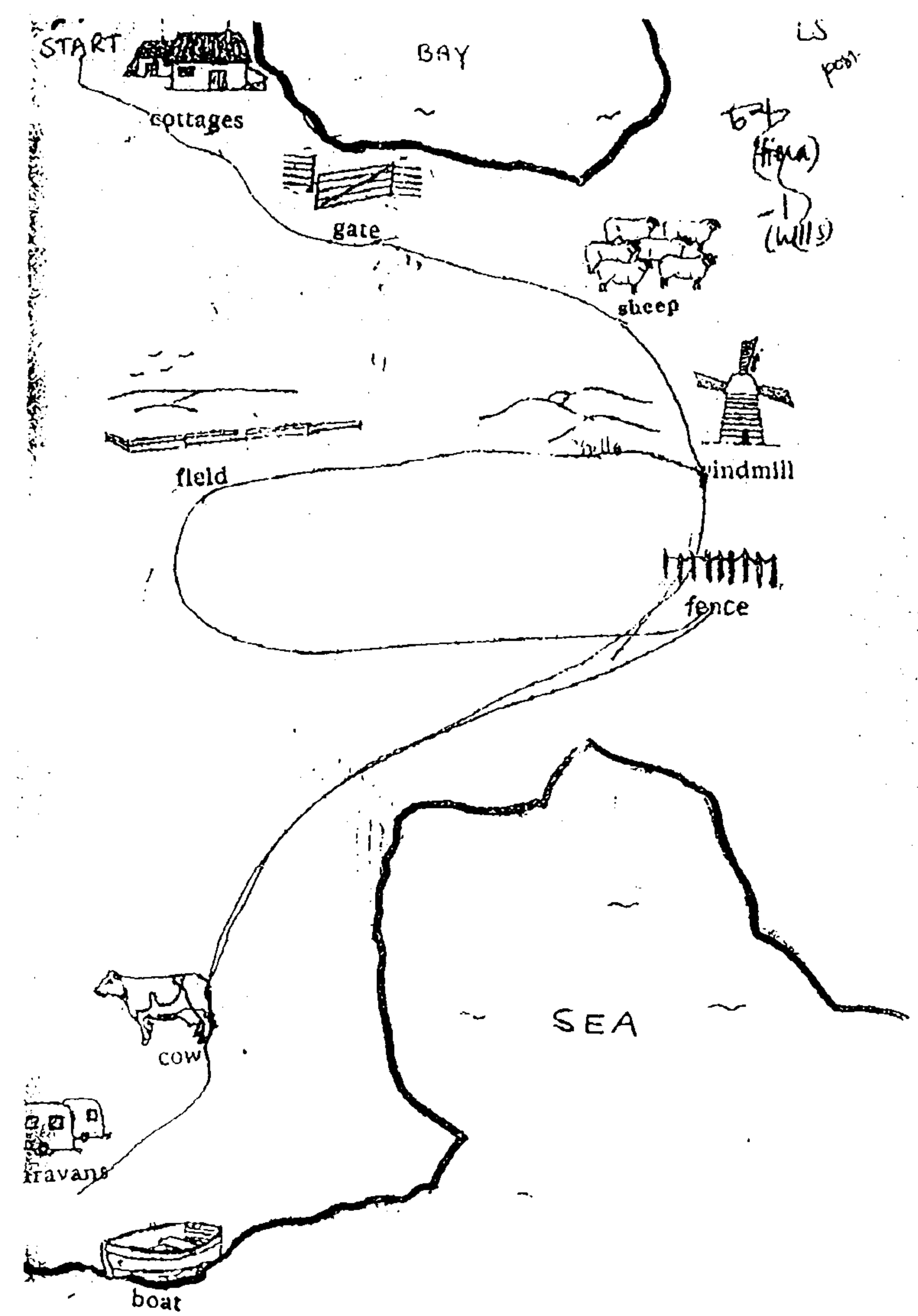
58. IF: I went round to the windmill. Then to the fence and hills and field and then come round again back to the fence. I went down to the cow and from the cow I went to the caravan.

59. IG: It's alright, carry on.

60. IF: That's it.

Figure 6J: Case study 2: Dialogue 4: Information giver (James) and completed information follower maps (Linda).





Information giver: Cognitive strategies

Task-focussed: Provision of information. The dialogue includes a total of twelve instructional utterances made by James. Of these, only four contain reference to feature information; all using Map Task feature labels. The other eight provide just directional information, such as *Turn, go down only a bit* (line 5) and *Now go up* (line 21).

James generally provides instructions which contain only one piece of information at a time, for example, unless he is providing both feature and directional information; *Go down from the hills down to a fence* (line 39). On the one occasion where he provides two pieces of information, *Go down. Turn, go down only a bit* (line 5) he is interrupted by Linda asking for information about which feature she should be heading to.

Task-focussed: Use of information. There is a period towards the start of the dialogue when Linda tells James that she cannot carry out his instruction. This develops into an argument as illustrated in excerpt 6.12 below:

Excerpt 6.12:

Line 13. IG: Go up.

Line 14. IF: I can't go up or I'd go back to the start again.

Line 15. IG: No you # have you turned right round?

Line 16. IF: Yeah I've come to the gates.

Line 17. IG: Yeah well go up then.

Line 18. IF: I can't go up or I'd go up +/.

Line 19. IG: Why?

Line 20. IF: Because I can't.

Line 21. IG: Yeah you can now go up.

Line 22. IF: I can't go up.

Line 23. IG: Course you can.

Line 24 . IF: I can't.

Line 25. IG: Yes you can.

Line 26. IF: I'll go into the gates.

Line 27. IG: Just go on.

Line 28. IF: I can't come up right 'cause the gates are in the way.

Line 29. IG: Go straight across.

In this excerpt, James fails to offer an effective solution to Linda's difficulty. In fact, he ends up abandoning the attempt to get Linda to draw the route upwards and moves on to describe the next part of the route. There are two similar occasions later in the dialogue where Linda mentions a feature which is missing from James map. James notices this discrepancy, but once again fails to do anything about it (lines 39 and 53).

In the final section of the dialogue where Linda recaps her route for James, James misses two opportunities to inform Linda that the route she is describing is not the same as the one on his map. In fact, at the end of this period, when Linda has clearly described a different route, James says *It's alright carry on* (line 59) despite him having evidence to the contrary.

Communication-focussed. James responds to the conversational turn-taking requirements of the task (this is particularly illustrated in the '*can-can't*' argument which takes place in the middle of the dialogue!). He does acknowledge and attempt to sort out difficulties that Linda has in following his instructions, even though these are not always adequately resolved. Through the dialogue, James employs a range of utterance functions. He always waits for evidence from Linda that she is ready for the next instruction before moving on.

Information giver: Regulatory strategies

Regulation of the interaction. At the beginning of the dialogue, James checks that he has interpreted a response by Linda correctly (line 3). Immediately after this exchange, James indicates his intention to give a new instruction once he has established that they are both in the same place, *Right. Turn go down only a bit* (line 5). This seems to serve the purpose of focussing either his own and/or Linda's attention.

James checks his partner's understanding or accomplishment of his instructions using a variety of strategies. These include asking for acknowledgement *yeah?* (line 3), requesting information about the accuracy of Linda's route drawing *have you turned right round?* (line 15), confirmation of Linda's position *you've got to the hills now?* (line 35) explicit questioning, *done that?* (line 49) and interrupting an instruction to check Linda is following as shown in excerpt 6.13 below:

Excerpt 6.13:

Line 7. IG ...from the cottage, right?

Line 8. IF Right

Line 9. IG down to ....

James is also able to move the interaction successfully out of the stale-mate achieved during the argument in the middle of the dialogue (line 29).

Regulating own behaviour. There is evidence in the false starts and reformulations of his instructions that suggest that James is monitoring his own instruction giving. For example, *...Turn, go down only a bit* (line 5); *Down to, alright turn* (line 9); *No you # have you turned right round?* (line 15); *Then go down, turn and go down to a goat* (line 41); *Then go to a, some fields. Turn and go down to some fields* (line 45); *And then go, turn, go down then across a bit* (line 51).

Information follower: Cognitive strategies

Task-focussed: Provision of information. On several occasions, Linda explicitly informs James that she has completed the instruction that she has just been provided with.

Task-focussed: Use of information. At the start, Linda has problems following the instructions of James mainly because of his insistence to provide directional information rather than feature information. By its nature, this results in a lot of the instructions being ambiguous. Half way through the dialogue, Linda responds to the ambiguous nature of James utterances by adopting a strategy where she begins to introduce features which are potentially on the route:

Excerpt 6.14:

Line 29.	IG:	Go straight across.
Line 30.	IF:	There's some sheep.
Line 31.	IG:	Go down. Turn +/
Line 32.	IF:	To the windmill?
Line 33.	IG:	What?
Line 34.	IF:	I've missed the field and the hills out.
Line 35.	IG:	Why have you? You've got to the hills now.
Line 36.	IF:	Yeah but I've got to go over to the field haven't I? You know where the windmill is right? There's some hills isn't there?

Following the adoption of this strategy, Linda draws each section of route once she has established the next feature.

In the middle of the dialogue, after there has been some confusion surrounding missing features, she recognises that the route she has drawn does not fit the description so she independently alters it.

Communication-focussed. Both members of the dyad take turns in speaking. Linda employs a range of utterance functions and makes some response to all of James' utterances, either in the form of a question or a statement about her own position. Linda makes attempts to pursue difficulties she has noticed up to a point, as she is doing in excerpt 6.12 (lines 13 to 29). Here, she seems to give in when James becomes frustrated and rather cross with her. However, it is at this juncture that there is a switch in strategy where Linda takes control and provides feature information for James. On the occasion when she mentions a feature missing from James' map and James responds by telling her that it is missing, neither participant pursues the implications that this may have for the accuracy of drawing the route on the IF map.

Information follower: Regulatory strategies

Regulation of the interaction. Evidence that Linda is monitoring the progress of the interaction comes from her use of questions which draw attention to potentially available information. This is illustrated in excerpt 6.14 (lines 29 to 36) above with shows Linda is checking her own understanding by asking for confirmation about which feature to head to after being provided with directional information. She uses the same strategy towards the beginning of the dialogue (line 6).

As mentioned above, on the occasion where James provides more than one piece of information in a single instruction, Linda interrupts the utterance to check she has understood correctly so far.

Towards the end of the dialogue, Linda initiates an exchange of utterances which serve to check that the route she has drawn matches the route on James map. This is signalled by her explaining to James what she is about to do and then checking that her first move was correct by asking a question:

Excerpt 6.15:

Line 54.	IF:	Right let me describe right. I started from the cottage right?
Line 55.	IG:	Yeah.
Line 56.	IF:	I come to some gates then I went down and come to some sheep.
Line 57.	IG:	Mmm.
Line 58.	IF:	I went round to the windmill. Then to the fence and hills and field and then come round again back to the fence. I went down to the cow and from the cow I went to the caravan.
Line 59.	IG:	It's alright, carry on.
Line 60.	IF:	That's it.

Regulating own behaviour. There are many examples in the dialogue of Linda monitoring her own comprehension (as indicated in the excerpts selected). There is also one occasion where Linda verbalises to herself the route she is taking as she draws it on her map, *It should have gone like that and then down and then there right* (line 48).

6.5.5 Summary

For dialogue one, at pre-test, Linda is efficient in her information-giving. She develops a strategy which provides directional information and feature information through instructions and questions. However, instructions which are not followed by a question about a feature tend to be ambiguous. When informed of a discrepancy between the maps, she acknowledges the difference and moves onto the next feature making no attempt to provide an alternative description of the route. James as information follower provides responses to all of Linda's utterances and informs her of missing features from the IF map, but commonly fails to request further information after an ambiguous instruction containing only directional information (only two out of ten responses to ambiguous information are questions). The Map Task score for this dialogue mainly seems to represent the competence of Linda in the role of information giver.

For dialogue two, at post-test, Linda uses the same strategy as she does in dialogue one; providing directional information and feature information in the form of instructions and questions. There are still some occasions where only directional information is given, and these are generally ambiguous. Linda does not pick up on potential problems indicated by her partner, even in the last section of the dialogue where James is describing the route back to her to check its accuracy. However, Linda does occasionally make some attempt in this dialogue to provide alternative information after being informed that a feature is missing from the IF map. She generally provides no more than two chunks of information in any one instruction and waits for a response from her partner before continuing. James provides responses to all Linda's utterances but all ambiguous instructions are followed by acknowledgements rather than questions. James informs his partner about missing features two out of three times. He also checks the route in the middle and at the end of dialogue. Generally, therefore, the strategies that the children adopt are very similar to those used in dialogue one which leads to similar Map Task scores.

For dialogue three, at pre-test, James's instructions generally contain feature information. Although he responds to all questions, the majority of Linda's comments in the role of IF are either refuted or ignored. Certainly, they are not acted upon in a way which may aid her drawing of the route. James does however seem to recognise the significance of checking his partner's progress as the task advances. Linda asks a range of types of question, answers questions asked and acknowledges all information when she can use it. She explicitly informs her partner about perceived difficulties but generally she fails to pursue these. The low score associated with this dialogue is likely to have resulted from James's poor information-giving strategies when providing and responding to information, and the failure of Linda to pursue the difficulties that she had identified. Describing the second half of the map again also will have affected the Map Task score, as Linda added the new route to the original rather than replacing it.

For dialogue four, at post-test, James now provides directional information most of the time. As in dialogue three, he still misses opportunities to inform his partner that there are errors in her route. However, in this dialogue, James uses a wider range of strategies to check the progress of the IF. He also seems more likely to monitor the effectiveness of his own information-giving. Linda begins to take more control and she develops the strategy of asking specific questions about which features she should be heading to when following the directional information provided by her partner. She also pursues difficulties for longer than she does in dialogue three (although they are still not necessarily resolved each time). The higher score associated with this dialogue appears to be due to (a) Linda, in the role of IF, adopting an efficient strategy which resulted in her having both directional and feature information to work with. She was also more persistent in making sure she received this information and (b) the changes in the information-giving strategies of James.

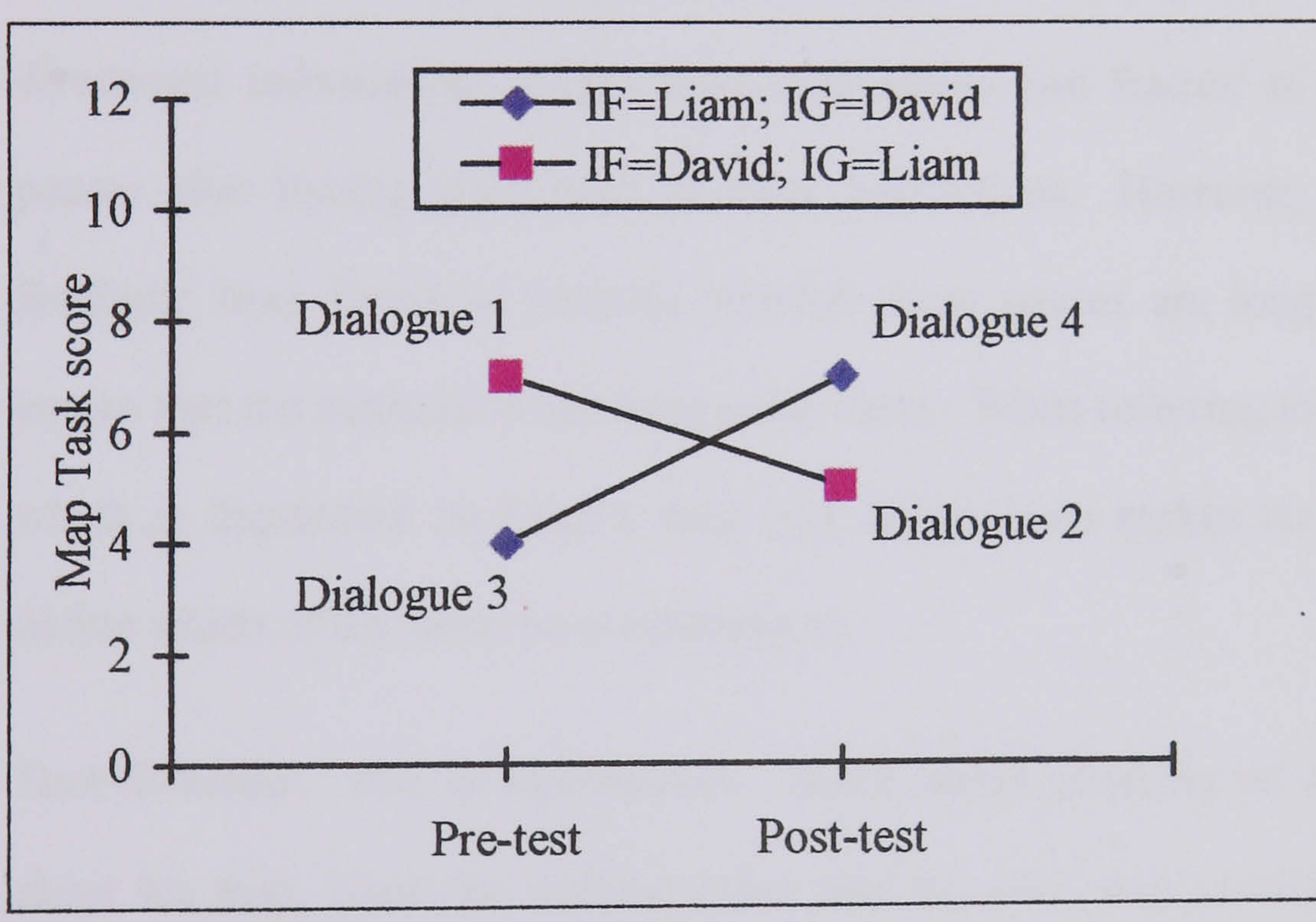
In summary, the high Map Task scores for dialogues one (pre-test) and two (post-test) seem to be due primarily to the effective information-giving from Linda. There is also some evidence that her strategies developed over time, despite this having no appreciable effect on the final Map Task score. In dialogue two (post-test) for example, she attempts to provide alternative information about the route when her partner tells her that he has a feature missing from his map. The dramatic change in Map Task score between dialogues three (pre-test) and four (post-test) also seems to have been mainly brought about by Linda, but this time as she took the information follower role. This is supported by changes in James's strategies as the information giver.

6.6 Case Study 3: Liam and David

Table 6K: Case study 3 details

	Time	Information giver	Information follower	Order in which Map Tasks were completed
Dialogue 1	Pre-test	Liam	David	First
Dialogue 2	Post-test	Liam	David	Second
Dialogue 3	Pre-test	David	Liam	Second
Dialogue 4	Post-test	David	Liam	First

Figure 6D: Case study 3: Map Task scores



6.6.1 Case study 3: Dialogue 1 (pre-test)

Transcript 6I: Case study 3: Dialogue 1

Information giver = Liam; Information follower = David

1. IG: Go to the cottage and you follow the path to the chicken, then you go, follow the path to the fence, then you follow the path to the sheep, then you follow the path to the hills, you follow the path all the way down to the fence, then you follow the path all the way to the goat, then you follow the path all the way to the field, then you follow the path to the cow, then, to the, follow the path to the boat, oh sea. That's sea. That's it

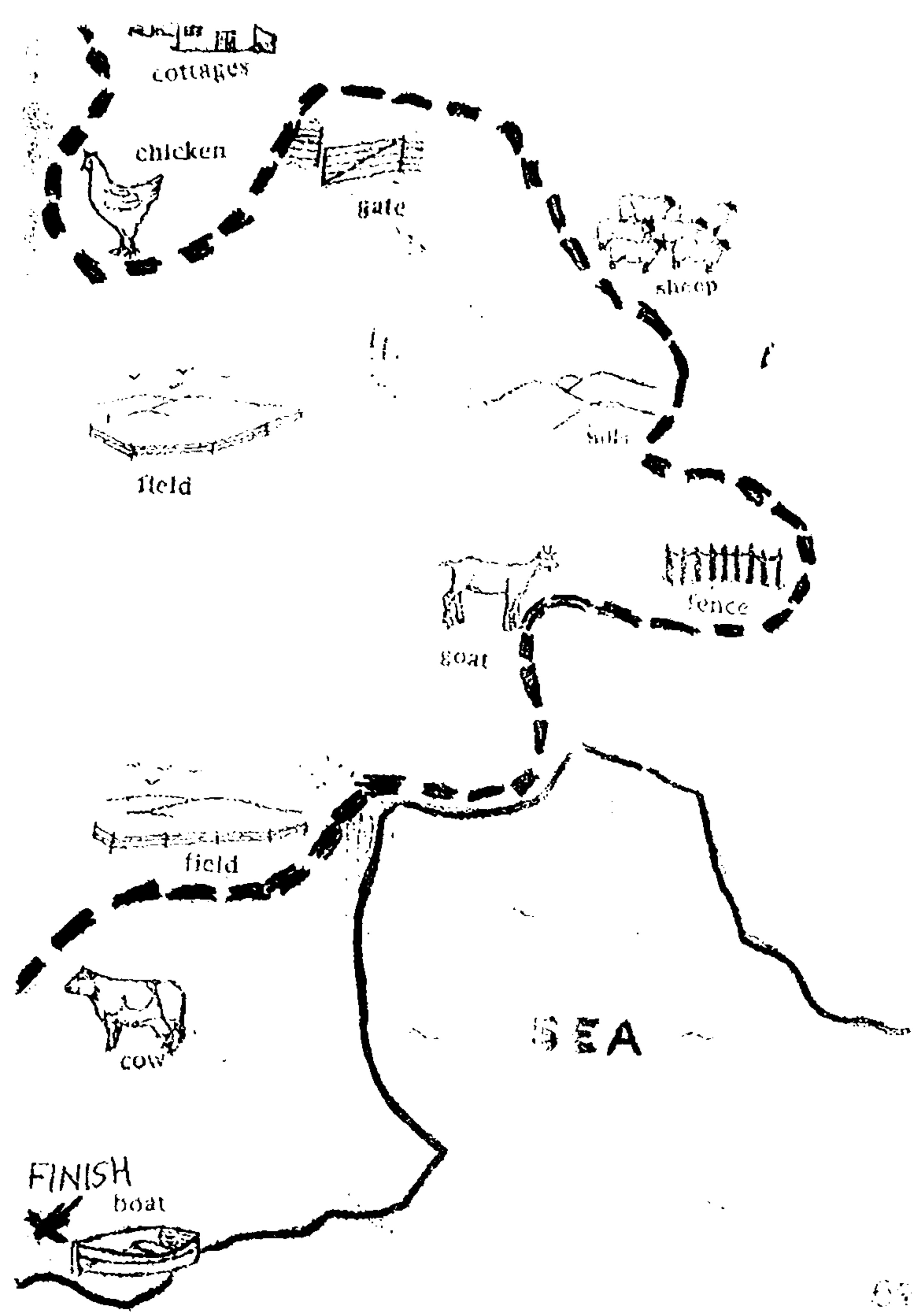
Information giver: Cognitive strategies

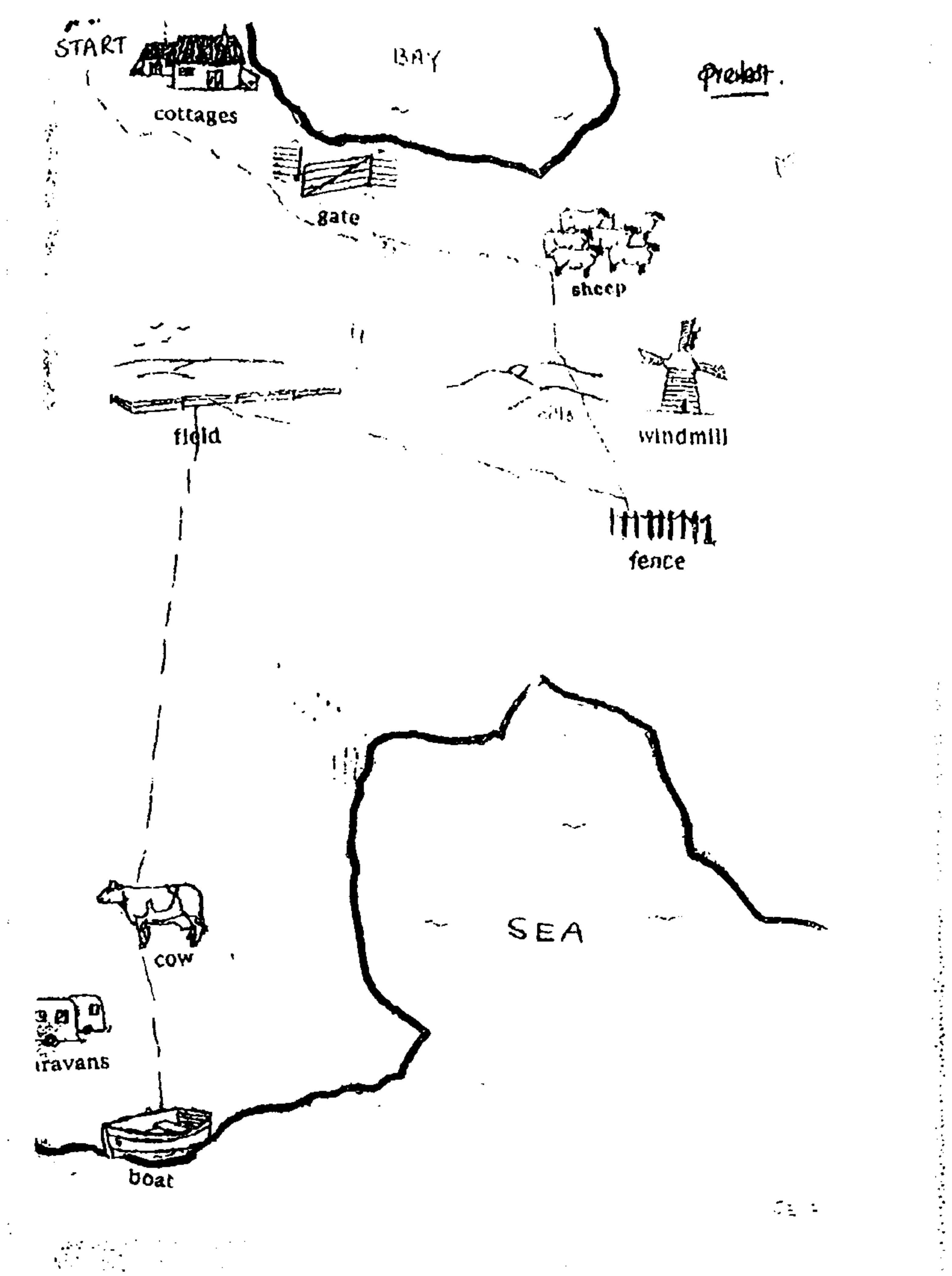
Task-focussed: Provision of information. Liam's instructions in this dialogue all follow the same pattern: *You follow the path to the x*. All but one of the features are appropriately labelled and there is only one reference to directional information. Liam gives instructions one feature at a time and pauses after having given each of these instructions. However, he gets no feedback from David to indicate whether these pauses are long enough to ensure that the instruction has been acted upon. When referring to the feature which is duplicated on Liam's map (the field), Liam makes no attempt to define which of the fields he is referring to.

Task-focussed: Use of information. Since David provides no information about his map, Liam has nothing other than his own map to consider when providing the instructions.

Communication-focussed. There is no turn-taking in this dialogue, as David says nothing throughout. All the utterances function as instructions.

Figure 6K: Case study 3: Dialogue 1: Information giver (Liam) and completed information follower (David) maps.





Information giver: Regulatory strategies

There is one indication that Liam may be monitoring the effectiveness of his own information-giving at the end of the dialogue where he appears to realise he was about to miss a reference to the sea; *follow the path to the boat , oh sea, that's sea.* Otherwise, there is little evidence of Liam making use of regulatory strategies.

Information follower

This dialogue is distinctive by the fact that David, in the role of information follower, says nothing from beginning to end. He gives no verbal response after any instruction, even when missing features are referred to. However, with respect to the features which are present on the map, he does follow Liam's instructions accurately, waiting for the next instruction when he comes across a missing feature.

6.6.2 Case study 3: Dialogue 2 (post-test)

Transcript 6J: Case study 3: Dialogue 2

Information giver = Liam; Information follower = David

1. IG: You start at the start line.
2. IF: Yeah.
3. IG: You go to the letterbox from the car.
4. IF: Yeah.
5. IG: Then to the letterbox.
6. IF: There isn't a letterbox.
7. IG: Then to the well.
8. IF: To the well?
9. IG: Yeah.

10. IF: Yeah.

11. IG: Then to the horse.

12. IF: Yeah.

13. IG: Then to the graveyard.

14. IF: Yeah.

15. IG: Then to the castle.

16. IF: There isn't a castle.

17. IG: Then to the dog.

18. IF: Yeah.

19. IG: Then to the kennel.

20. IF: There isn't a kennel.

21. IG: Then to the bus.

22. IF: Yeah.

23. IG: That's it.

24. IF: Start at the car.

25. IG: Yeah.

26. IF: Go to the well.

27. IG: Yeah.

28. IF: Then to the horse.

29. IG: Yeah.

30. IF: Then to the graveyard.

31. IG: Yeah.

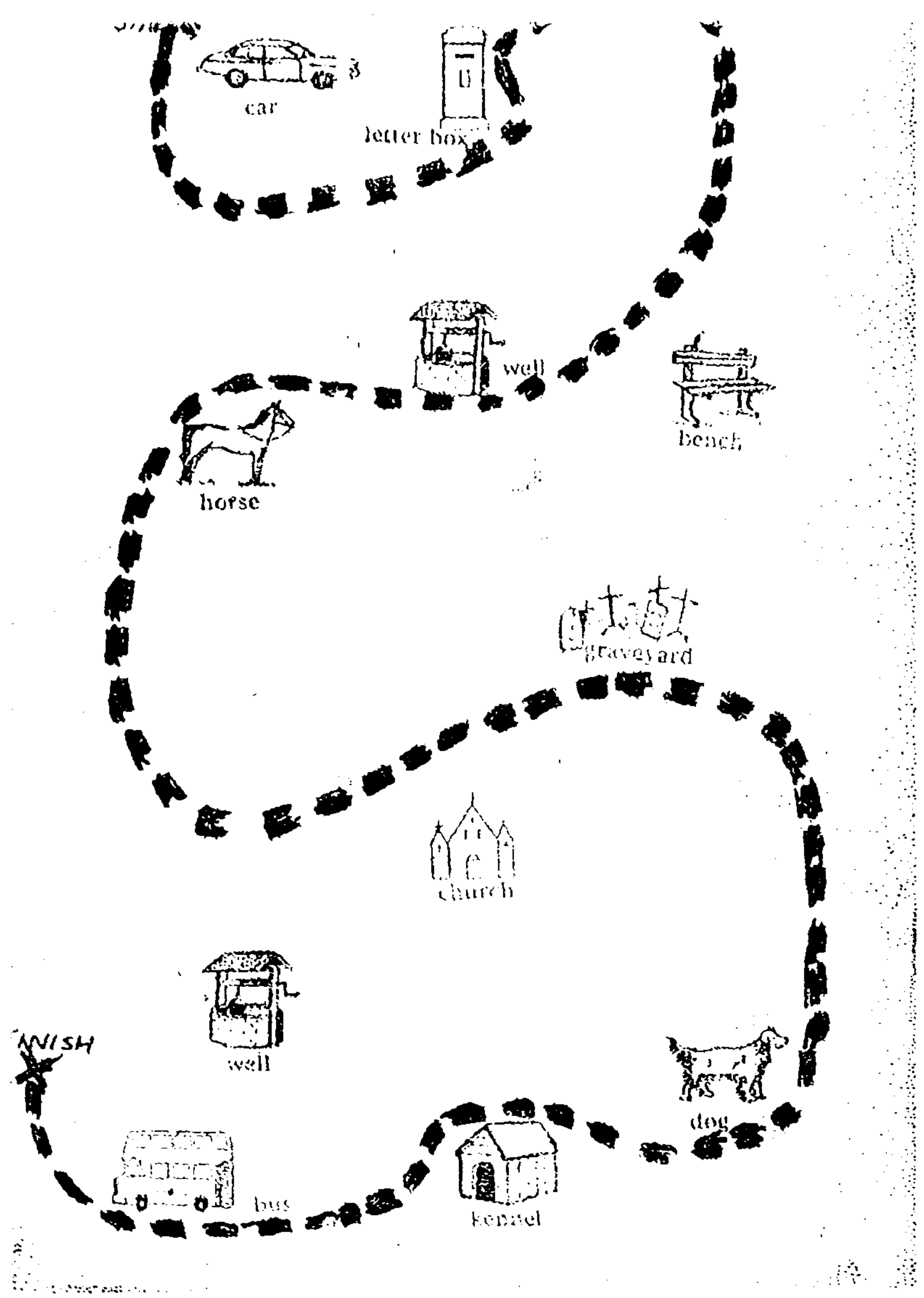
32. IF: Then to the dog.

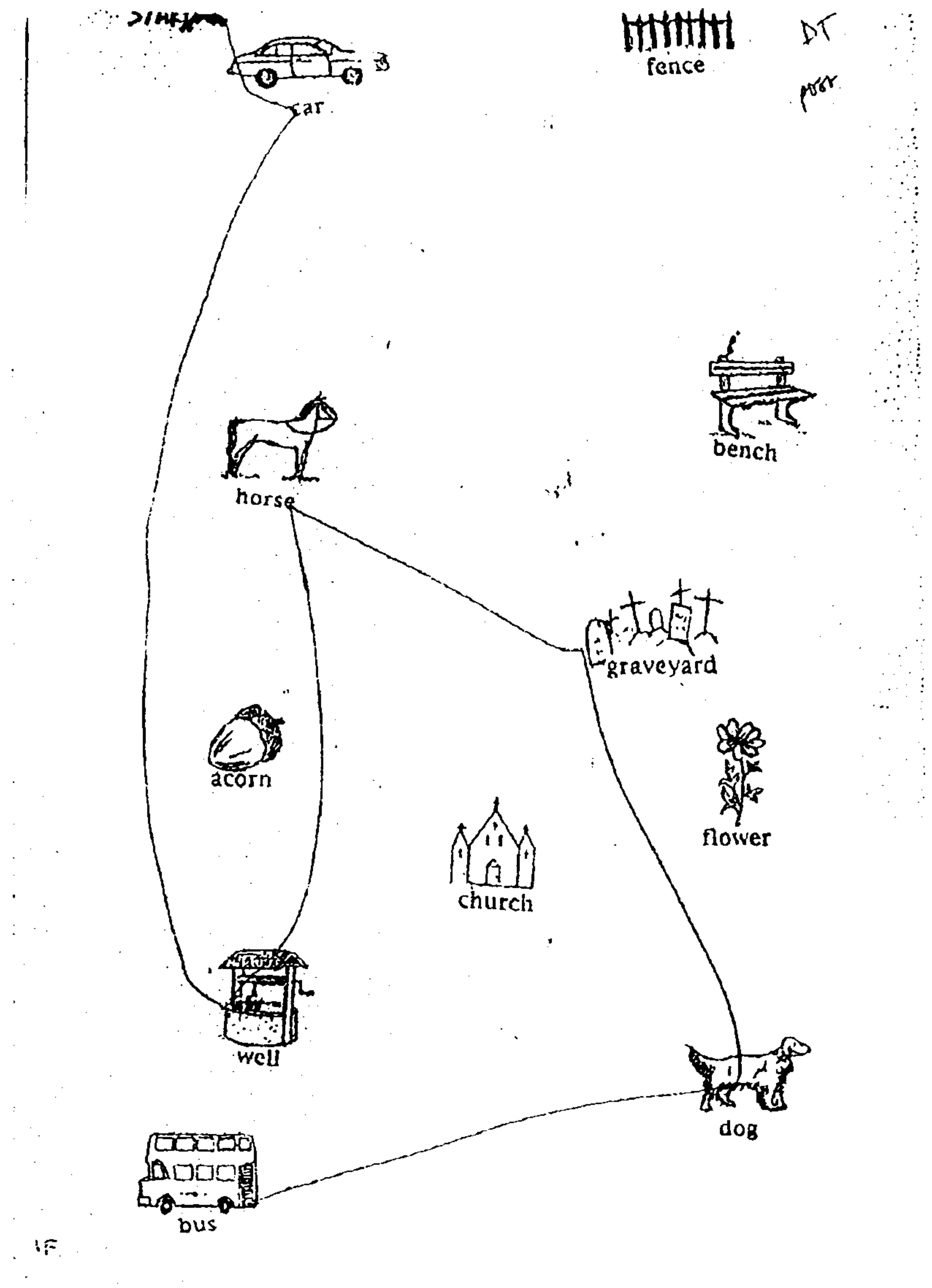
33. IG: Yeah.

34. IF: Then to the bus.

35. IG: Yeah.

Figure 6L: Case study 3: Dialogue 2: Information giver (Liam) and completed information follower maps (David).





Information giver: Cognitive strategies

Task-focussed: Provision of information. Liam gives instructions about which feature to proceed to next. The majority of this information is both accurate and unambiguous although directional and prepositional information are not provided. On one occasion Liam appears to change his mind about the feature that he is referring to, which is not made explicit to David; *You go to the letterbox, to the car* (line 3). On another occasion he mistakenly refers to the church as a castle (line 15). In the middle of the dialogue, Liam also confuses the sequence of the features along the route, and presents David with two features in the wrong order. Instructions are provided one feature at a time and waits for confirmation that this has been achieved before moving on to the next feature. Liam does not define which of the duplicated features he is referring to.

Task-focussed: Use of information. When David provides conflicting information about missing features on his own map, Liam fails to respond to these and instead provides information about the next feature to proceed to (for example line 17 and line 21).

Towards the end of the dialogue David repeats back to Liam the features which are passed by his route. After each mention of a feature Liam responds with *yeah.* However, because of the differences in the maps and the lack of negotiation about missing features earlier in the dialogue, this route described by David misses out several features which are present on Liam map. On no occasion does Liam point this out to David.

Communication-focussed. Conversational turn-taking is adhered to by both children. The utterances employed by Liam function in the main to provide instructions or to respond to checks from David. As stated above, Liam does not acknowledge the problems associated with missing features on the IF map which are indicated by David.

Information giver: Regulatory strategies

There is no explicit evidence of Liam either monitoring his own understanding or the effectiveness of his communications on the understanding of his partner. Neither is there any evidence of any self-guiding comments being used.

Information follower: Cognitive strategies

Task-focussed: Provision of information. When Liam refers to a feature not on David's map, David responds by telling Liam that it is not present (lines 6, 16 and 20). He provides feedback to Liam after each instruction informing him that he has completed the instruction .

Task-focussed: Use of information. David follows the information provided by Liam accurately, waiting for reference to the next feature when he gets to a feature missing from his map.

Communication-focussed. David takes appropriate conversational turns. He generally responds to each instruction provided by Liam appropriately with either an acknowledgement (if the feature is present on his map) or an explanation (which tells Liam that the feature just mentioned is not on his map). He asks a range of questions, either to confirm his hearing of the previous instruction (line 8) or to check his route is correct (lines 24, 26, 28, 30, 32 and 34) . On none of the occasions where David tells Liam that there is a feature missing and Liam responds by giving the next instruction does he pursue the problem he has identified.

Information follower: Regulatory strategies

Regulating the interaction. Once Liam has completed his description of the route, David checks his performance by describing his route back.

Regulating own behaviour. On one occasion David checks his interpretation of an instruction when the feature mentioned by Liam is some distance away from the previously mentioned features (line 8).

6.6.3 Case study 3: Dialogue 3 (pre-test)

Transcript 6K: Case study 3: Dialogue 3

Information giver = David; Information follower = Liam

1. IG: Draw a path from the volcano to the tent.
2. IF: Oh, yeah.
3. IG: Go up to the bridge.
4. IF: What did you say, tent?
5. IG: Yeah then bridge.
6. IF: There's no tent on here.
7. IG: Then to the bridge.
8. IF: I've done to the bridge.
9. IG: Then to a bench Then to a wall.
10. IF: Wall? # Ohh I couldn't find it.

11. IG: Then to the bird.

12. IF: What bird, there in't one here. There's no bird here. Are you sure?

13. IG: Yeah. Then to a mountain.

14. IF: There's no bird and there's no tent. This is a fake! David!

15. IG: Then a mountain.

16. IF: I went to a mountain.

17. IG: Then to a windmill.

18. IF: To the windmill.

19. IG: Then to another mountain.

20. IF: You alright, David? Are you imagining it? There's no more mountains.

21. IG: Then to a pig.

22. IF: Must have been wiped out.

23. IG: Then you've finished.

24. IF: No.

25. IG: Yeah.

26. IF: What? There's some. Is it finished?

27. IG: Yeah.

28. IF: No it in't.

29. IG: It is.

30. IF: I've got some more stuff.

31. IG: Yeah, it's finished.

32. IF: I've got +/

33. IG: It's finished Liam.

34. IF: It in't.

35. IG: Yes it is.

36. IF: It can't be.

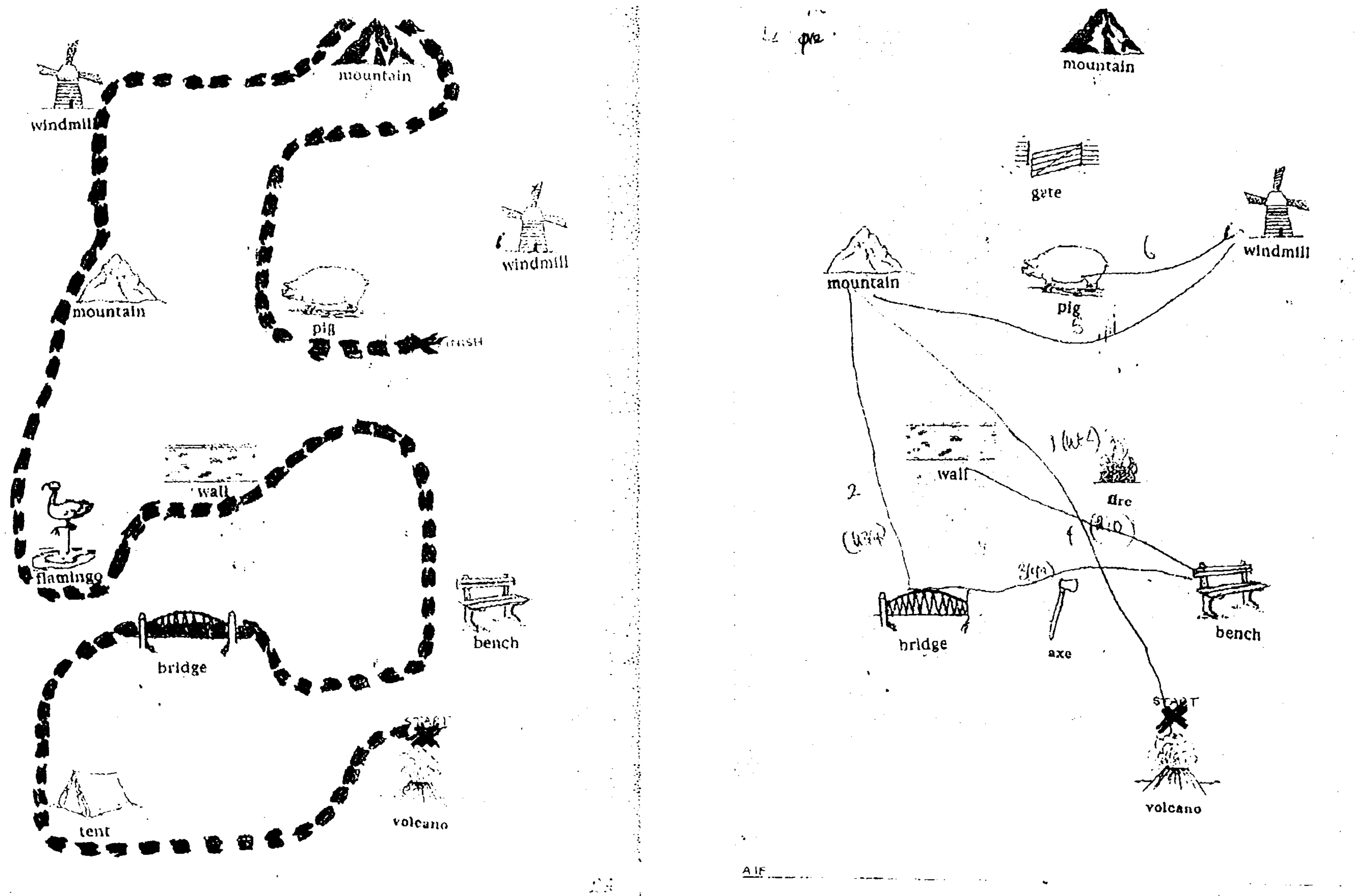
37. IG: It is.

38. IF: There's no more stuff. You said there was a tent here.

39. IG: There is on mine.

40. IF: There in't on mine. And you said, there's an axe here, fire and a gate, but no tent. David! Oh forget it.

Figure 6M: Case study 3: Dialogue 3: Information giver (David) and completed information follower (Liam) maps.



Information giver: Cognitive strategies

Task-focussed: Provision of information. All of David's instructions in this dialogue provide feature information in a clear, accurate and unambiguous manner. Directional information is provided only on one occasion towards the beginning of the dialogue. There is no attempt to define to which of the two duplicated windmills David is referring. David provides information about the route one feature at a time and waits until he has had some kind of acknowledgement that Liam has at least processed each instruction before providing the next. On the one occasion when Liam does not respond verbally, David waits until Liam looks up from his map, indicating he is ready for the next instruction.

Task-focussed: Use of information. When Liam indicates that there are differences between the two maps David ignores the information and proceeds with the instruction to go to the next feature. This happens even when Liam persists in his attempt to persuade David that the maps are different (see excerpt 6.16):

Excerpt 6.16:

Line 1.	IG	Draw a path from the volcano to the tent.
Line 2.	IF	Oh yeah.
Line 3.	IG	Go up to the bridge.
Line 4.	IF	What did you say , tent?
Line 5.	IG	Yeah then bridge.

Line 6.	IF	There's no tent on here.
Line 7.	IG	Then to the bridge.
Line 8.	IF	I've done to the bridge.
Line 9.	IG	Then to a bench, then to a wall.
Line 10.	IF	Wall # uhoh, oh I couldn't find it
Line 11.	IG	Then to the bird.
Line 12.	IF	What bird there in't one here. There's no bird here. Are you sure?
Line 13.	IG	Yeah. Then to a mountain.
Line 14.	IF	There's no bird and there's no tent. This is a fake! David!
Line 15.	IG	Go to a mountain.

In this excerpt David asks Liam to proceed to the tent, a feature which is missing from Liam's map. When Liam tells David that there is no tent on his map, David ignores the information and gives an instruction to go to the next feature. Later in the excerpt Liam once again informs David that there is no tent and still the information is ignored.

Communication-focussed. Turn-taking is adhered to. David's utterances all function either to provide an instruction to Liam about which feature to proceed to or to insist that the task has been completed after protests from Liam that it is not. As stated above, David does not even acknowledge Liam's attempts to inform his partner that the maps are different. This is the case even when Liam explicitly comments *This is a fake David!* (line 14) and *You alright David? Are you imagining it?* (line 20).

Information giver: Regulatory strategies

There is no evidence of David explicitly monitoring his own understanding or the effectiveness of his instructions on the comprehension of his partner. David makes no explicit self-guiding comments.

Information follower: Cognitive strategies

Task-focussed: Provision of information. All but one of David's instructions which refer to information which is not on Liam's map are responded to by an indication that there is a problem (see for example, the excerpt 6.16 above). However, it appears that once David has ignored the information provided by Liam about a potential mismatch of the two maps, Liam drops his attempt to sort it out and instead responds to the next instruction. However, as soon as the next difficulty arises, Liam reminds David of the previous features which he could not find on his map. In fact, there are a total of seven utterances which explicitly inform David of a difference between the two maps (lines 6, 12, 14, 20, 22, 30). And indeed the final utterances of the dialogue become an argument debating whether or not the task is finished.

Task-focussed: Use of information. At the beginning of the task, Liam makes a mistake in following David's instructions which causes problems later in the task. He is told that the second feature is a tent but proceeds instead to a mountain. He soon realises his mistake and checks with David; *What did you* *say, tent?* (line 4). When this is affirmed, Liam tells his partner that his map does not have a tent, but when this claim is ignored he duly proceeds from the mountain to the next feature as if there was no problem. Later on in the dialogue, when he is told that the next feature on the route is the mountain, he claims that he has been there (line 16) and yet still this is ignored which results in another error in the drawing of the route.

Communication-focussed. Turn-taking is generally adhered to despite Liam demonstrating a frustration that the differences between the two maps are not being recognised by his partner. Liam responds appropriately to all of David's instructions. These responses serve a range of functions including acknowledgement, disagreement, explanation and question. As discussed in 'provision of information' above, Liam attempts to inform David about the problem of missing features, but does not pursue these when David does not respond appropriately.

Information follower: Regulatory strategies

Regulating the interaction. Evidence that Liam is monitoring the effectiveness of the interaction comes from his attempts to tell David when he has noticed a discrepancy between the two maps. He does this by informing David of these differences (as discussed above) but in addition he is likely to suggest explicitly that David ought to take some responsibility for the problem; *There's no bird here. Are you sure?* (line 12) and a little later on, *there's no bird and there's no tent # this is a fake! David!* (line 14).

Regulating own behaviour. There are three examples of Liam using self-guiding comments to support his own performance or confirm his own understanding. In lines 10 and 18, he repeats the feature that David has just mentioned whilst looking down at his map. These utterances seem to be acting as self-guiding comments as he searches. Also in line 10, Liam says to himself *Uhoh I couldn't find it* immediately after finding the wall. Here Liam is reflecting on his own action. In line 22, Liam is reflecting aloud on his own understanding of the task.

6.6.4 Case study 3: Dialogue 4 (post-test)

Transcript 6L: Case study 3: Dialogue 4

Information giver = David; Information follower = Liam

1. IG: It starts at the [?]house
2. IF: Yeah.
3. IG: And goes round up to the cat.
4. IF: Round the cat.
5. IG: Then it goes to the swan.
6. IF: Yeah.
7. IG: Then it goes to the wall. Then to the snail.
8. IF: Yeah.
9. IG: Then it goes to the tall flower.
10. IF: Tall flower? Oh yeah.
11. IG: Then down to the fence. Then it goes down to the hammock.
12. IF: Yeah.
13. IG: Then to the dog kennel.
14. IF: To the dog kennel? No there's no dog kennel.
15. IG: Then it finishes at the car.
16. IF: Yeah. Now check. Right you start from the house.
17. IG: Yeah.
18. IF: Then you go to the swan. I mean the # yeah the swan

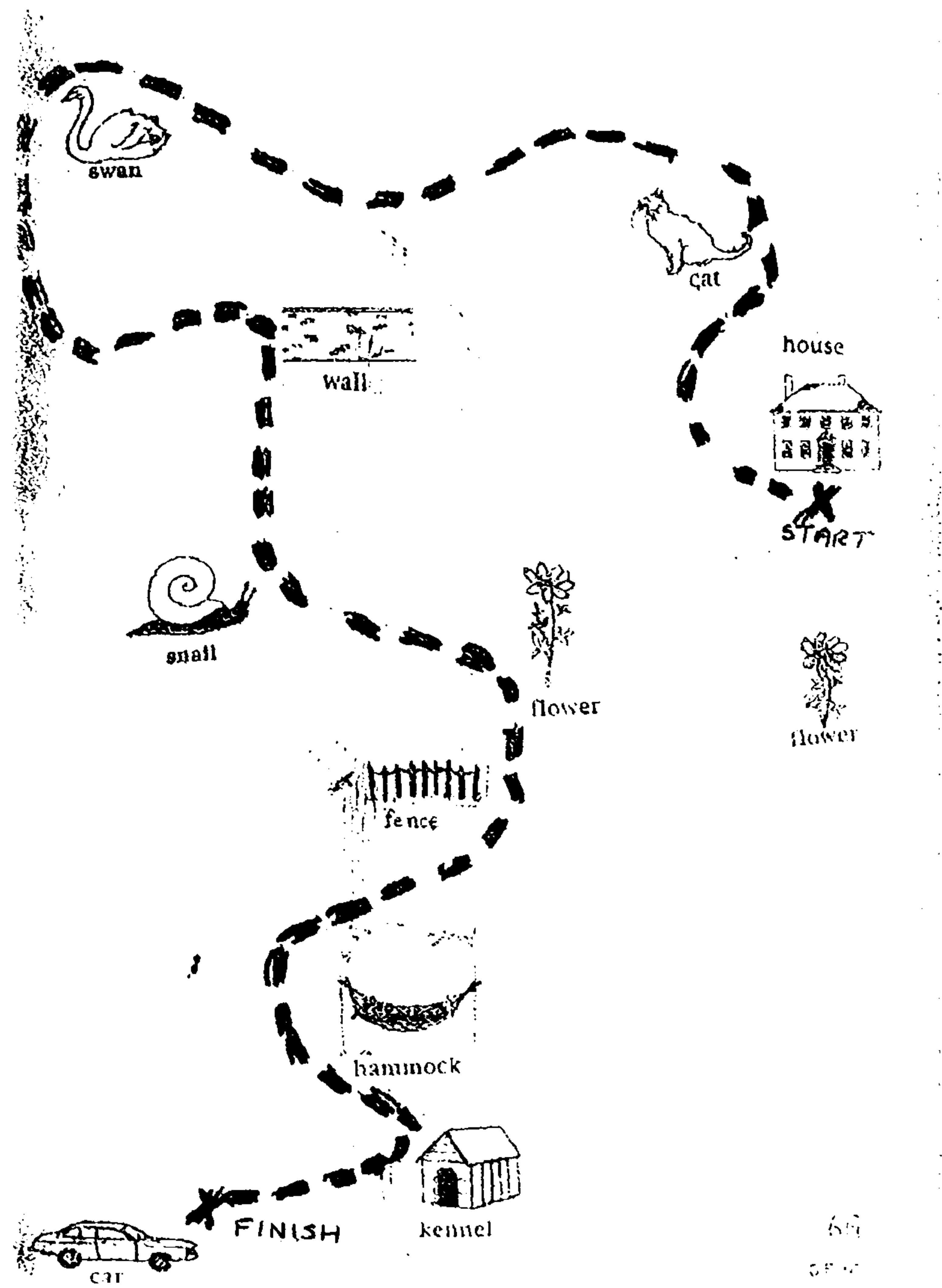
19. IG: Yeah.
20. IF: Then to the wall.
21. IG: Yeah.
22. IF: To the snail.
23. IG: Yeah.
24. IF: To the flower.
25. IG: Yeah.
26. IF: To the fence.
27. IG: Yeah.
28. IF: Fence to the hammock.
29. IG: Yeah.
30. IF: Then to the car.
31. IG: Yeah.

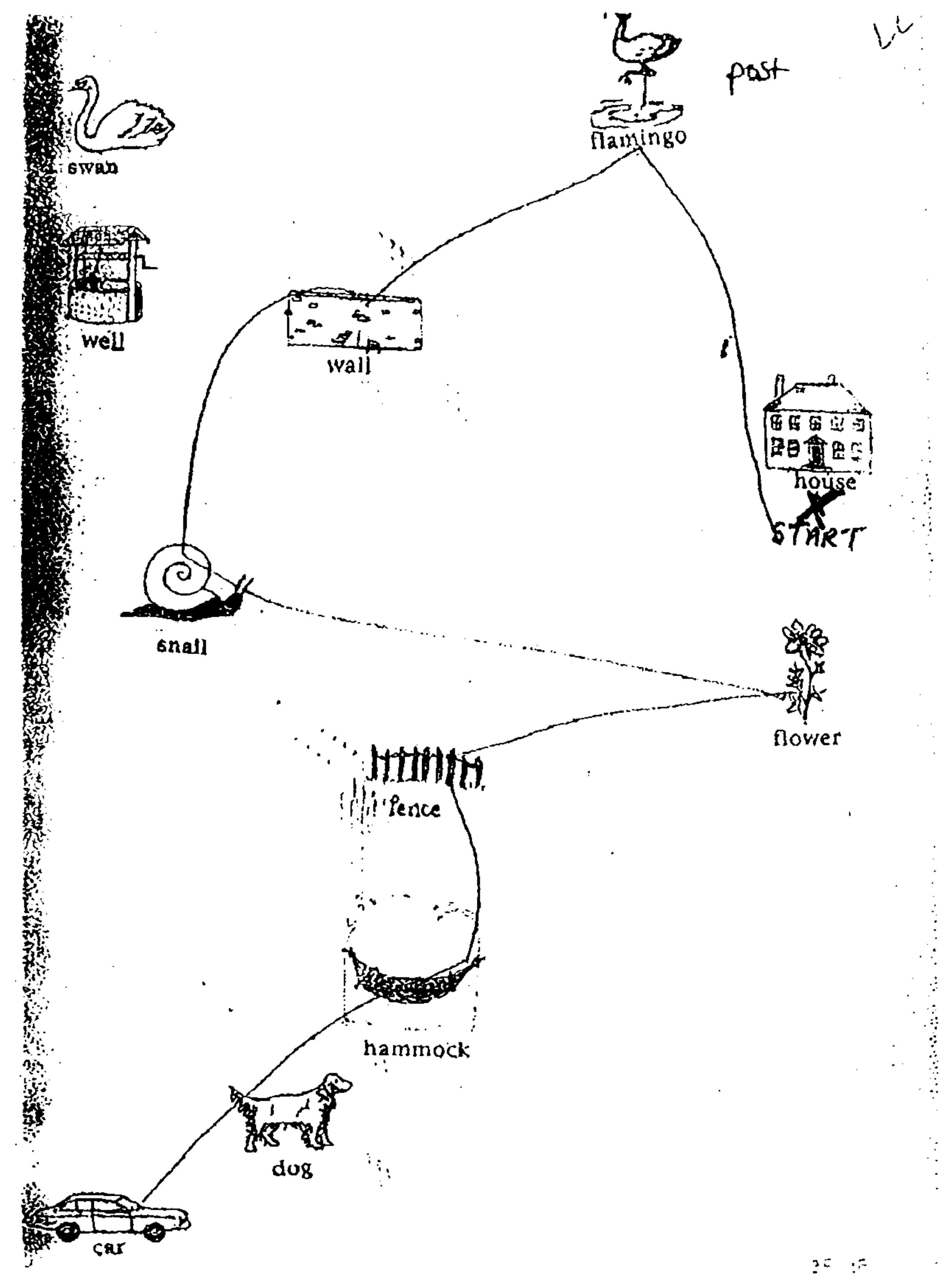
Information giver: Cognitive strategies

Task-focussed: Provision of information. David gives clear and accurate information when describing the order of features to visit and uses correct feature labels. Out of a total of nine instructions which inform Liam about which feature to advance to, three of these contain directional information (lines 3 and 11). When instructing Liam to go to the flower which is duplicated on David's map, David attempts to define which feature he is referring to; *then it goes to the **tall** flower* (line 9). The route is described one feature at a time and, on the majority of occasions, David waits until he knows Liam has processed each instruction before moving on to the next one.

Task-focussed: Use of information. In response to Liam telling David that there is a missing feature on his map, David ignores the information offered and proceeds to the next instruction (line 15). This characteristic of failing to do anything about information provided by Liam is also reflected in David's

Figure 6N: Case study 3: Dialogue 4: Information giver (David) and completed information follower (Liam) maps.





responses in the latter part of the dialogue when Liam decides to recap on the route in order to check his accuracy. Here David misses three opportunities to specify the exact position of the route by failing to tell Liam that he has failed to mention two features in his description and by failing to remind Liam which of the duplicated flowers should be visited.

Communication-focussed. Conversational turn-taking is adhered to. David's utterances all function either as instructions about where the route goes or as responses to checks from Liam. Liam's indication of a problem, as discussed above, is not acknowledged by David.

Information giver: Regulatory strategies

There is no evidence of David explicitly monitoring his own comprehension or the effectiveness of his own performance on the understanding of his partner. As mentioned above, he does miss opportunities for checking his partner's route drawing in the latter part of the dialogue. David makes no explicit comments that serve a self-guiding function.

Information follower: Cognitive strategies

Task-focussed: Provision of information. In response to features mentioned by David but missing from Liam's map, Liam first fails to indicate to David that the feature is missing, although he does repeat the instruction to himself as he searches the map (line 4). For the second, Liam tells David that the feature is not on his map (line 14).

Task-focussed: Use of information. Liam follows David's instructions which refer to features present on both maps correctly. When a feature is missing from his map, he just waits until the next instruction is given and proceeds to the next feature.

Communication-focussed. Liam takes turns in the dialogue. He responds to the majority of David's instructions with acknowledgements that he has carried out the instruction apart from the one occasion when he informs that IG that the feature just mentioned is missing from his map (line 14). However, when this is ignored by David, Liam fails to pursue the problem and it is not mentioned again.

Information follower: Regulatory strategies

Regulating the interaction. Once David has completed his description of the route, Liam initiates an exchange of 16 utterances which function as a check that he has correctly interpreted David's instructions (lines 16 to 31). In the first utterance of this exchange *Yeah. Now check. Right you start from the house* (line 16), Liam verbalises to himself what he must do next (*now check*) and then, before proceeding to the first feature, he checks that David is with him (*right*). The dialogue then continues as Liam describes in turn all the features on his route which David previously mentioned.

Regulating own behaviour. There are two other IF utterances which can be interpreted as self-guiding comments where Liam repeats the instruction given by David to himself as he searches the map to find the features (lines 4 and 14).

6.6.5 Summary

In the role of information giver at pre-test, Liam provides clear and accurate feature information whilst David in the role of information follower says nothing throughout the task. The fact that there is no discussion about missing features and that Liam's instructions are correct and unambiguous means that there is no opportunity for the discussion to be complicated by misunderstandings and misapprehensions. However, the Map Task score will necessarily be limited due to the lack of shared information.

For dialogue two, at post-test, Liam again provides just feature information. These instructions are generally correct and unambiguous, however, there are occasional inaccuracies. David provides feedback about all discrepancies between the maps but these are not responded to by his partner and are then not pursued by himself. David repeats the route at the end of dialogue during which his partner misses opportunities to discuss errors. The resulting Map Task score represents the limited success achievable when there are errors in the feature information provided, when directional information is not included and when information about the IF map is not used.

For dialogue three, at pre-test David gives unambiguous instructions which comprise feature information. Liam always informs his partner if there is a discrepancy between the maps, but this never affects what is drawn, since

David ignores the information. Liam makes several comments which indicate he is reflecting on his own action and his own understanding. He also is explicit in his recognition that success in the task is the result of joint achievement. Like dialogue one, the Map Task score associated with this dialogue represents the level which can be achieved when the instructions consist of clear information about which feature to proceed to and when information about the IF map is not used. However, the fact that Liam incorrectly followed an early instruction will lower the Map Task score.

For dialogue four, at post-test, David still gives clear, unambiguous feature information. Some directional information is now included. He also makes an attempt to specify which of the duplicated features he is referring to which might be indicative that he has a better understanding of the types of information-giving strategies required for success on the this particular task. This relatively effective strategy combined with more accurate information-following probably accounts for the higher Map Task score. However, there is still no evidence of David making use of the information provided by his partner, even in Liam's repetition of the route at end of dialogue. Compared with the pre-test dialogue (dialogue three), Liam is less likely to initiate and pursue a discussion about differences noticed between the two maps (one time compared with seven times) and does not produce the same range of utterance functions as in dialogue three. He checks the accuracy of route by repeating the route back to David once completed, however, this does not actually gain the pair anything since David fails to pick up on any discrepancy between the routes.

This case study is interesting in that there is very little negotiation and discussion between the members of the dyad in all four dialogues. When considering the factors which have lead to the different Map Task scores across the dialogues, it is useful to discriminate between 'task factors' to do with the giving, using and following instructions and 'communication factors' which cover the nature of the negotiation, for example, question asking, checking and sharing information about your own map. In this way, the differences in the Map Task scores for each dialogue in Case Study three can be seen to be more the result of task factors than communication factors. In dialogue one, David in the role of information follower does not speak. But his partner's instruction giving is satisfactory. When the roles are reversed and Liam takes on the role of information follower (dialogue three), not surprisingly he shares information with his partner and is keen to get David to respond. However, whilst doing so he makes a mistake in his instruction following which results in a lower score than the earlier pre-test dialogue. By post-test, David now provides some feedback for the IG when he takes the information follower role (dialogue two). However, this information is still not used by Liam, and there are some inaccuracies in his instruction giving which leads to a lower Map Task score. In dialogue four, David still gives clear instructions about which features to go to but now adds some directional information and takes care to specify which of the duplicated feature he is referring to, leading to a higher Map Task score.

6.7 Discussion

Taking a case study approach has meant that the strategies which the children are using are observed within the specific contexts in which they take place. That is, explanations of change in strategic behaviours now take into account factors such as the children's interpretation of the task requirements; their previous experience of doing the task; the non-verbal behaviours of the children; the specific attributes of the maps in front of the children and so on.

The analysis has drawn attention to both the similarities in the way the three pairs of children perform the task and the differences between them. In particular it has provided evidence which can be used to assess the different effects of the intervention on the individual children within the three dyads.

With regard to the similarities between the three cases, it is apparent that the children are competent at a range of tasks which make up the communicative process. For instance, they adhere to the rules of conversational turn-taking; they generally respond to obligating utterances and provide time for these responses to happen; they employ a range of utterance functions and can indicate misunderstandings. This observation supports findings from other studies which report that children and adolescents with moderate learning difficulties demonstrate a competence in certain aspects of the communication process (see for example Abbeduto, 1984; Abbeduto & Rosenberg, 1980;

Owings et al., 1981). At the same time, there are several aspects of the communicative process with which the children seem to have more difficulty. This finding is similarly supported in the literature. For example, the children sometimes fail to indicate ambiguity in messages (Abbeduto et al., 1991; Longhurst & Berry, 1975; Rueda & Chan, 1980) and frequently fail to establish unambiguous referents for their instructions (Beveridge & Tatham, 1976; Kernan & Sabsay, 1987; Longhurst, 1974). The present study also indicates that these children often find it difficult to maintain their attempts to repair communication breakdowns. It is also apparent that there are a range of issues that are more to do with the Map Task itself rather than the communication strategies which may affect the scores that these children achieve. For example, the case studies have confirmed the claim made in chapter five about the children's interpretation of the task being to get from one feature to the next. Hence prepositional information is rarely used. The strategy that the information-giving children use to refer to the duplicated feature on their map is also worth considering. In five of the six dialogues this feature is not disambiguated by the information giver. It seems that the children in the IG role are responding to the perceptual salience of the target feature on the IG route and thus fail to see a need to specify which of the two features is being referred to (H.H Clark et al., 1983).

The case studies have also provided an arena for exploring whether the range of strategies introduced in chapter five can adequately explain these children's behaviours. It was proposed in chapter five that a useful way of thinking about the range of strategies which may be available to the children is to draw a distinction between task-focussed factors and communication-focussed factors. It seems that for some dialogues, the Map Task score can be explained by the children's effectiveness at the task rather than their communication abilities *per se*. That is, a high Map Task score for some dyads comes about primarily as a result of the children giving correct and appropriate information in their instructions, following instructions correctly and making use of the information which becomes available to them. At the same time, for some children high scores on the Map Task seem to be associated with how they communicate with each other during the task. Included here are strategies such as asking questions after ambiguous messages, answering questions appropriately, acknowledging instructions and pursuing questions and explanations until they are resolved. Obviously, the nature of the Map Task means that communication factors can never be truly independent from task factors and indeed must be viewed within the context of the task. This can be seen, for example, when consideration is given to the regulatory strategies addressed in the analysis. Strategies such as checking your partner's progress or understanding and monitoring your own behaviour through self-guiding comments and questions cannot be viewed either as essentially communicative or essentially task-related. That said, the dichotomy is a useful one when considering the particular effects the intervention has had on individual children. At the same time, strategies which were considered 'cognitive' in nature, have also been demonstrated to play a regulatory role in the dialogues. For instance, one can argue that the provision of information by the IF not only provides the IG with task-related information, but in some cases is evidence that the IF is controlling the interaction either by telling his or her partner to continue or by interrupting the flow of the IG's information provision in order to share their own information, as can be seen in dialogues 3 and 4 of case study 2.

In addition to these similarities between the dialogues, there are also marked differences, particularly with respect to the changes in strategic behaviours over the course of the intervention which affect the Map Task scores. Results reported in chapters three and four suggested that the intervention had most effect on particular strategies associated with the information follower role. However, by considering the appropriateness in the use of strategies by both the information giver and the information follower, the case studies have confirmed the hypothesis that the source of change in Map Task performance may be different for different children. The case studies have highlighted the range of strategic behaviours for both the information giver *and* the information follower which may be affected by the intervention programme.

6.8 Summary

The case studies presented in this chapter have served several functions. Primarily they have demonstrated that the Map Task scores associated with particular dialogues can be explained by a number of different factors. For each of the three dyads, a range of cognitive and regulatory strategies has been identified and their change in use over time has been observed within the specific context of the task and of the interaction. The next step in this second phase of analysis is to group together the full set of strategies observed in the case studies to create a coding frame. The purpose of this coding frame is two-fold. First, it will be used to confirm that the key behaviours exposed by taking a case-study approach are observable and interpretable and will therefore provide some external validity for the findings of the case-studies. Second, the coding frame will be used to examine the extent and nature of change in the strategic functioning of the remaining children who took part in the intervention.

Chapter 7: Second phase of analysis: Part 2: The coding frame

7.1 Introduction

It was claimed at the end of chapter five that the apparent dissociation between the communication performance measure and the process measures may be explained by the fact that the measures used have failed to take adequate account of the appropriateness of the communicative strategies being used by the children and that the source of change might not be the same from one dialogue to another – differences in changes may be hidden by the approach taken in the prior analyses. This chapter aims to address these claims. A full set of strategic and regulatory behaviours was constructed across all the case studies presented in chapter six to produce a coding frame. This enabled the appropriateness of strategy use to be taken into account. A combination of hierarchical cluster analysis and analyses of variance was used to address the second claim that performance gains may be the result of changes in the use of a range of strategies. This approach provides converging evidence for the qualitative data provided by the case studies presented in chapter six but also is employed here as an exploratory exercise to test the feasibility of an alternative methodology for analysing dyadic interactions which are observed to vary at a number of different levels.

7.2 Method

The pre-test and post-test dialogues of eleven dyads (22 children)[9] were analysed using a coding frame generated from the evidence provided in the case studies.

7.2.1 The coding frame

The coding frame was produced by grouping together all the strategic and regulatory strategies identified across the twelve dialogues presented as case studies in chapter six. This produced a set of items which could be rated according to how frequently they are judged to occur in any one dialogue by following transcripts of that dialogue alongside a video recording of the interaction (see appendix D for the full set of items). The majority of these items correspond to those task-focused cognitive strategies and regulatory strategies presented at the end of chapter five (see table 5A). Because the results of the case studies and prior analyses also demonstrated quite clearly that the children found some aspects of the communication process itself unproblematic, for example turn-taking and the management of a range of utterance functions (see section 6.7 above), some of the communication-focused strategies outlined in table 5A did not directly become items in the coding frame. However, those communication strategies which were

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[9] There were therefore eight children whose scores contributed to the analyses in chapters six and seven but who were not part of the current analysis. This is because their partner in the Map Task at pre-test either did not complete the full intervention programme or was absent for the post-test Map Task.

highlighted by the case studies as being potentially problematic for some children, for example establishing unambiguous referents and dealing with communication failures, were included as items on the coding frame.

For the majority of the coding frame items, the rater was asked to make a judgment on a six-point scale ranging from 'never' to 'always'. On six occasions the rating scale consisted of four-points ranging from 'never' to 'often' where 'always' and 'nearly always' were not appropriate given the nature of the statement, and on one occasion the rating scale consisted of just three points 'never', 'sometimes' and 'always'. Where the judgment to be made was based on an estimate of frequency of features, the scale consisted of four points: 'no features', 'some features', 'most features' and 'all features'.

For all items, the rater was asked to consider both the immediate and wider context in which any utterance was being made and make a judgment whilst taking this context into account. In order to do this, sections of the transcripts and videos were re-visited several times for each coding frame to be completed.

The items included in the coding frame are presented below with examples from the dialogues as illustration.

Information giver: Provision of information

Type of information contained in instructions.

Here the rater is asked to consider the information content of the instructions provided by the IG. Specifically, the rater is asked to judge whether the instructions provided by the information giver include information about (a) which feature comes next (*feature* information), (b) which direction to go in (*directional* information) and (c) how to negotiate around the feature (*prepositional* information).

Accuracy of information-giving

This section asks the rater to consider (i) the number of features *on the IG route* which the IG appropriately includes in his or her description of the route and (ii) whether the feature, directional or prepositional information provided by the IG is accurate according to the IG map. If the IG does not use the exact feature label provided on his or her map but uses one which is an adequate alternative given the interaction, this is classed as appropriate.

Order in which features are mentioned

The route on the IG map is compared with the order of features appropriately described by the IG. Both partners are shown where to start the route so the first feature is not included in the rater's estimation.

Handling of duplicated features

Here the rater is asked to judge whether the IG makes it clear which of the duplicated features she or he is referring to. Only the IG's unprompted attempts are considered here, and not any attempt which is prompted by a query from the IF.

Manner of information provision

This section of the coding frame asks the rater about how the IG goes about providing information. Specifically, the rater is asked to consider (i) whether the IG indicates that she or he is about to give the next instruction, for example, ***Right** there's an 'ouse, right, and you have to like go up, turn*; (ii) whether the IG waits for an acknowledgement which indicates that the previous instruction has been understood or acted upon; and (iii) the number of 'chunks' of information provided in any one instruction. A chunk of information is specified by mention of one feature and any associated directional and prepositional information. If a second feature is mentioned without leaving time for the IF to complete the instruction, or further directional information is provided, this is counted as more than one chunk.

The following example (7.1) shows how the IG describes the route one feature at a time and how he waits for the IF to acknowledge that the instruction has been completed before moving on to the next feature:

Example 7.1:

IG:	And from there you go to a wall
IF:	Yeah
IG:	Then to a fence
IF:	Yeah
IG:	Then a urm like a bed net bed
IF:	Yeah

In the next example (7.2), the third utterance shows the IG combining feature and directional information. This is still classed as a single chunk of information since only one feature is mentioned. In the final utterance, although two features are mentioned, one with attached directional information, the IG pauses to check that the IF is ready to continue before giving the second instruction. This utterance is classed as two instructions both comprising one chunk of information:

Example 7.2:

IG:	Start at the cottage
IF:	Yeah
IG:	Then go down to the chicken
IF:	Chicken yeah
IG:	Then to the gate # then you go up to some sheep

Example 7.3 shows the IG giving two chunks of information in one instruction:

Example 7.3:

IG:	Then go down I mean left left curve then another curve going left
IF:	Yeah where to?
IG:	To the tent going straight

Information giver: Use of information

These statements ask the rater to consider the different ways that the IG might respond when the IF provides some information about the IF map, either as a statement, as part of a question, or in response to a question. Examples 7.4 to 7.8 illustrate the range of possible IG responses.

(i) IG ignores IF information

Example 7.4:

IG:	It goes straight up # and there's a letterbox
IF:	Not on mine # to the gate though
IG:	And turn # right right again draw a big curved path

Example 7.5:

IG:	...can you see a kennel? A kennel? A dog's kennel?
IF:	No
IG:	Right
IF:	Hey?
IG:	Keep going down

(ii) IG responds by telling the IF to move on to the next feature

Example 7.6:

IG:	To the tent going straight
IF:	There's no tent
IG:	Skip that # and go to the dog

Example 7.7:

IG: The tent

IF: I haven't got a tent

IG: Well just go just go to the bridge then

(iii) IG responds by changing the instruction in order to take into account the information provided by the IF

Example 7.8

IG: Go to the fence

IF: I haven't got a fence

IG: Well go left and then up and right to the house

Information giver: Regulation

Regulating the interaction

Here the rater is asked to consider the extent to which the IG checks the IF's understanding or accomplishment of an instruction and their attention, agreement and readiness and repeats or reformulates instructions to make their meaning more clear.

(i) Checking attention, agreement and readiness

Example 7.9:

IG: Go down past the car

IF: What d'you mean # what's +/?

IG: **There's a car i'n't there?**

IF: Yeah

IG: **At the start?**

IF: Yeah

IG: Go past that

Example 7.10:

IG: **And there's a church i'n't there?**

IF: Yeah I'm there

IG: **You there?**

IF: Yeah

(ii) Checking IF's understanding or accomplishment of an instruction

This often occurs over a series of utterances rather than just a single utterance (see example 7.11).

Example 7.11:

IG: Turn right and then you get to a bird of some kind

IF: Hmm?

IG: Some kind of bird

IF: N n nothing there

IG: What?

IF: There's nothing there

IG: Oh # skip that # then you go to the mountain

IF: Yeah

IG: **Yeah? From the wall you go the mountain**

IF: Yeah I've done that

In example 7.11 above, the IG explicitly makes sure that his partner has understood what to do. After establishing that there is no bird on the IF map, the IG suggests a change of plan. He checks whether this change has been understood by confirming the acknowledgement and repeating the instruction.

(iii) Repetition and reformulation of instruction

These statements ask the rater to decide the extent to which the IG repeats or changes his or her instructions to make the meaning clearer, either following a prompt by the IF as in example 7.12 below, or when not prompted by the IF *And the # yeah # have you got a seal? A # s # yes a snail?*.

Example 7.12:

IG:	Okay start start at the volcano
IF:	Where did you say go?
IG:	You start at the volcano don't you? Put a line from the volcano

Regulating one's own behaviour

This section asks the rater to consider evidence that the IG is monitoring his or her own behaviour. Evidence might include the IG changing an instruction half-way through: *then go down I mean left # left curve;* or using self-guiding comments which seem to help the IG in their role or focus their attention: ***Okay*** *start, start at the volcano.*

Information follower: Provision of information

This section asks the rater to consider how much information the IF provides the IG in *unsolicited* statements. The types of information of interest here are (i) information about the IF map and (ii) information about the IF's progress or readiness for the next instruction.

Information follower: Use of information

Here the rater is asked to examine the completed IF map and the video to make a decision about how successfully the IF follows the instructions provided by the IG.

Information follower: Regulation

Regulating the interaction

The rater is asked to judge the extent to which the IF draws attention to 'potentially available' information which was missing from the original IF utterance. As described in chapter four, questions posed by the IF in the Map Task which draw attention to potentially available information can take three forms. These include potential requests for elaboration which request the IG to elaborate on what has just been said, potential requests for confirmation which request confirmation of the IF's understanding and potential requests for specification which request specification of the IG instruction in an attempt to clarify the IG's utterance (see figure 4C).

The rater is also asked to judge whether the IF checks the route is correct once it has been completed.

Regulating one's own behaviour

This section asks the rater to consider the extent to which the IF shows evidence of monitoring his or her own understanding of the IG's instructions. The statements address how the IF responds when she or he needs something clarifying or repeating. This may either be because the IG has provided an unclear or ambiguous messages or has referred to a feature missing from the IF map.

Also included in this section is consideration of whether the IF uses self-guiding comments. These may take the form of repeating the previous instruction to oneself, repeating a word over again in order to remember it or more general muttering or talking to oneself about the task. Examination of the video is necessary in order to establish whether the IF is verbalising to him or herself or intends to be heard by his or her partner.

7.2.2 Reliability

The coding frame was trialed over several dialogues by the author and the trained coder involved in the earlier analyses. Points of disagreements were clarified and changes were made to the items to take into account these misunderstandings. Once the author and coder had agreed on all the items for three complete dialogues, the coding frame was considered to be ready for use.

The reliability of the coding frame was assessed by training a third rater, who rated a sample of twelve dialogues using both the transcripts and the video recordings of the interactions. Percentage agreements and kappa coefficients were calculated for the ratings of this third coder and the author. Due to the very small number of occasions when prepositional information was referred to in the dialogues, the three items which referred to this information were not included in the calculations. The final question on the coding frame required a yes/no response rather than a rating. Since there was perfect agreement between the coders for this item, it was also not included in the reliability calculations. Percentage agreement across all but these four items was 65.7% (rk =0.58)[10]. Analysis of the coding frame data presented in the remainder of this chapter is based on the agreed ratings of the third coder and the author after transcripts and video recordings were discussed.

7.3 Rationale

The aim of this stage of the research is to address the claims made in chapter five that the reasons why we observe an apparent dissociation between changes in communicative performance and changes in the process of communication may potentially be due to the assumptions that were made

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[10] When the disagreements were analysed more closely, it became apparent that approximately 30% of these involved mismatches in ratings between adjacent pairs on the scales. When disagreements of two adjacent points on the scales were recoded as agreements, percentage agreement between the two coders rose to 86.9% (r_k =0.83). The remaining mismatches constituted instances where the 3 rd coder had 'missed' a particular utterance and had made a rating which misrepresented that aspect of the dialogue (these instances constituted approximately 60% of the total mismatches between the coders and the 3rd coder recognised the oversight in the later discussion) and instances where the 1st and 3rd coder had drawn straightforwardly different interpretations of the dialogues (these constituted only 10% of the total number of mismatches).

about the effects of the intervention and the tools that were used to measure such effects. By using a coding frame to establish the extent of appropriate strategy use and a different approach to analysis of the data provided by the coding frame, the following series of analyses is able to address these claims.

7.4 Results

The means (and standard deviations) of the agreed ratings of all coding frame items for pre-test and post-test Map Task dialogues for children who demonstrated improvement and no improvement are shown in table 7A. There were 11 children in each cell, unless indicated. Details of the rating scale for each item (or set of items) are also provided.

Table 7A: Coding frame: Mean (SD) ratings for all items by Map Task improvement group

			Improvers		Non-improvers	
		Coding frame item	**Pre**	**Post**	**Pre**	**Post**
IG: Provision of information	*Type of information contained in instructions*	Instructions contain feature information [1]	4.91 (1.30)	5.00 (1.10)	4.91 (1.64)	5.36 (0.81)
		Instructions contain directional information [1]	3.27 (1.68)	3.36 (1.91)	3.18 (1.89)	2.55 (1.51)
		Instructions contain prepositional information [1]	1.36 (0.67)	1.64 (0.92)	1.18 (0.40)	1.64 (1.03)
	Accuracy of information-giving	Feature information is appropriate [2]	5.36 (1.50)	5.82 (0.40)	5.50 (0.53) *n=10*	5.91 (0.30)
		Directional information is correct and unambiguous [1]	3.30 (1.89) *n=10*	3.50 (2.00) *n=8*	4.44 (1.59) *n=9*	3.00 (2.00) *n=7*
		Prepositional information is correct and unambiguous [1]	3.00 (2.00) *n=3*	4.00 (2.74) *n=5*	1.00 (0.00) *n=2*	1.50 (0.58) *n=4*
	Characteristics of provision of feature information	Number of features mentioned [2]	2.82 (1.08)	3.55 (0.93)	3.45 (1.04)	3.27 (0.65)
		Number of features mentioned in correct order [2]	3.67 (0.71) *n=9*	3.55 (0.69)	3.70 (0.67) *n=10*	4.00 (0.00)
		Whether double feature is disambiguated [3]	1.00 (0.00) *n=9*	1.22 (0.67) *n=9*	1.00 (0.00) *n=9*	1.00 (0.00)
	Manner of information provision	Indicates next instruction is forthcoming [1]	1.45 (0.93)	1.45 (0.52)	1.73 (1.27)	1.36 (0.67)
		Route is described one 'chunk' at a time [1]	5.73 (0.63)	5.64 (0.50)	5.73 (0.47)	5.82 (0.40)
		Waits for acknowledgement from IF [1]	5.73 (0.90)	5.55 (0.69)	4.64 (1.69)	5.45 (0.93)
IG: Use of information		Ignores IF information [1]	1.91 (2.17)	2.45 (1.97)	1.73 (2.57)	3.27 (2.49)
		Acknowledges IF information and tells IF to move to next feature [1]	1.91 (2.17)	2.91 (2.30)	1.45 (2.34)	2.18 (2.09)
		Changes instructions in response to IF information [1]	2.64 (2.69)	3.18 (2.23)	0.45 (0.52)	1.73 (1.90)

			Improvers		Non-improvers	
		Coding frame item	Pre	Post	Pre	Post
IG: Regulating the interaction	*Checking partner's progress*	Checks IF's understanding or accomplishment[1]	2.09 (1.38)	2.00 (1.00)	2.27 (1.62)	1.73 (1.19)
		Checks IF's attention, agreement or readiness [4]	1.36 (0.67)	1.91 (0.83)	1.45 (0.93)	1.82 (1.17)
	Repetition/reformulation of instruction	Repeats/changes instruction without prompt [4]	2.00 (0.89)	2.00 (0.89)	2.00 (0.89)	1.91 (0.83)
		Repeats/changes instruction in response to IF queries [1]	4.60 (2.07) *n=10*	4.70 (1.77) *n=10*	4.00 (2.18) *n=9*	3.45 (2.11)
IG: Regulating own behaviour		Monitors own performance [4]	1.91 (1.22)	2.64 (1.03)	2.18 (0.87)	2.09 (0.94)
IF: Information provision		Tells IG about own map [4]	2.45 (1.29)	3.27 (0.90)	1.73 (1.01)	2.73 (1.19)
		Tells IG about readiness for next instruction [1]	4.73 (1.90)	4.64 (1.29)	3.18 (1.60)	4.18 (1.47)
IF: Use of information		Correctly follows feature information [1]	4.55 (1.63)	5.36 (0.67)	4.70 (1.25) *n=10*	5.45 (0.69)
		Correctly follows directional information [1]	3.90 (2.18) *n=10*	4.88 (1.25) *n=8*	3.89 (1.90) *n=9*	3.57 (2.23) *n=7*
		Correctly follows prepositional information [1]	4.75 (1.89) *n=4*	3.80 (2.59) *n=5*	1.00 (0.00) *n=2*	2.00 (1.73) *n=5*
IF: Regulating the interaction		Draws attention to potentially available information [4]	2.00 (1.10)	2.09 (1.38)	1.82 (0.98)	2.09 (1.22)
		Checks the route is correct once completed [5]	0.00 (0.00)	0.36 (0.50)	0.00 (0.00)	0.45 (0.52)
IF: Regulating own behaviour	*Response to misunderstandings/mishearing*	Asks a question if something needs clarifying or repeating[4]	3.45 (1.21)	3.18 (1.08)	2.64 (1.12)	3.09 (0.94)
		After ambiguous instructions, tells IG instruction has been understood or completed [1]	2.20 (1.40) *n=9*	2.90 (1.52) *n=9*	3.18 (1.78)	2.36 (1.43)
	Self-guiding comments	Uses self-guiding comments [4]	2.55 (1.44)	1.91 (0.94)	1.73 (1.01)	2.18 (0.98)

Rating scales: [1]1 = 'never'; 6 = 'always'; [2]1 = 'no features'; 4 = 'all features'; [3]1 = 'never'; 3 = 'always' [4] 1 = 'never'; 4 = 'often'; [5]0 = 'no'; 1 = 'yes'

7.4.1 Preliminary analysis

The data associated with the ratings of each coding frame item was analysed using a repeated-measures analysis of variance[11] where the independent variables were Map Task improvement group (two levels: improvers and non-improvers) and time (two levels: pre-test and post-test) and the dependent variable was item rating. Table 7B presents the F values and probabilities associated with the main effects and the interaction effect for each of these analyses.

As can be seen from examination of the results presented in table 7B, few of the analyses of variance revealed significant effects. There was a main effect of group for the item 'IG changes his/her instruction in order to take into account information provided by the IF' ($F_{1,20}$=7.018; p=.015). Information givers in the 'improvers' group were more likely than information givers in the 'non-improvers' group to change their instructions to take into account information provided by the IF (improvers: $\overline{X}$=2.91; non-improvers: $\overline{X}$=1.09). There were also two main effects of time. Information followers provided more information about their own map at post-test than at pre-test ($F_{1,20}$=9.662; p=.006; pre-test: $\overline{X}$=2.09; post-test: $\overline{X}$=3.00) and were rated as correctly following feature information more often at post-test ($F_{1,19}$=6.642;

[11] Three coding frame items were not analysed due to small cell sizes or variance.

Table 7B: Coding frame: *F* values and significance levels for univariate analyses of variance for all coding frame items

		Coding frame item	Main effect of group	Main effect of time	Interaction effect
IG: Provision of information	*Type of information contained in instructions*	Instructions contain feature information [1]	$F_{1,20}$=.199; p=.660	$F_{1,20}$=.634; p=.435	$F_{1,20}$=.282; p=.601
		Instructions contain directional information [1]	$F_{1,20}$=.595; p=.449	$F_{1,20}$=.350; p=.561	$F_{1,20}$=.623; p=.439
		Instructions contain prepositional information [1]	$F_{1,20}$=.108; p=.746	$F_{1,20}$=3.441; p=.078	$F_{1,20}$=.215; p=.648
	Accuracy of information-giving	Feature information is appropriate [3]	$F_{1,11}$=.169; p=.686	$F_{1,11}$=2.679; p=.118	$F_{1,11}$=.011; p=.918
		Directional information is correct and unambiguous [1]	$F_{1,11}$=.347; p=.566	$F_{1,11}$=1.015; p=..334	$F_{1,11}$=.697; p=.420
		Prepositional information is correct and unambiguous	Analysis not performed due to small cell sizes		
	Characteristics of provision of feature information	Number of features mentioned [1]	$F_{1,17}$=.640; p=.433	$F_{1,17}$=.684; p=.418	$F_{1,17}$=1.901; p=.183
		Number of features mentioned in correct order [2]	$F_{1,17}$=1.644; p=.217	$F_{1,17}$=.064; p=.804	$F_{1,17}$=2.869; p=.109
		Whether double feature is disambiguated	Analysis not performed due to small cell sizes		
	Manner of information provision	Indicates next instruction is forthcoming [1]	$F_{1,20}$=.076; p=.786	$F_{1,20}$=.879; p=.360	$F_{1,20}$=.879; p=.360
		Route is described one 'chunk' at a time [1]	$F_{1,20}$=.323; p=.576	$F_{1,20}$=.000; p=1.00	$F_{1,20}$=.370; p=.550
		Waits for acknowledgement from IF [1]	$F_{1,20}$=3.260; p=.086	$F_{1,20}$=.836; p=.371	$F_{1,20}$=2.065; p=.166
IG: Use of information		Ignores IF information [1]	$F_{1,20}$=.150; p=.702	$F_{1,20}$=3.658; p=.070*	$F_{1,20}$=.837; p=.371
		Acknowledges IF information and tells IF to move to next feature [1]	$F_{1,20}$=.862; p=.364	$F_{1,20}$=1.804; p=.234	$F_{1,20}$=.037; p=.848
		Changes instructions in response to IF information [4]	$F_{1,20}$=7.018; p=.015*	$F_{1,20}$=3.165; p=.090	$F_{1,20}$=.506; p=.458
IG: Regulating the interaction	*Checking partner's progress*	Checks IF's understanding or accomplishment [1]	$F_{1,20}$=.009; p=.924	$F_{1,20}$=1.070; p=.313	$F_{1,20}$=.546; p=.469
		Checks IF's attention, agreement or readiness [1]	$F_{1,20}$=.000; p=1.00	$F_{1,20}$=3.906; p=.062	$F_{1,20}$=.156; p=.697

		Coding frame item	Main effect of group	Main effect of time	Interaction effect
IG: Regulating the interaction *cont.*	*Repetition/ reformulation of instruction*	Repeats/changes instruction without prompt [1]	$F_{1,20}$=.020; p=.888	$F_{1,20}$=.054; p=.819	$F_{1,20}$=.054; p=.819
		Repeats/changes instruction in response to IF queries [1]	$F_{1,16}$=.534; p=.479	$F_{1,16}$=.120; p=.914	$F_{1,16}$=.107; p=.747
IG: Regulating own behaviour		Monitors own performance [1]	$F_{1,20}$=.134; p=.718	$F_{1,20}$=1.929; p=.180	$F_{1,20}$=3.189; p=.089
IF: Information provision		Tells IG about own map [1]	$F_{1,20}$=2.925; p=.103	$F_{1,20}$=9.662; p=.006*	$F_{1,20}$=.097; p=.759
		Tells IG about readiness for next instruction [1]	$F_{1,20}$=2.915; p=.103	$F_{1,20}$=1.859; p=.188	$F_{1,20}$=2.677; p=.117
IF: Use of information		Correctly follows feature information [1]	$F_{1,19}$=.001; p=.977	$F_{1,19}$=6.642; p=.018*	$F_{1,19}$=.001; p=.977
		Correctly follows directional information [1]	$F_{1,12}$=3.691; p=.079	$F_{1,12}$=.147; p=.708	$F_{1,12}$=.147; p=.768
		Correctly follows prepositional information [1]	Analysis not performed due to small cell sizes		
IF: Regulating the interaction		Draws attention to potentially available information [1]	$F_{1,20}$=.054; p=.819	$F_{1,20}$=.338; p=.568	$F_{1,20}$=.084; p=.771
		Checks the route is correct once completed [1]	Analysis not performed due to small cell sizes		
IF: Regulating own behaviour	*Response to misunderstand-ing/mishearing*	Asks a question if something needs clarifying or repeating [1]	$F_{1,20}$=1.661; p=.212	$F_{1,20}$=.089; p=.769	$F_{1,20}$=1.422; p=.247
		After ambiguous instructions, tells IG instruction has been understood or completed [1]	$F_{1,18}$=.030; p=.864	$F_{1,18}$=.047; p=.831	$F_{1,18}$=4.502; p=.048*
	Self-guiding comments	Uses self-guiding comments [1]	$F_{1,20}$=.588; p=.542	$F_{1,20}$=.084; p=.775	$F_{1,20}$=3.025; p=.097

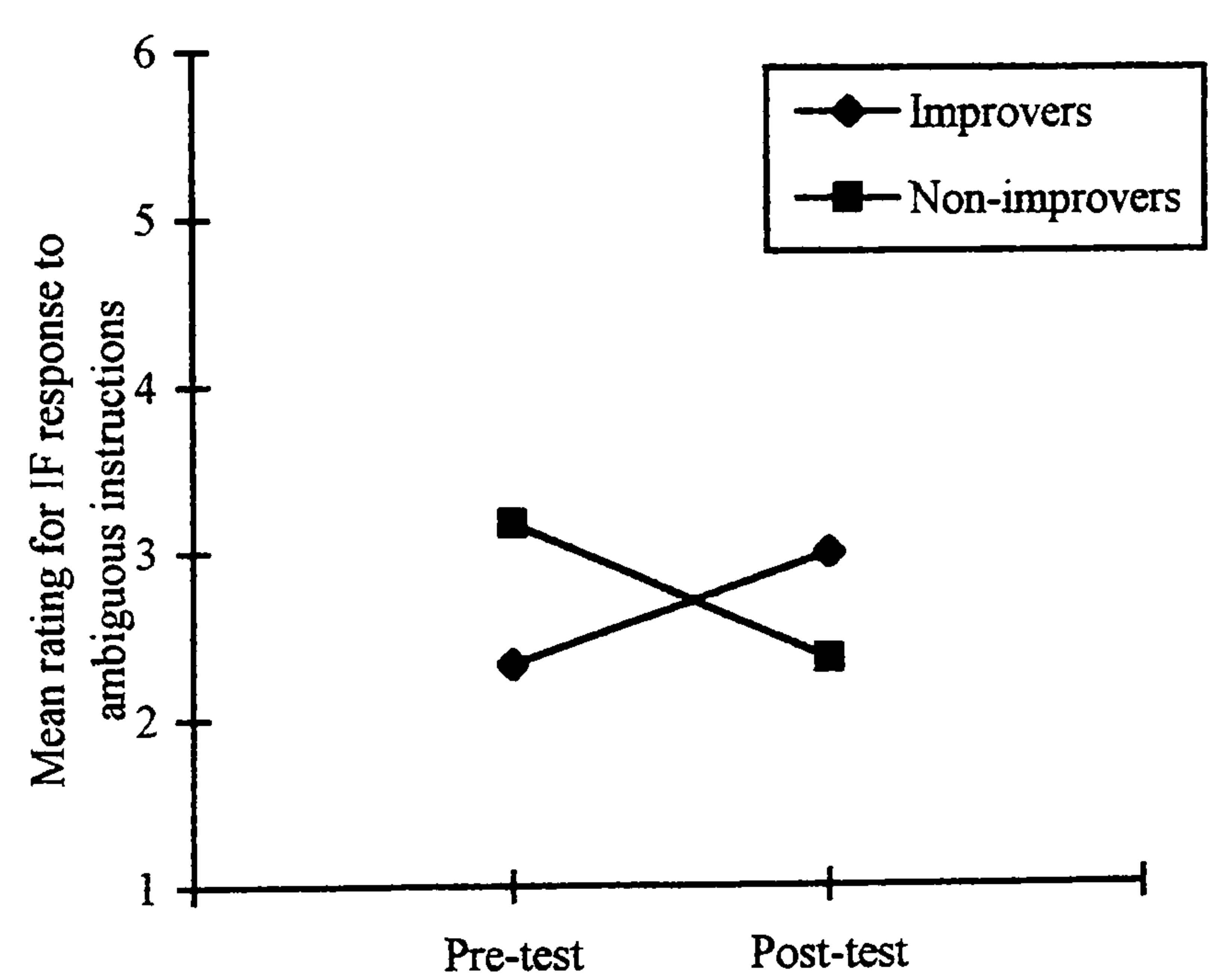
p≤0.05

[1] Tests of homogeneity of variance were satisfactory [2] Homogeneity of variance could not be tested due to small cell sizes

[3] Variances were heterogeneous p=0.028 [4] Variances were heterogeneous p=0.001

p=.018; pre-test: $\overline{X}$=4.62, post-test: $\overline{X}$=5.43). Finally, the analyses revealed one significant interaction between improvement group and time. This was for the item 'the IF responds to ambiguous instructions by informing the IG that the instruction has been understood or completed' ($F_{1,18}$=4.502; p=.048). Figure 7A illustrates this interaction.

Figure 7A: Coding frame: Interaction between improvement group and time for coding frame item 'IF responds to ambiguous instructions by informing the IG that the instruction has been understood or completed'



Simple main effects of this interaction revealed no significant differences.

Summary

These analyses indicate that the group of children who demonstrate improved communicative performance over time are generally more effective in their response to queries from the information follower about ambiguous instructions – they are more likely to provide alternative information if the information follower indicates that there is a problem. This strategy was not examined directly in the previous analyses presented in chapters three and four. Changes over time include greater provision of information about the IF map and more accurate following of instructions about which feature to head to. This was the case for both groups of children. The analyses also demonstrate that information followers in the improvers group were more likely at post-test than at pre-test to indicate that they had completed or understood an instruction when that instruction had in fact been ambiguous or unclear.

Generally, therefore, the set of analyses of variance presented above reveals few significant differences between the group of children whose communicative performance was observed to improve and the group of children who did not improve, despite appropriateness of strategy use now being taken into account. This mirrors the pattern of results presented in previous chapters. These results, therefore, serve to strengthen the proposal that change in communicative performance as a result of an intervention programme such as this, can be brought about by a range of different factors which may vary from one individual to another. Examining overall changes in strategy use means that crucial differences between individual children's changes remain hidden. The series of analyses which follow attempt to address precisely this issue. It also provides an illustration of the kind of methodology which may be useful when attempting to address the problems of analysing individual performances within a dyadic interaction.

7.4.2 Extending the analysis

The aim of the analyses presented in the following section, therefore, is to establish whether improvement in communicative performance can be explained by different changes in strategy use for different children. This means that rather than assuming that a consistent pattern of change in strategy use would be observed for *all* the children in the improvement group (as indicated by similar patterns of changes in ratings of the items on the coding frame), different patterns of change would be observed for groups of children within the improvement group. For instance, for some children we might expect to see improvements in information-giving strategies leading to improved communicative performance, and yet for others, we might see improvements in information-following strategies leading to improved communicative performance.

As a starting point for looking for evidence of these types of differences in changes in strategy use, the children's strategy use at the beginning and at the end of the intervention was examined to see whether the children could be grouped according to their use of these strategies at these two points. This was done by grouping pre-test and post-test coding frame ratings according to their similarity using hierarchical cluster analysis.

Before the cluster analysis was performed on the coding frame data, the items were split into sets according to the type of role they were considered to play within the interaction. Generally, this means that these sets map quite directly onto the groupings of items presented in the coding frame and detailed in section 7.2.1 above. Exceptions to this are as follows:

- The small variability in the ratings of items which address 'the manner in which information is presented' and 'whether the double feature is appropriately disambiguated by the IG' meant that these items were not considered in the cluster analyses (small variability necessarily means that differences in the use of these strategies are unlikely to be the reason for change in some children and not others).

- The fact that very few children included prepositional information in their pre-test and post-test instructions means that judging accuracy of providing this type of information and accuracy of following this type of information was impossible. These two items were therefore excluded from the cluster analyses.

- It was noted in chapter six that IF strategies which served to provide the IG with information seemed to be serving a regulatory function within the interaction as well as an information-provision function. For this reason, in the following analyses, coding frame items which refer to these strategies are grouped with the other strategies which serve to regulate the interaction.

Figure 7B outlines which coding frame items have been categorised into which sets.

Each set of pre-test coding frame items and post-test coding frame items shown in figure 7B was subjected to a hierarchical cluster analysis using the average linkage method with squared Euclidian distances (Sokal & Michener, 1958) in order to examine the patterns of strategy use across the dialogues at pre-test and post-test. This would indicate whether particular groups of children were being rated in similar ways. Because of the exploratory nature of these analyses and the lack of clear consensus about how to establish the optimal number of groups resulting from a cluster analysis (Aldenderfer & Blashfield, 1984), a pragmatic heuristic was adopted: only solutions that resulted in clusters of six or more cases, clustering within 15 scale points and with no more than two excluded cases were considered. This means that pre-test sets 2, 4, 5, 9 and 11 and post-test sets 4, 5, 8, 9 and 11 are not reported because the results of the cluster analyses revealed groups with cell sizes of less than six.

Figure 7B: Sets of coding frame items

Set		Coding frame items included in set
Set 1:	IG: Type of information contained in instructions	• Instructions contain feature information • Instructions contain directional information • Instructions contain prepositional information
Set 2:	IG: Accuracy of information-giving	• Feature information is appropriate • Directional information is correct and unambiguous
Set 3:	IG: Characteristics of provision of feature information	• Number of features mentioned • Number of features mentioned in correct order
Set 4:	IG: Use of information	• Ignores IF information • Acknowledges IF information and tells IF to move to next feature • Changes instructions in response to IF information
Set 5:	IG: Checking partner's progress	• Checks IF's understanding or accomplishment • Checks IF's attention, agreement or readiness
Set 6:	IG: Repetition/ reformulation of instruction	• Repeats/changes instructions without prompt from IF • Repeats changes instructions in response to IF queries
Set 7:	IG: Monitoring own performance	• Monitors own performance
Set 8:	IF: Correct following of IG information	• Correctly follows feature information • Correctly follows directional information
Set 9:	IF: Sharing information and responsibility	• Tells IG about own map • Draws attention to potentially available information • Tells IG about readiness for next instruction • Checks the route is correct once completed
Set 10:	IF: Responses to misunderstandings/mishearings	• Asks a question if something needs clarifying or repeating • After ambiguous instructions, tells IG instruction has been understood or completed
Set 11:	IF: Self-guiding comments	• Uses self-guiding comments

Tables 7C and 7D provide the results of the cluster analyses for the sets of items whose solutions met the requirements at pre-test and post-test (see appendix E for the dendrograms associated with these analyses).

Tables 7C and 7D and the dendrograms provided in appendix E demonstrate that six of the pre-test sets of coding frame items and six of the post-test items each clustered into two clusters according to the limits set. This means that the children clustering in one group are being rated in similar ways to each other, and these ratings are different from those of the children in the other group. In order to establish whether these similarities and differences in the children's use of strategies relate to communicative performance gains, the two clusters for each set at pre-test and post-test were placed against the two original Map Task improvement groups in a set of 2 x 2 contingency tables. Tables 7E and 7F provide the one-tailed Fisher exact probabilities associated with these tables. Of course, there are potential difficulties in drawing strong conclusions from results of statistical analyses performed on small sample sizes as those below. Statistical power, for example, gets lower as sample sizes reduces. Given the exploratory nature of the exercise, however, it was felt important that any small effects should not be ignored, and for this reason a p value of 0.1 has been adopted in the analyses which follow. These issues are explored in greater detail in the final chapter of the thesis.

Table 7C: Coding frame: Results of hierarchical cluster analysis for sets of items at pre-test

Set	Number of cases included in analysis	Number of groups fitting criteria	Number of cases within each cluster	Number of cases not fitting into clusters
Set 1: IG: Type of information contained in instructions	22	2	Cluster 1: 13 Cluster 2: 7	2
Set 3: IG: Characteristics of provision of feature information	19	2	Cluster 1: 11 Cluster 2: 6	2
Set 6: IG: Repetition and reformulation of instructions	19	2	Cluster 1: 12 Cluster 2: 7	0
Set 7: IG: Monitoring own performance	22	2	Cluster 1: 13 Cluster 2: 7	2
Set 8: IF: Correct following of information	18	2	Cluster 1: 8 Cluster 2: 9	1
Set 10: IF: Response to misunderstandings/mishearings	21	2	Cluster 1: 13 Cluster 2: 7	1

Table 7D: Coding frame: Results of hierarchical cluster analysis for sets of items at post-test

Set	Number of cases included in analysis	Number of groups fitting criteria	Number of cases within each cluster	Number of cases not fitting into clusters
Set 1: IG: Type of information contained in instructions	22	2	Cluster 1: 12 Cluster 2: 10	0
Set 2: IG: Accuracy of information-giving	15	2	Cluster 1: 7 Cluster 2: 8	0
Set 3: IG: Characteristics of provision of feature information	22	2	Cluster 1: 9 Cluster 2: 11	2
Set 6: IG: Repetition and reformulation of instructions	21	2	Cluster 1: 9 Cluster 2: 12	0
Set 7: IG: Monitoring own performance	22	2	Cluster 1: 12 Cluster 2: 10	0
Set 10: IF: Responses to misunderstandings/mishearings	21	2	Cluster 1: 13 Cluster 2: 8	0

Table 7E: Coding frame: *P* values associated with Fisher exact probability test for clusters associated with sets of pre-test items against Map Task improvement groups

	Map Task improvement group
Set 1: IG: Type of information contained in instructions	0.50
Set 3: IG: Characteristics of provision of feature information	0.04*
Set 6: IG: Repetition and reformulation of instructions	0.43
Set 7: IG: Monitoring own performance	0.18
Set 8: IF: Correct following of information	0.60
Set 10: IF: Responses to misunderstandings/mishearings	0.18

* $p \leq 0.1$

Table 7F: Coding frame: P values associated with Fisher exact probability test for clusters associated with sets of post-test items against Map Task improvement groups

	Map Task improvement group
Set 1: IG: Type of information contained in instructions	0.34
Set 2: IG: Accuracy of information-giving	0.60
Set 3: IG: Characteristics of provision of feature information	0.08*
Set 6: IG: Repetition and reformulation of instructions	0.06*
Set 7: IG: Monitoring own performance	0.10*
Set 10: IF: Responses to misunderstandings/mishearings	0.61

* $p \leq 0.1$

The results of the Fisher exact tests demonstrate significant overlaps in membership between the Map Task improvement groups and the clusters associated with four sets of coding frame items: pre- and post-test set 3 items (the number of features mentioned in an instruction), post-test set 6 items (whether the IG repeats or changes their instructions in response to IF queries) and post-test set 7 items (IG monitoring behaviour). The 2 x 2 contingency tables which are associated with these significant associations are provided as tables 7G to 7J.

Table 7G: Coding frame: Contingency table for pre-test set 3 clusters and Map Task improvement groups

		Cluster group	
	Map Task improvement group	Cluster 1	Cluster 2
Pre-test set 3: IG: Characteristics of provision of feature information	Non-improvers	8	1
	Improvers	3	5

χ^2=4.90; p =.04

Table 7H: Coding frame: Contingency table for post-test set 3 clusters and Map Task improvement groups

		Cluster group	
	Map Task improvement group	Cluster 1	Cluster 2
Post-test set 3: IG: Characteristics of provision of feature information	Non-improvers	7	4
	Improvers	2	7

χ^2=3.43; p=.08

Table 7I: Coding frame: Contingency table for post-test set 6 clusters and Map Task improvement groups

		Cluster group	
	Map Task improvement group	Cluster 1	Cluster 2
Post-test set 6: IG: Repetition /reformulation of instruction	Non-improvers	7	4
	Improvers	2	8

χ^2=4.07; p=.06

Table 7J: Coding frame: Contingency table for post-test set 7 clusters and Map Task improvement groups

		Cluster	
	Map Task improvement group	Cluster 1	Cluster 2
Post-test set 7: IG: Monitoring own performance	Non-improvers	8	3
	Improvers	4	7

χ^2=2.93; p=.10

Of course, what these analyses do not provide, is information about the *nature* of the differences in strategy use between the two clusters associated with each set of items. Neither do they tell us whether there are systematic changes in strategy use over time for the children belonging to the same cluster. In order to establish this, multivariate or univariate analyses of variance were performed on the data associated with the four sets of items found to be associated with change in communicative performance, that is, those summarised in table 7G[12]. The aim of these analyses was to establish the nature of the differences in strategy use between the clusters for each set of items at pre-test and post-test and whether there were different changes over time for children in these two groups. The design for all four analyses is the same: the independent variables are time (2 levels: pre-test and post-test) and group (2 levels: groups 1 and 2 previously determined by the cluster analysis).

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[12] As discussed above, due to exploratory nature of these analyses, a p value or 0.1 has been adopted in these analyses

The dependent variable(s) consist of the ratings of items included in each set being analysed.

Analysis 1: Pre-test set 3: 'IG Characteristics of provision of feature information'

The means (and standard deviations) for the ratings of the two items constituting set 3: 'number of features mentioned' and 'number of features mentioned in the correct order' at pre-test and post-test for the two clusters of children determined by the cluster analysis at pre-test are shown in table 7K.

Table 7K: Coding frame: Means (SD) of ratings for set 3 items by pre-test cluster

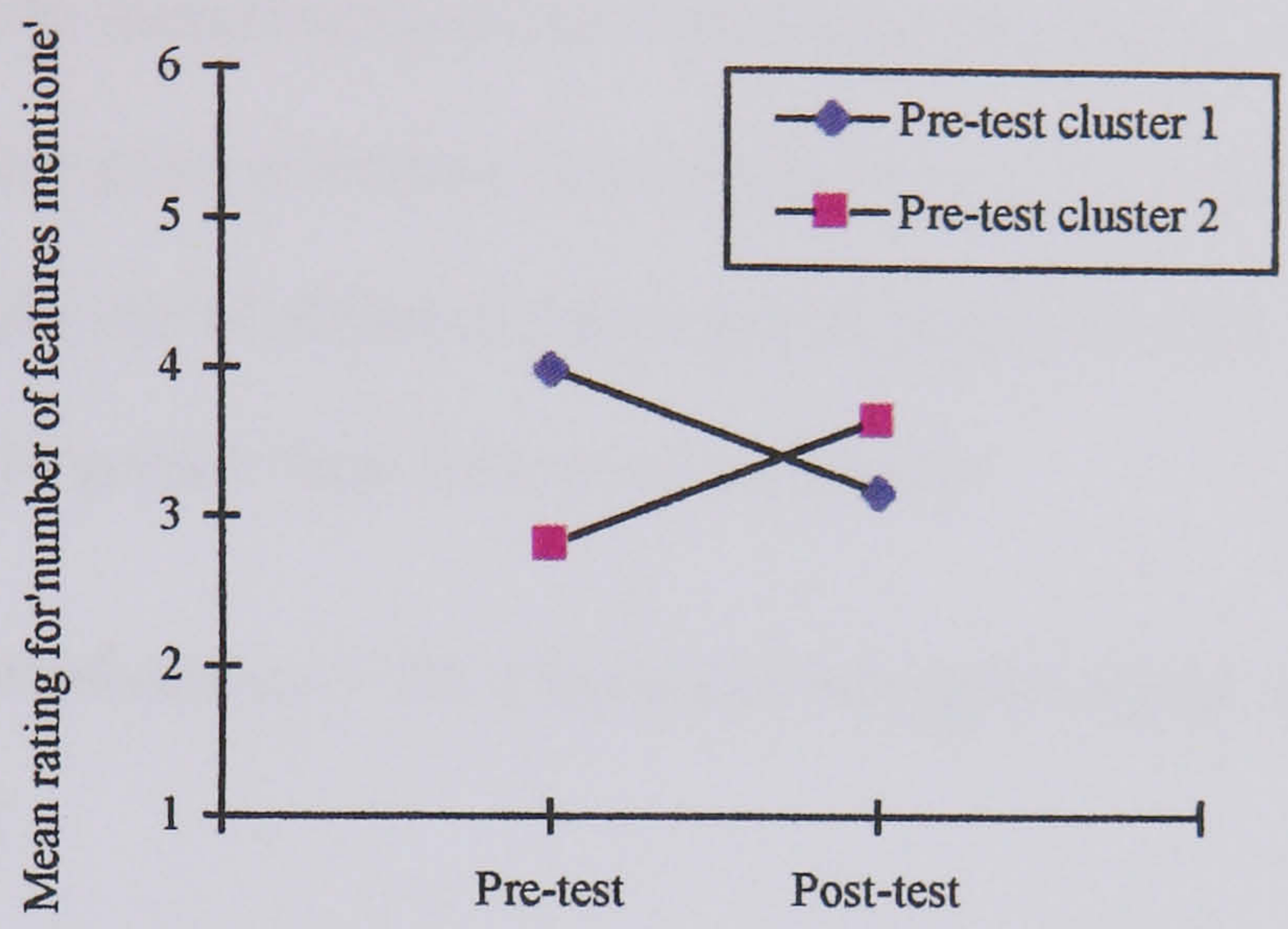
	Number of features mentioned		Number of features mentioned in correct order	
Pre-test cluster	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	4.00	3.18	3.91	3.91
n=11	(0.00)	(0.75)	(0.30)	(0.30)
Cluster 2	2.83	3.67	3.83	3.67
n=6	(0.41)	(0.52)	(0.41)	(0.52)

A multivariate analysis of variance[13] performed on the data shown in table 7K, using the design specified above, demonstrated a significant multivariate interaction between cluster group and time ($F_{2,14}$= 8.85, p =.003). Univariate

[13] Homogeneity of variance could not be tested here due to small cell sizes.

tests indicated that this effect was being carried by the item 'number of features mentioned' ($F_{1,15}$= 18.75, p <.001; see figure 7C).

Figure 7C: Coding frame: Interaction between pre-test set 3 cluster and time for 'number of features mentioned'



An analysis of simple main effects indicated a significant difference between the ratings for each cluster at pre-test, with children in cluster 1 mentioning more features at pre-test than children in cluster 2 ($F_{1,30}$= 20.32, p <.001). Significant differences were also observed between pre-test and post-test ratings for both clusters. Children in cluster 1 mentioned fewer features at post-test than pre-test ($F_{1,15}$= 13.04, p =.003) and children in cluster 2 mentioned more features at post-test than pre-test ($F_{1,15}$= 7.38, p =.016). No other effects reached significance.

Putting the results of this analysis together with the information presented in the contingency table provided as table 7G, it would seem that improvements on the communicative performance measure (as indicated by membership of the Map Task improvement group) is associated with the information giver providing an increasing number of features in their instructions (as indicated by membership of cluster 2). Five out of six children in this cluster produce dialogues which result in improved scores on the Map Task at post-test. At the same time, no improvement on the communicative performance measure (as indicated by membership of the 'non-improvers' group) is associated with the information giver providing fewer features in their instructions pre-test to post-test. Eight out of eleven children in this cluster produce dialogues which do not result in greater Map Task scores at pre-test.

Analysis 2: Post-test set 3 'IG Characteristics of provision of feature information'.

Table 7L gives the means (and standard deviations) for ratings of the two items constituting set 3: 'number of features mentioned' and 'number of features mentioned in the correct order' at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test. Three cases have been excluded from this analysis (one case from cluster 1 and two cases from cluster 2) due to missing data for second item. These children did not include features in their instructions, therefore it was not possible to rate this item.

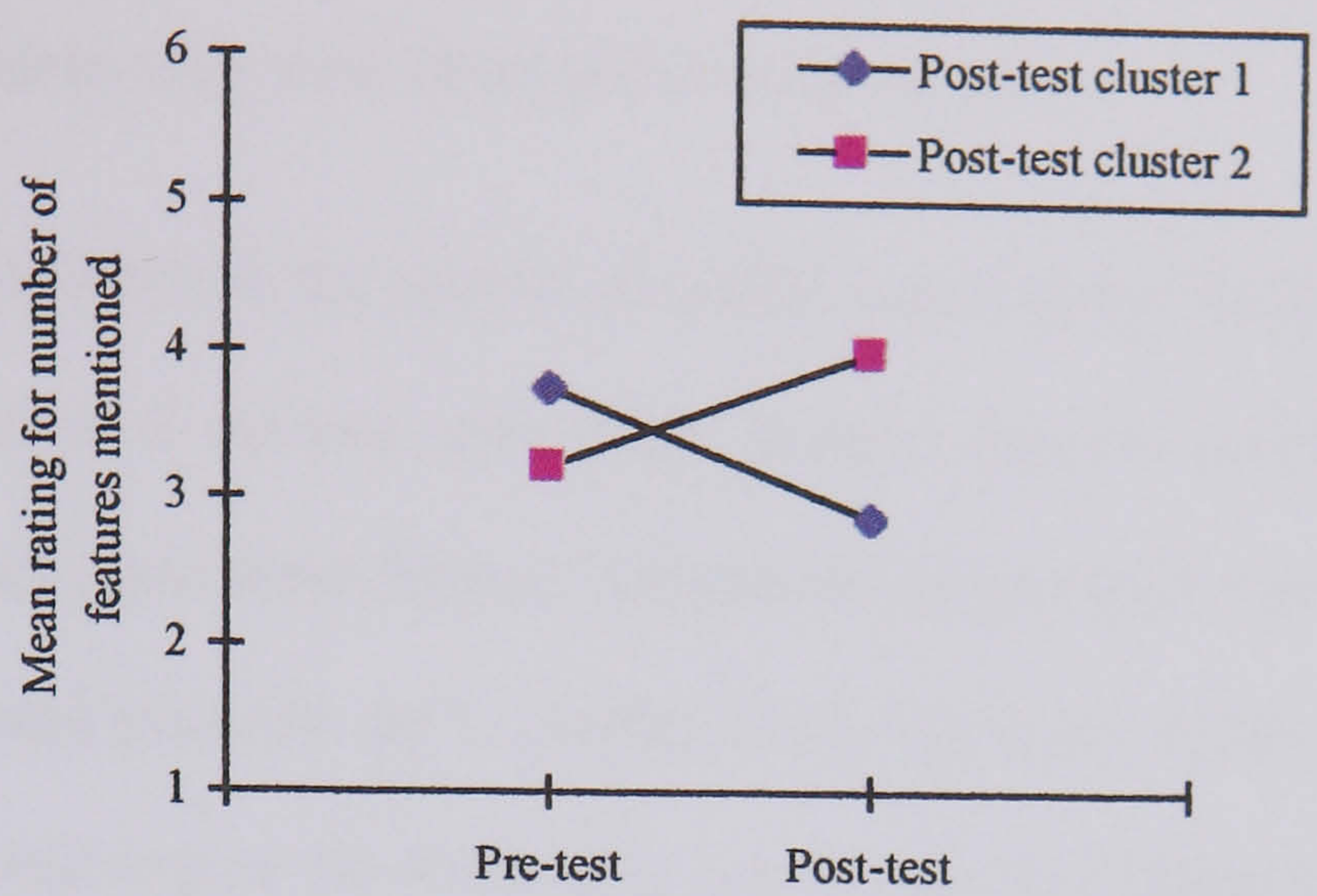
Table 7L: Coding frame: Means (SD) of ratings for set 3 items by post-test cluster

	Number of features mentioned		Number of features mentioned in correct order	
Post-test cluster	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	3.75	2.88	3.88	4.00
n=8	(0.64)	(0.22)	(0.53)	(0.30)
Cluster 2	3.22	4.00	3.67	3.78
n=9	(0.65)	(0.23)	(0.54)	(0.30)

A multivariate analysis of variance[14] performed on the data summarised in table 7L indicated a significant multivariate main effect of cluster group ($F_{2,14}$ = 6.34, p =.011) and a significant multivariate interaction between cluster group and time ($F_{2,14}$ = 9.81, p =.002). Univariate tests of the main effect were inconclusive in determining which of the dependent variables was being affected ('number of features mentioned': $F_{1,15}$= 3.05, p = .101; 'number of features mentioned in the correct order': $F_{1,15}$ = 2.31, p = .149). However, univariate tests demonstrated a univariate interaction between cluster group and time for just the first of these items ($F_{1,15}$= 20.59, $p < .0001$; see figure 7D).

[14] Homogeneity of variance could not be tested here due to small cell sizes.

Figure 7D: Coding frame: Interaction between post-test set 3 cluster and time for 'number of features mentioned'



Simple main effects analysis of this interaction indicated significant differences at pre-test and post-test between the two clusters. At pre-test, cluster 1 were rated as using more features in their instructions than cluster 2 ($F_{1,30}$= 4.46, p=.043) and at post-test, cluster 2 were rated as using more features than cluster 1 ($F_{1,30}$= 20.28, $p < .001$). Changes over time were also significant for both clusters. Cluster 1 were rated as using fewer features over time ($F_{1,15}$= 10.90, p=.005) and cluster 2 were rated as using more features over time ($F_{1,15}$=9.69, p =.007).

This analysis supports the claim made after the previous analysis. Improving communicative performance is associated with IGs who provide more feature information over time, whereas no improvement in performance is associated with fewer features provided over time (see also contingency table 7H). In addition, the group of children who provide more feature information over time began the programme providing fewer features in their instructions than the other group of children. This maps directly onto the finding made in chapter three which demonstrated that children making the gains on the communicative performance measure started with significantly lower scores than the children who were observed to make no gains.

Given the similarity in the pattern of results observed for the pre-set 3 clusters and the post-set 3 clusters, one might assume that the children in the two clusters which gave more feature information at post-test (that is, pre-test set 3, cluster 2 and post-test set 3, cluster 2) are the same children. In the same way, one would expect the children in the two clusters characterised as giving less information about features over time (that is, those children belonging to pre-test set 3, cluster 1 and post-test set 3, cluster 1) to be the same children. In order to confirm this is indeed the case, and that membership of both improving clusters is related to Map Task improvement, a 2 x 2 contingency table was created where the number of children belonging to both improving clusters and the number of children belonging to neither improving clusters was set against the number of children demonstrating improvement and no improvement on the communicative performance measure (see table 7M).

Table 7M: Coding frame: Contingency table for gains in pre-test set 3 and post-test set 3 strategies against Map Task improvement groups

	Cluster membership	
Map Task improvement group	Membership of neither cluster demonstrating increasing strategy use	Membership of both clusters demonstrating increasing strategy use
Non-improvers	5	0
Improvers	1	4

χ^2=14.22; $p < .001$

The data presented in table 7M demonstrates a significant association between communicative improvement and membership of these clusters. Membership of both clusters which demonstrate increasing provision of feature information is related to improvement on the communicative performance measure (all 4 of the improvers are members of both these clusters) and membership of neither improving cluster is related to no improvement in communicative performance (5 out of the 6 non-improvers belong to neither cluster which demonstrate increasing provision of feature information). This relationship is statistically significant (χ^2=14.22; Fisher exact test $p < .001$).

We return now to the analyses of variance for the remaining two sets of coding frame items (sets 6 and 7) that demonstrate a significant relationship with changes in communicative performance.

Analysis 3: Post-test set 6 'IG Repetition /reformulation of instruction'

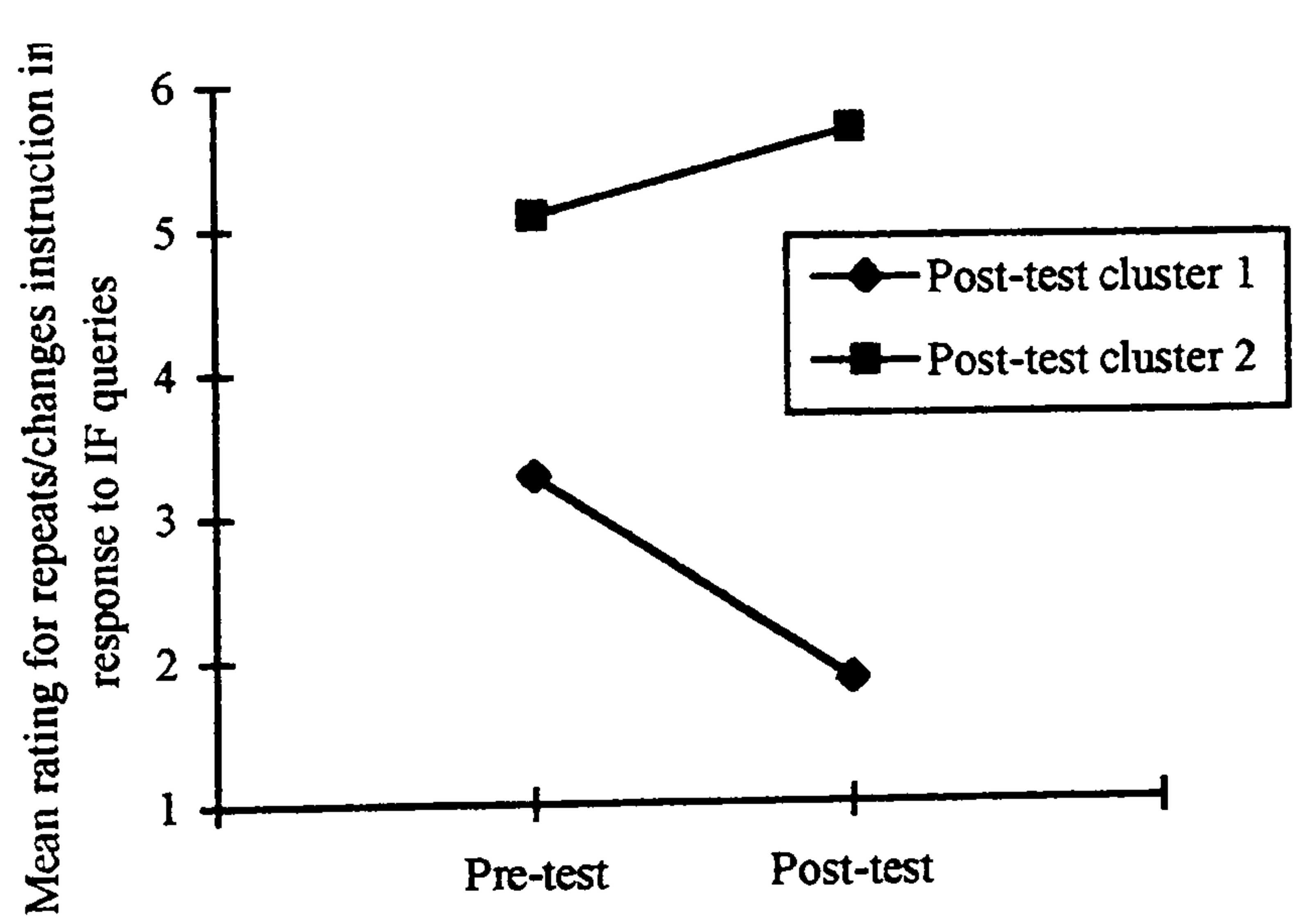
The means (and standard deviations) for the ratings of set 6 items: 'repeats/changes instructions without prompt from IF' and 'repeats/changes instructions in response to IF queries' at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test are presented in table 7N. Three cases are excluded from this analysis (two from cluster 1 and one from cluster 2) due to missing data points for the second item ('repeats/changes instruction in response to IF queries'). In these dialogues, the IFs did not query any IG instructions and therefore a rating for this item was not possible. One case from cluster 2 is also excluded due to an extreme value for the first of the two items at post-test.

Table 7N: Coding Frame: Means (SD) of ratings for set 6 items by post-test cluster

	Repeats/changes instruction without prompt from IF		Repeats/changes instruction in response to IF queries	
Post-test cluster	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	2.00	2.00	3.29	1.86
n=7	(1.00)	(1.00)	(2.29)	(0.69)
Cluster 2	2.10	1.90	5.10	5.70
n= 10	(0.99)	(0.88)	(1.66)	(0.48)

A multivariate analysis of variance[15] performed on the data summarised in table 7N indicated a significant multivariate main effect of cluster group ($F_{2,14}$ = 18.56, p < .001). Univariate tests demonstrated that information givers in cluster 2 were rated as more likely than information givers in cluster 1 to respond to IF queries by repeating or changing an instruction ($F_{1,15}$= 26.55, p < .001). There was also a univariate interaction between cluster group and time for the second of the two items ('repeats/changes instruction in response to IF queries'; $F_{1,15}$= 5.28, p = .036; see figure 7E).

Figure 7E: Coding frame: Interaction between post-test set 6 clusters and time for 'repeats/changes instruction in response to IF queries'



[15] Tests of the assumption of homogeneity of variance were satisfactory.

Simple main effects analysis indicated significant differences at post-test between the two clusters ($F_{1,30}$= 25.16, p < .001) with information givers in cluster 1 being rated as more likely than information givers in cluster 2 to repeat or change an instruction in response to a query from their partner. The decrease in ratings for cluster 2 information givers approached significance ($F_{1,15}$= 4.07, p =.062) as did the cluster group difference at pre-test ($F_{1,30}$= 3.59, p =.068).

Putting together these results with the data presented in contingency table 7I, it appears that increasing communicative performance is also associated with more frequent IG repetition or reformulation of instructions in response to queries from the IF at post-test (as indicated by membership of cluster 2). Eight out of the twelve children who belong to this cluster also belong to the Map Task improvers group.

On the other hand, decreasing frequency of these types of response over time (cluster 1 membership) is associated with membership of the group who do not improve on the communicative performance measure. Seven out of the nine children who belong to this cluster also belong to the Map Task non-improvers group.

Analysis 4: Post-test set 7 'IG Monitoring own performance'

The means (and standard deviations) for the ratings of the item 'monitoring own performance' at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test are presented in table 7O. One child from cluster 2 is not included in this analysis due to an extreme value on the post-test rating.

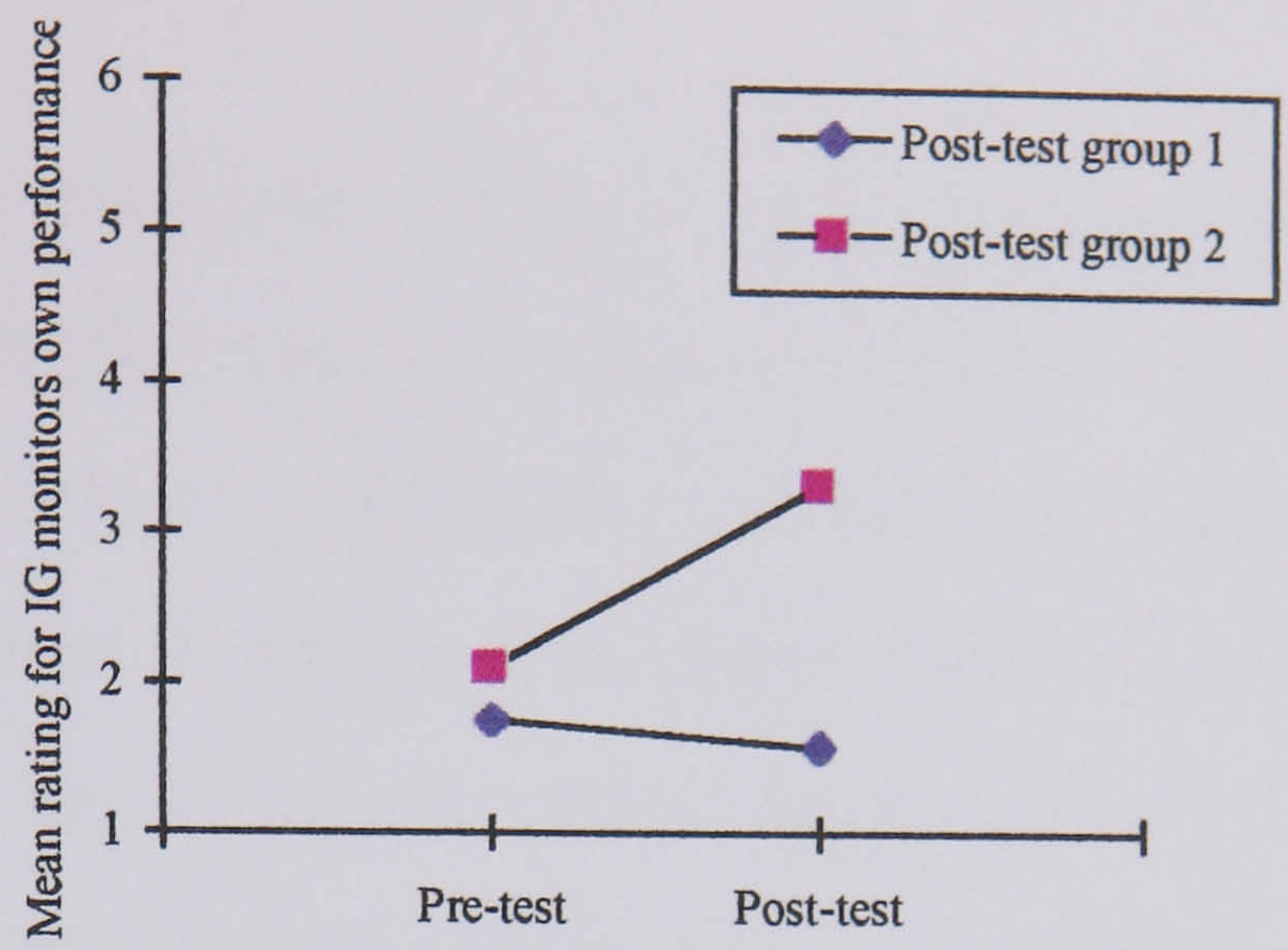
Table 7O: Coding frame: Means (SD) of ratings for set 7 item by post-test group

	IG monitors own performance	
Post-test cluster	Pre-test	Post-test
Cluster 1	1.75	1.58
n=12	(0.75)	(0.51)
Cluster 2	2.11	3.33
n=9	(0.93)	(0.50)

An analysis of variance[16] performed on the above data demonstrated significant main effects of time ($F_{1,19} = 9.70$, $p = .006$) and of cluster group ($F_{1,19} = 17.50$, $p<.001$). Ratings of frequency of IG monitoring averaged over all children increased significantly over time, with children in cluster 2 having overall ratings significantly higher than children in cluster 1. The analysis also demonstrated a significant interaction between cluster group and time ($F_{1,19} = 16.80$, $p <.001$; see figure 7F).

[16] Tests of the assumption of homogeneity of variance were satisfactory.

Figure 7F: Coding frame: Interaction between post-test set 7 clusters and time for 'IG monitors own performance'



Simple main effects analysis of this interaction indicated a significant change over time for children in cluster 2 ($F_{1,19} = 22.76$, $p < .001$). These information givers were rated as monitoring their own performance more at post-test than at pre-test. The difference between the cluster groups at post-test was also significant. Cluster 2 information givers were rated as monitoring their own performance more often than cluster 1 information givers ($F_{1,38} = 33.15$, $p < .001$). No other effects were significant.

Combining these results with the data presented in contingency table 7J indicates that gains in communicative performance is associated with increasing frequency with which the IG monitors his or her own performance. Seven out of the eleven children which belong to cluster 2 (who increase in IG monitoring) are also members of the Map Task improvers group. At the same time, eight out of the eleven children belonging to cluster 1 (who show no gains in IG monitoring behaviours over time) are also members of the group of children who failed to make improvements on the Map Task.

Summary

By putting the results of the analyses of variance together with the pattern of data provided by the contingency tables, it is possible to draw a preliminary picture of the nature of the differences in change in communication strategies for different groups of children. According to these results, membership of the Map Task improvers group overlaps significantly with membership of groups which demonstrate significant increases in the inclusion of feature information (set 3); are more likely to respond appropriately to IF queries (set 6); and demonstrate more IG self-monitoring behaviours (set 7).

At the same time, membership of the non-improvers group (dialogues which do not result in improved Map Task performance at post-test) overlaps significantly with membership of groups which provide information about fewer features over time, do less repeating or reformulating of their instructions in response to queries from their partners at post-test than at pre-test and remain doing very little self-monitoring in the role of information giver at post-test.

Expanding the picture

The analyses presented above have highlighted the strategy use which appears to be associated with changes in communicative performance. However, they are not able to tell us whether the *same* children make up the three clusters which are associated with gains in Map Task performance. It could be, for instance, that the children who demonstrate gains in the strategy captured by coding frame items in set 3 and who make associated gains in communicative performance are not the same children as those who demonstrate improvements in strategies captured by set 6 and set 7 items. Such a finding would support the claim that the intervention may have resulted in different changes for different children, all of which lead to gains in communicative performance. In order to establish whether this seems to be happening, the clusters associated with pre and post-test sets 3 and post-test sets 6 and 7 were placed against each other in another set of 2 x 2 contingency tables. Table 7P provides the one-tailed probabilities associated with the Fisher exact test for these contingency tables.

As can be seen from table 7P, only two combinations of sets (pre-test set 3 x post-test set 6 and post-test set 3 x post-test set 6) showed a significant association. Tables 7Q and 7R provide the 2 x 2 contingency tables for these sets.

Table 7P: Coding frame: *P* values associated with Fisher exact probability tests for pre-test set 3 and post-test sets 3, 6 and 7 clusters.

	Pre-test set 3: IG: Characteristics of provision of feature information	Post-test set 3: IG: Characteristics of provision of feature information	Post test set 6: IG: Repetition and reformulation of instructions	Post-test set 7: IG: Monitoring own performance
Pre-test set 3: IG: Characteristics of provision of feature information		0.30	0.09*	0.15
Post-test set 3: IG: Characteristics of provision of feature information			0.06*	0.54
Post-test set 6: IG: Repetition and reformulation of instructions				0.58
Post-test set 7: IG: Monitoring own performance				

* $p \leq 0.1$

Table 7Q: Coding frame: Contingency table for pre-test set 3 clusters against post-test set 6 clusters

	Post-test set 6: IG: Repetition and reformulation of instructions	
Pre-test set 3: IG: Characteristics of provision of feature information	Cluster 1	Cluster 2
Cluster 1	7	4
Cluster 2	1	5

χ^2=3.44; p =.09

Table 7R: Coding frame: Contingency table for post-test set 3 clusters against post-test set 6 clusters

	Post-test set 6: IG: Repetition and reformulation of instructions	
Post-test set 3: IG: Characteristics of provision of feature information	Cluster 1	Cluster 2
Cluster 1	6	3
Cluster 2	2	8

χ^2=4.23; p =.06

The significant associations between the cluster groups of set 3 and set 6 coding frame items demonstrate a relationship between changes in the provision of feature information (set 3) and changes in how the IGs respond to queries from the IF (set 6). Membership of the group of children who increase their feature information appears to be related to membership of the group of children who provide their partners with more appropriate responses. At the same time, membership of the group of children who do not increase their feature information appears to be related to membership of the group of children who get worse at responding to IF queries.

These analyses also confirm the overlap in membership of the pre-test and post-test set 3 clusters, and for this reason, the analyses which follow restrict themselves to considering just post-test set 3 clusters rather than both post-test and pre-test set 3 clusters.

Given that we already know that membership of set 3 cluster 2 and membership of set 6 cluster 2 are both associated with membership of the group of 'improvers' on the communicative performance measure, it would seem appropriate to conclude that making increasing use of these two strategies is implicated in improved communicative performance, whereas a failure to make use of these strategies results in no gain. This evidence is supported by data presented in the 2 x 2 contingency table presented as table 7S below.

Table 7S: **Coding frame: Contingency table for gains in set 3 and set 6 strategies against Map Task improvement groups**

	Cluster membership	
Map Task improvement group	Membership of neither cluster demonstrating increasing strategy use	Membership of both clusters demonstrating increasing strategy use
Non-improvers	6	3
Improvers	0	5

$\chi^2 = 7.612; p < .01$

Table 7S presents the number of children who are members of neither cluster which demonstrated increasing use of the strategies associated with sets 3 and 6 (that is, membership of set 3, cluster 1 *and* set 6 cluster 1) and the number of children who are members of both clusters which are characterised by increasing strategy use (that is, set 3, cluster 2 *and* set 6 cluster 2) against Map Task improvement group. For the improvers, all the children provide more feature information at post-test than at pre-test *and* increase the frequency with which they give appropriate responses to queries for the improvers (no children make increases in neither strategy, 5 make increases on both). For the non-improvers, a significant association exists between membership of this group and those groups of children who do not improve on these strategies (6 children make increases in neither strategy, 3 children make increases on both). This relationship is statistically significant ($\chi^2 = 7.612$; Fisher exact test $p < .01$).

The fact that there was no significant association between ratings on either set 3 or set 6 coding frame items and ratings on set 7 coding frame items (the only other set that was significantly related to changes in communicative performance) suggests that the former group of 'improving' children appears to be distinct from the group of children whose changes in communicative performance is associated with changes in self-monitoring behaviours (set 7).

For the children who do not demonstrate gains in communicative performance, there also seem to be two distinct groups; those who include fewer features in their instructions over time and respond to their partners less effectively (sets 3 and 6) and those who fail to increase their use of self-regulatory behaviours (set 7).

Expanding the picture further

We now have evidence to suggest that changes in communicative performance may be the result of different kinds of strategy change for different children. In order to expand the picture further, it is necessary to establish whether those strategies which have been implicated are related to any of the other strategies that were examined using the coding frame. In order to do this, a third set of 2 x 2 contingency tables were examined. This time they represent the post-test cluster groups associated with the three sets of items already analysed (sets 3, 6 and 7) against the clusters associated with each of the other sets of coding frame items. Table 7T provides the one-tailed probabilities associated with the Fisher exact test for these contingency tables.

Table 7T reveals several significant associations worthy of further analysis. First, take the association between set 3 clusters and set 2 clusters. We have already established that providing more feature information at post-test (set 3, cluster 2) is associated with more appropriate responses to IF queries (set 6, cluster 2) and with improved communicative performance. What the association demonstrated in table 7T suggests is that this type of strategy use may also be related to the use of strategies captured by coding frame items belonging to set 2 ('accuracy of information-giving'). Table 7U provides the contingency table demonstrating this association.

Table 7T: Coding frame: *P* values associated with Fisher exact probability test for post-test set 3, 6 and 7 clusters against clusters of all other post-test sets.

	Set 3: IG: Characteristics of provision of feature information	Set 6: IG: Repetition and reformulation of instructions	Set 7: IG: Monitoring own performance
Set 1: IG: Type of information contained in instructions	0.66	0.25	0.01*
Set 2: IG: Accuracy of information giving	0.02*	0.60	0.23
Set 3: IG: Characteristics of provision of feature information		0.06*	0.54
Set 6: IG: Repetition and reformulation of instructions	0.06*		0.58
Set 7: IG: Monitoring own performance	0.54	0.58	
Set 10: IF: Responses to misunderstandings/mishearings	0.13	0.20	0.06*

* $p \leq 0.1$

Table 7U: Coding frame: Contingency table for post-test set 3 clusters against post-test set 2 clusters

Post-test set 3: IG: Characteristics of provision of feature information	Post-test set 2: IG: Accuracy of information-giving	
	Cluster 1	Cluster 2
Cluster 1	1	6
Cluster 2	6	1

χ^2=7.14; p =.02

In order to establish the nature of the strategy use of the two groups of children identified by the two set 2 clusters, an analysis of variance was performed, using the same design as those analyses of variance presented above (independent variables: time (2 levels: pre-test and post-test) and group (2 levels: groups 1 and 2 previously determined by the cluster analysis); dependent variable(s): the ratings of items included in the set).

The means (and standard deviations) for ratings of set 2 items ('accuracy of information-giving') at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test are shown in table 7V. One case from each cluster has been excluded due to missing data points. In cluster 1, one child did not use directional information at pre-test and therefore rating accuracy of directional information is not relevant. Similarly in cluster 2, one child did not use feature information, so rating accuracy of feature information is also not relevant.

Table 7V: Coding Frame: Means (SD) of ratings for set 2 items by post-test cluster

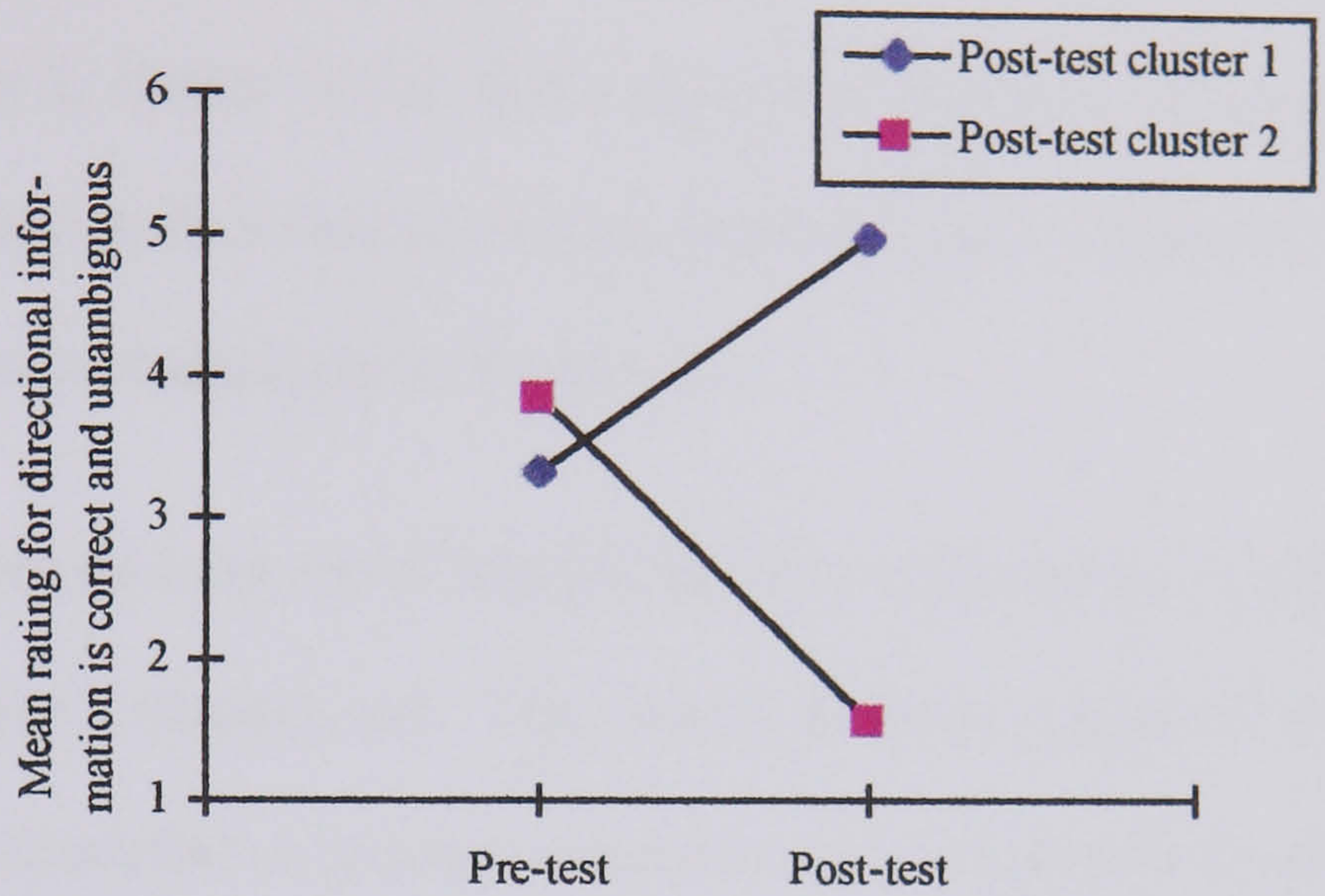
	Feature information is correct and un-ambiguous		Directional information is correct and un-ambiguous	
Post-test cluster	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	5.16	6.00	3.33	5.00
n=6	(1.30)	(0.25)	(1.66)	(0.66)
Cluster 2	5.71	5.86	3.86	1.57
n=7	(1.32)	(0.26)	(1.68)	(0.67)

A multivariate analysis of variance[17] was performed on this data using the design specified. This demonstrated a significant multivariate main effect of cluster group ($F_{2,10}$= 4.70, p =.037) and a significant multivariate interaction between cluster group and time ($F_{2,10}$= 7.35, p =.011). Univariate tests indicated the main effect of cluster group was carried just by the second item, 'directional information is correct and unambiguous' ($F_{1,11}$= 6.11, p =.031). Averaged over time, directional information used by children in cluster 1 was significantly more likely to be rated as correct and unambiguous than children in cluster 2. Similarly, the univariate tests indicated that the interaction

[17] Homogeneity of variance could not be tested here due to small cell sizes.

between cluster group and time was carried by the same item ($F_{1,11}$= 15.97, p =.002; see figure 7G).

Figure 7G: Coding frame: Interaction between set 2 post-test clusters and time for ' directional information is correct and unambiguous'



Simple main effects analysis of this interaction illustrated that there was a significant difference between the two groups at post-test, with children in cluster 1 being rated as providing more accurate directional information than children in cluster 2 ($F_{1,22}$= 19.94, p < .001). The differences in ratings over time was significant for both cluster groups of children. Children in cluster 1 were rated as giving more accurate directional information at post-test than at pre-test ($F_{1,11}$= 5.27, p = .042) and children in cluster 2 were rated as giving less accurate directional information at post-test than at pre-test ($F_{1,11}$= 11.57, p=.006). No other effects were significant.

Returning now to the contingency table shown in table 7U, this demonstrates a significant overlap in membership of clusters for set 2 items and set 3 items. Children who increase the accuracy of their directional information (set 2, cluster 1) are likely to also be members of the cluster who provide an increasing number of features in their instructions by post-test (set 3, cluster 2). At the same time, children whose directional information becomes less accurate (set 2, cluster 2) are likely also to be members of the group who use fewer features in their instructions by post-test (set 3, cluster 1). 12 out of 14 children can be categorised in these ways.

We now have an even more detailed picture of the nature of change in some of the children's strategy use. The overlap between clusters from sets 3 and 6 (table 7Q) identified a group of children who improved in communicative performance and who demonstrated increasing use of feature information in their instructions also over the course of the intervention as well as responding more appropriately to their partner's queries. What the data presented in table 7U indicate is that an additional characteristic of these children is that they become increasingly accurate at providing directional information (set 2). At the same time, there are a group of children who fail to make gains in the Map Task, use fewer features over time, are less responsive to their partner's queries and become increasingly less accurate in their provision of directional information.

We now turn to the remaining two significant associations shown in table 7T. These both relate to associations between the set 7 clusters. The first demonstrates a relationship between set 7 cluster membership and set 1 cluster membership. The contingency table demonstrating this relationship is provided in table 7W.

Table 7W: Coding frame: Contingency table for post-test set 7 clusters against post-test set 1 clusters

	Post-test set 1: IG: Type of information contained in instructions	
Post-test set 7: IG: Monitoring own performance	Cluster 1	Cluster 2
Cluster 1	10	2
Cluster 2	2	8

χ^2=8.82; p =.01

The second demonstrates a relationship between set 7 cluster membership and set 10 cluster membership. This contingency table is provided in table 7X.

Table 7X: Coding frame: Contingency table for post-test set 7 clusters against post-test set 10 clusters

	Post-test set 10: IF: Responses to misunderstandings/ mishearings	
Post-test set 7: IG: Monitoring own performance	Cluster 1	Cluster 2
Cluster 1	9	2
Cluster 2	4	6

χ^2=3.88; p =.06

These two contingency tables (tables 7W and 7X) provide more information to add to the picture of children's strategy use. They suggest that changes in IG self-monitoring behaviours are also related to some aspect of set 1 strategy use ('type of information contained in instructions') and some aspect of set 10 strategy use ('responses to misunderstandings/mishearings'). Once again, in order to establish the nature of the cluster differences, two analyses of variance were performed on the data associated with set 1 and set 10 items. The design of the analyses was identical to those presented above.

First, set 1 items. The means (and standard deviations) for ratings of set 1 items ('type of information contained in instructions') at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test are shown in table 7Y. The multivariate analysis of variance for this set of data[18] revealed a significant multivariate main effect of cluster group ($F_{3,18}$= 12.97, p <.001).

Univariate tests indicated main effects of cluster group for all three dependent variables ('instructions contain feature information': $F_{1,20}$= 10.88, p = .004; 'instructions contain directional information': $F_{1,20}$= 42.85, p < .0001; 'instructions contain prepositional information': $F_{1,20}$= 4.67, p = .043).

Children in cluster 1 were rated as using more instructions that contained feature information than children in cluster 2, whereas children in cluster 2 were rated as using more instructions that contained directional information and more instructions that contained prepositional information than children in cluster 1.

In addition, univariate tests suggested that instructions containing prepositional information marginally increased over time ($F_{1,20}$= 3.66, p =.07).

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[18] Tests of the assumption of homogeneity of variance were satisfactory.

Table 7Y: Coding Frame: Means (SD) of ratings for set 1 items by post-test cluster

	Instructions contain feature information		Instructions contain directional information		Instructions contain prepositional information	
Post-test cluster	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	5.33	5.75	2.58	1.58	1.08	1.33
n=12	(1.34)	(0.70)	(1.56)	(0.78)	(0.50)	(0.88)
Cluster 2	4.40	4.50	4.00	4.60	1.50	2.00
n=10	(1.33)	(0.70)	(1.54)	(0.77)	(0.50)	(0.89)

Second, set 10 items. Table 7Z provides the means (and standard deviations) for the ratings of set 10 items ('IF responses to misunderstanding/mishearing') at pre-test and post-test for the two clusters of children determined by the cluster analysis at post-test. One case from cluster 1 has been excluded from this analysis due to a missing data point for the second pre-test item where the IG instructions have required no clarification.

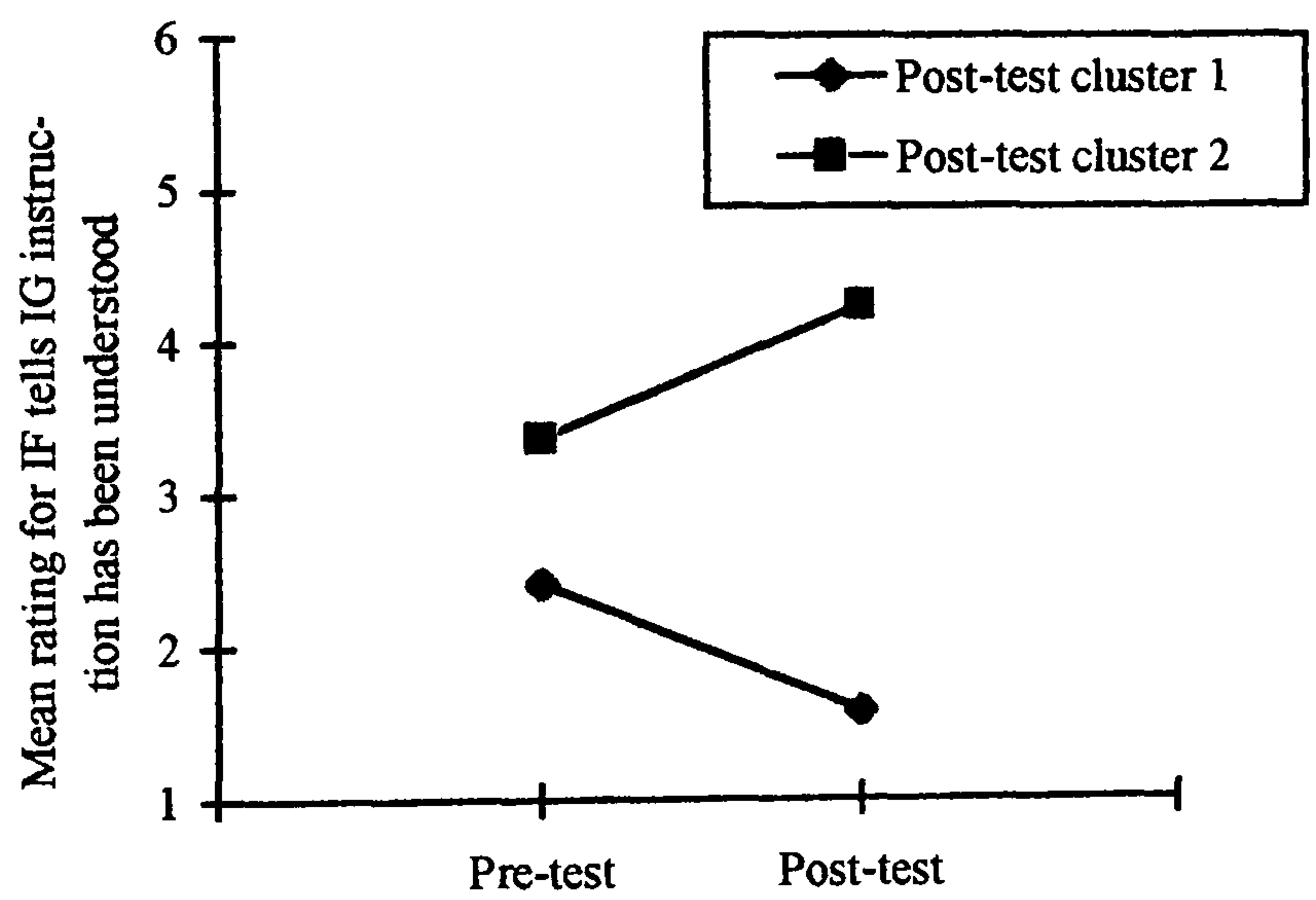
Table 7Z: Coding Frame: Means (SD) of ratings for set 10 items by post-test cluster

	IF asks a question		IF tells IG instruction has been understood or completed	
Post-test cluster	Pre-test	Post-test	Pre-test	Post-test
Cluster 1	2.92	3.08	2.41	1.58
n=12	(1.07)	(0.87)	(1.54)	(0.65)
Cluster 2	3.25	3.38	3.38	4.30
n= 8	(1.04)	(0.85)	(1.51)	(0.64)

A multivariate analysis of variance[19] performed on the data summarised in table 7Z indicated a significant multivariate main effect of cluster group ($F_{2,17} = 14.52$, $p < .001$) and a significant multivariate interaction between cluster group and time ($F_{2,17} = 3.70$, $p = .046$). Univariate tests demonstrated that the main effect of cluster group was due to the effect on ratings of the second item, 'IF tells IG instruction has been understood or completed' ($F_{1,18} = 16.25$,

p = .001). Information followers in cluster 2 were rated as more likely than information followers in cluster 1 to inappropriately tell their partner that an instruction had been understood or completed when in fact it needed clarification. Univariate tests also demonstrated that the interaction effect was being carried by ratings on this same item ($F_{1,18}$ = 6.22, p =.023; see figure 7H).

Figure 7H: Coding frame: Interaction between set 10 post-test clusters and time for item 'IF tells IG instruction has been understood and completed after misunderstanding /mishearing'



Simple main effects of this interaction indicated a significant difference in ratings at post-test ($F_{1,36}$ = 22.26, p < .0001) with children in cluster 2 being rated as more likely to tell their partner an instruction had been understood or completed than children in cluster 1.

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[19] Tests of the assumption of homogeneity of variance were satisfactory.

There was also a significant difference between pre-test ratings and post-test ratings for children in cluster 1 ($F_{1,18} = 3.70, p < .070$) and children in cluster 2 ($F_{1,18} = 2.72, p = .010$). Cluster 1 children had lower ratings at post-test than at pre-test, cluster 2 had higher ratings at post-test than at pre-test.

These two analyses of variance provide additional information about the characteristics of the children's strategy use. The first demonstrates that children in set 1 cluster 1 are more dependent on feature information when providing instructions, whereas children in set 1 cluster 2 use a range of information in their instructions. The second analysis demonstrates that children in set 10 cluster 1 are less likely at post-test to respond to an instruction that requires clarification with an inappropriate acknowledgement that they have completed the instruction. On the other hand, children in set 10 cluster 2 are more likely at post-test to give such inappropriate messages.

We can now put this information together with that provided in the contingency tables associated with these sets of items (see tables 7W and 7X). Both sets of items were shown to be significantly associated with set 7 items (IG self-monitoring). If you are a child who depends on providing just feature information in one's instructions (set 1, cluster 1), you are likely also to be a member of the group of children who do not do much self-monitoring as IGs (set 7, cluster 1). At the same time, if you are a child who uses directional and prepositional information as well as feature information (set 1, cluster 2), you are likely also to be a child who does monitor their own behaviour (set 7, cluster 2). 18 out of a total of 22 children can be classified in this manner.

If you are a child who over time demonstrates a reduction in ineffective strategies used in response to misunderstandings or mishearings (set 10, cluster 1), you are also likely to demonstrate an increasing use of IG self-monitoring behaviours (set 7, cluster 1). An increase in ineffective responses (set 10, cluster 2) is associated with limited use of IG self-monitoring behaviours (set 7, cluster 2). 15 out of 21 children can be classified in this way.

So it would seem that for the group of children whose improvements in communicative performance is associated with an increasing frequency of self-monitoring behaviours used in the role of IG, there are associations with two other strategies. These are the use of a range of type of information in one's instructions (set 1) and a decrease over time of the use of inappropriate strategies to deal with miscomprehensions when taking the IF role (set 10). Children who do not demonstrate communicative gain, tend not to demonstrate these two characteristics.

Overall summary

According to the results presented in this chapter, gains on the measure of communicative performance (the Map Task) are associated with particular types of ratings of three coding frame items. First, information givers in the 'improvers' group provide information about more features at post-test than at pre-test (set 3: number of features described by the IG). Second, the frequency with which questions from the information followers in this group are responded to by either a repetition of the original instruction or a reformulation of the instruction is greater both at pre-test and post-test (set 6: repeats/changes an instruction in response to IF queries). Third, information givers in the 'improvers' group use more self-monitoring behaviours at post-test than at pre-test (set 7: IG monitors own performance).

There is a statistically significant association between the use of the first two of these strategies but no association between these and the third. This suggests that the children who make up the former two sets are distinct from those children whose changes in communicative performance is associated with characteristics of their self-monitoring behaviours. That is to say, the children whose improving performance on the Map Task can be explained by reference to increasing use of feature information and more frequent appropriate responses are *not* generally the same children whose improving performance can be explained by increasing self-monitoring behaviour. Similarly for the non-improvers – different children are failing to make gains in performance for different reasons.

Not only is providing information about a greater number of features over time (set 3) associated with an greater frequency of repetition or reformulation of an instruction in response to a query from the information follower (set 6) but it is also associated with improving accuracy in the provision of directional information (set 2). At the same time, providing information about fewer features over time is associated with fewer repetitions or reformulations of instructions and with less accurate directional information at post-test.

Turning now to the other explanation for improved Map Task performance, increases in IG self-monitoring behaviours (set 7) are associated with providing instructions containing directional and prepositional information alongside feature information at both pre-test and post-test (set 1) and with fewer occasions at post-test than at pre-test in which the information follower tells the information giver that an instruction has been understood or completed when in fact it requires clarification (set 10). Little IG self-monitoring behaviour at pre-test and post-test, on the other hand, is associated with a dependence on providing just feature information in instructions at pre-test and post-test (set 1) and an increase in the frequency in which instructions which required clarification are responded to as if they have been understood or acted upon (set 10).

Two clear categories of change therefore, have emerged. The first category of change is characterised by increased provision of feature information, increased accuracy of directional information and more appropriate responses to IF queries. These results suggest that the children have a basic or 'surface' understanding of the requirements of the Map Task, characterised by a view that the responsibility for completing the task successfully lies primarily with the information giver who needs to provide appropriate information. The task requires the IG to provide information about the route and in doing so to answer questions asked by the IF. Over the course of the intervention programme, information givers do more of these 'information-giving' behaviours.

The second category of change is characterised by increasing use of strategies used by the children which serve to monitor each other's understanding and to a certain extent, regulate the interaction itself. These changes comprise increasing self-monitoring by the IG, an emphasis on providing a wider range of information in instructions and more appropriate responses by the IF when the IG provides unclear information. The changing use of these strategies suggest that the children have a broader and more sophisticated understanding of the requirements of the task – that it is important that both partners take some responsibility for creating and maintaining mutual understanding or intersubjectivity within the interaction.

Analysis of individual cases

At this point it is worth examining the specific cases which have been used in the preceding analyses, to help establish which of the two broad categories of reasons for change in communicative competence explain individual children's behaviours. Table 7AA shows the pattern of cluster membership for dialogues which were associated with improved performance on the Map Task. Shown here is cluster membership of only those sets which were demonstrated as being significantly associated with the Map Task improvement groups, rather than the pattern of cluster membership for the full range of sets of items included in the preceding analyses. Dialogues for which improvement on the Map Task is claimed to be the result of the first category of changes (information-giving behaviours) are labeled 'change category 1'. Dialogues for which improved communicative performance can be explained by reference to the second category of change (regulatory behaviours) identified by the analyses are labeled 'change category 2'.

Table 7AA: Classification of Map Task improvers to categories of strategy change

	Information-giving strategies		**Regulatory strategies**	
Dialogue case no.	Number of features described (set 3)	Repetition/ reformulation of instruction (set 6)	IG self-monitoring (set 7)	'Change category'
2	✓			
3		✓	✓	2
4	✓	✓	✓	1 & 2
6		✓	✓	2
7	✓	✓		1
9			✓	2
12	✓	✓	✓	1 & 2
14	✓	✓	✓	1 & 2
15		✓	✓	2
18	✓			
21	✓	✓		1

Table 7AA shows that, for the majority of children, gains in performance on the Map Task can be explained by one or both of these categories of change - increasing proficiency in *information-giving* strategies and/or *regulatory* strategies. Two cases (cases 2 and 18) have not been categorised due to them only showing increasing use in one of the strategies associated with increasing proficiency in information-giving strategies. Reasons for this are discussed below (section 7.5.1).

Characteristics of pre-test performance

Consider now the initial uses of those strategies which make up the two categories of change. At pre-test, the children who demonstrate increasing use of regulatory strategies generally made *more* use of these strategies at pre-test than the children who did not demonstrate changes in these strategies (see table 7Y, figure 7H and figure 7J). This pattern is also evident if one looks back at pre-test scores for another strategy that may be considered as regulatory and which were not included in the earlier analyses of variance due to statistical limitations. Children with increasing self-monitoring scores (set 7) and as discussed above, higher pre-test scores, were also observed to have higher scores at pre-test and post-test on the regulatory item 'repeats/changes instruction without prompt from IF' (set 7, cluster 1: $\overline{X}$=1.67; set 7, cluster 2: $\overline{X}$=1.67; main effect of cluster group: $F_{1,20} = 5.86, p$=0.025).

This is not the same pattern for those children who demonstrate increasing proficiency in information-giving strategies. These children provided *less* feature information at pre-test than those children who did not make improvements in this strategy (see figure 7F) and were similarly accurate in their directional information as children who did not increase in accuracy (see figure 7I). The one strategy in which these children did start with higher scores at pre-test than the children who did not demonstrate change in strategy use was frequency of appropriate response to IF questions (see table 7G). Within the class of information-giving strategies which appear to have an effect on performance, this is the only *responsive* strategy and requires an appreciation of the obligatory nature of certain utterances within an interaction in order to preserve mutual understanding.

7.5 Discussion

The preliminary analysis of the coding frame data revealed relatively little information about the children's strategy use over and above what the previous analyses have demonstrated. However, the effects that were demonstrated tapped aspects of strategy use which had not been directly addressed in earlier analyses. A difference revealed by the analysis between the group of children who demonstrated improvements on the measure of communicative performance (the Map Task) and the group of children who did not demonstrate improvements constituted the way the information givers responded to queries from their partners. Children in the improvers group were more likely to provide the information follower with alternative information in these circumstances. There were also changes observed over time. Information followers were shown to tell their partners about aspects of their own map more at post-test than at pre-test. This latter finding is certainly unsurprising given findings presented in earlier chapters. There it was established that at post-test the children in the role of information follower increased the amount they contributed to the interaction. What the present result indicates is that at least part of this increasing effort consists of providing appropriate information about their own map. Information followers were also shown to become more accurate in the following of instructions about features on the route.

The results of the preliminary analysis also demonstrated that information followers in the group of children who demonstrated improvements in communicative performance were more likely to tell their partner that they had completed or understood an instruction despite its ambiguity or lack of clarity. Although on the face of it, this can be viewed as a less than effective strategy, it is only ineffective if the information follower appreciates that the instruction is ambiguous. If the IF does not perceive the ambiguity, informing the IG that they are in a position to continue with the next instruction *is* an effective strategy which advances the interaction.

By extending the analysis of the coding frame data to take into account the fact that there may be different changes in strategy use for different children, we can begin to build a clearer picture of the various effects of the intervention programme and how these relate to change in communicative performance. Two categories of change are proposed. One concerns strategies which are primarily characteristic of the task being viewed as one which requires the information giver to take responsibility for the success by providing clear information and answering questions when asked. The second involves strategies which serve a more regulatory function within the interaction and are used to maintain mutual understanding.

Interestingly, this distinction between the different types of factors which may be subject to change over the course of the intervention was also raised in the discussion following the presentation of the case studies. Here, attention was drawn to the observation that for some of the children, changing performance on the Map Task might be the product of various factors associated with the children's understanding about the requirements of the task. For other children, change was considered to be due to improvements in the effectiveness of the communication strategies which were being used by the children. The present analysis confirms such speculation and provides more precise information about the specific strategies which may bring about such change.

The observations about the relationship between pre-test performance and changes in strategy use for the different kinds of strategies which appear to be important, suggest that the *regulatory* aspects of the intervention were only effective for children who already had some appreciation or proficiency in the use of these strategies in the first place. This is theoretically interesting if one considers Vygotsky's notion of the zone of proximal development (Vygotsky, 1962). It would appear that assisting the children to use regulatory strategies at the level set by this intervention was appropriate only for those children who were already skilled (albeit in a limited way) in using these strategies.

That is, the intervention provided a level of assistance appropriate for only some of the children's ZPDs.

7.5.1 Problematic cases

For some dialogues changes take place at both the information-providing level and the regulatory level, for others, changes are only observed in one of the categories of strategy (see table 7AA). However, two dialogues (cases 2 and 18) do not fit neatly into either classification. In order to determine what it is about these cases which means that their improved performance on the Map Task cannot be explained by reference to changes in these sets of behaviours, it is necessary to return to the completed coding frames and associated transcripts of these dialogues.

First, take case 2. This pair of dialogues has already been analysed in detail in chapter six and forms part of case study 2 (dialogues 3 and 4). The case study confirms the fact that IG responses to IF queries did not change over time. The result of improved Map Task performance in this case appears to be due partly to the unfortunate move by the IF at pre-test to an incorrect feature early on, which caused problems which the pair were not able to sort out later, and partly to the addition of directional information by the information giver at post-test, which the IF was able to make use of. Of course, increasing use of directional information has not demonstrated itself as being a strategy which explains improved performance for a significant number of children in the study and is therefore not considered as a candidate for inclusion in the information-providing strategy category described above.

Case 18 is also straightforward to explain. Post-test performance is very effective – the information giver provides clear instructions containing feature information, the information follower tells her partner when he mentions a missing feature, and the information giver responds to this by explicitly telling her to move on to the next feature. However, there was a marked difference at pre-test. Here the information-giver provided information about only one feature in the whole dialogue. The problems associated with this strategy were exacerbated by the information follower failing to tell her partner about the ambiguity of his instructions. In addition to this, the information follower also started drawing her route in the wrong place. Given these observations, the change in route-drawing performance on the Map Task for this pair of children, then, is expected. The reason why this pair's performance cannot be classed as due to improving information-giving strategies (see table 7Z above) is that although feature information increased in frequency, there were no queries at post-test from the IF, so necessarily, IG responses to IF queries were not observed.

7.5.2 Issues of appropriateness and metacognition

One of the main aims of this second phase of analysis was to consider the *appropriateness* of the use of a range of strategies rather than purely the frequency with which these strategies are observed. Appropriateness was considered by taking into account the specific context in which the strategies were being employed. This entailed, for example, recognising the children's understanding of the task and the characteristics of earlier communications.

Being able to make such appropriate use of strategies demands more than just a knowledge of how to formulate a particular type of utterance. Rather, it demands that you understand when or how to use a particular strategy for a particular purpose. For example, what is important here is not the number of questions used, but whether the questions are used in appropriate situations and in appropriate ways in order that mutual understanding can be achieved. In this way, appropriateness necessitates metacognitive awareness of your own and your partner's understanding and misunderstandings. Given that the intervention originally set out to promote generalisation of higher-order metacognitive and regulatory skills, the findings of the second phase of analysis are very encouraging.

7.5.3 Implications for methodology

The results of this phase of analysis also have implications more generally for the methodologies used in studies which analyse aspects of collaborative interactions. Results of standard dialogue measures, such as counts of the number of words, utterance types or turns, are problematic on two counts. First, they necessarily represent some aspect of combined performance rather than an individual's contribution within the collaborative interaction. Second, they fail to adequately take into account the appropriateness of the use of certain types of utterances or strategies. So, for example, we really want to know *not* whether children ask a lot or a few questions but whether these questions are required or whether they are appropriate in a given situation. To a certain extent, some standard dialogue measures are able to take this into account by looking at the immediately preceding utterance or utterances. However, the issue is not as straightforward as this. Appropriateness might vary from one interaction to another depending on for example, shared understanding of the task, the immediate communicative context and characteristics of previous interactions. Only by considering factors such as these is it possible to come to a prudent conclusion about the abilities of an individual's behaviour.

The method employed here has also highlighted the fact that developmental change can be the product of a range of factors, which may vary from one child to another, depending, for example, on the starting point. This has important implications for both the design and the evaluation of intervention programmes which seek to promote and measure change in children's behaviours.

Chapter 8: Discussion

8.1 Review of the findings

The theoretical framework underpinning the thesis comes primarily from Vygotsky; social interaction and communication play a central role in the development of a range of higher mental processes. The central aim of the research was to explore the extent to which this theoretical perspective can be used to design an appropriate intervention programme aimed at promoting self-regulation in a group of children with moderate learning difficulties.

In line with Brown and her colleagues (Brown & Campione, 1986), it was proposed that the reason why some children find much of school learning demanding is due to their having poor metacognitive or self-regulatory skills which makes generalising their learning from one situation to a new situation problematic. The intervention programme aimed to provide the children with certain strategic communicative behaviours and the opportunity for practising using these within a scaffolded, collaborative environment. It was predicted that changes in the use of regulatory strategies would result in pre- to post-intervention gains in communication.

A range of measures was used to ascertain the extent to which this hypothesis could be supported. These measures included cognitive and regulatory strategies associated with the two roles of information-giving and information-following which are intrinsic aspects of the communication task employed.

The children's use of several of these strategies was observed to change over the course of the intervention, and the early analyses indicated that this was primarily the case for strategies typically used by children in the information follower role. Indeed, out of all the measures used in the first phase of analysis, only one change in information giver performance was observed; increasing frequency in clarifications of information followers' queries. With respect to changes over time for information-following strategies, information followers generally made more contributions to the interaction, as indicated by an increasing turn length. These contributions were marked by an increasing number of attempts to check understanding (chapter three) and to provide the information giver with more information about the IF map (chapter seven). At the same time, information followers generally became less likely to respond to their partner with an acknowledgement (chapter three). A difference was also observed in the manner in which the information followers requested clarification from their partners. A greater number of 'potential' requests at post-test offered the children greater opportunity for task-related discussion than at pre-test (chapter four). These findings were also confirmed by the observation made in chapter four that children's response to ambiguity in instructions generally became more effective and they support the prediction that the intervention programme would promote the use of communicative strategies which are self-regulatory in nature. In addition, information followers were found to become more accurate in following instructions which provided information about the features on the IG route (chapter seven).

The data presented in chapter three also provided an opportunity to make some tentative comparisons of the communicative abilities of the MLD children who participated in the study and those of children and adults without learning difficulties when presented with the same task. The results suggested that whilst the MLD children demonstrated the use of a range of utterance functions not unlike those expected from older children and adults, the *extent* to which different utterance functions were used mirrored younger children's behaviours. That is, the MLD children's interactions were dominated by instruction giving by the information giver, rather than being characterised by equal frequencies of IG instructions and IF questions (IGs also used more words and longer turns than IFs). This suggests that even by the end of the intervention the MLD children in general were still not appreciating that successful performance on this type of task requires contributions from both interlocutors in order to achieve mutual understanding.

However, despite these gains in children's communicative strategies, when a clearly defined measure of communicative success (the Map Task) was taken, gains over time were only demonstrated for half the children who participated in the intervention programme. In an attempt to explore the potential reasons for this dissociation, differences in strategy use for the children who improved on the Map Task and for the children who did not show such improvement were explored. The communicative process measures used in the first phase of analysis revealed virtually no differences between these groups. Children demonstrating improvements on the Map Task appeared to be more likely both at pre-test and post-test to provide clarifications to their partners after some indication of difficulty (chapter three) and there was some evidence of a change in what the information followers in this group felt were the requirements of the task. When presented with an instruction which contained two elements of information (out of a possible three), these children were less likely to indicate that they had a difficulty carrying out the instruction at post-test. Children who did not demonstrate improvements on the Map Task, on the other hand, continued to provide more 'beneficial' responses to instructions that contained less than the ideal amount of information regardless of how many elements of information were included (chapter four).

The second phase of analysis, which took appropriateness of strategy use into account, revealed two other differences in strategy use between those children who improved on the communication performance measure and those children who did not improve. These analyses demonstrated that information givers in the former group were more likely to effectively respond to queries from their partners (that is by repeating or changing the instruction that was not understood) and information followers were more likely to indicate that they had understood an instruction when actually it was ambiguous or unclear. It was argued in chapter seven, that this latter finding can be interpreted as an effective strategy if the information follower has not actually appreciated that the instruction has been ambiguous, in that it lets the information giver know that he or she can proceed to the next instruction. In fact this confirms the claim made about the finding in chapter four that Map Task improvers were more likely to provide 'ineffective' responses to instructions that contained two elements of information. These are only ineffective responses if the instruction itself has been judged to be unclear. If the information follower makes the judgement that it can be followed, then it is perfectly appropriate for them to tell the information giver that all is well.

Overall then, there was little evidence of differences in the communicative strategies used by children who improved on the Map Task and children who showed no improvement. Furthermore, it can be argued that those changes which were observed seemed to comprise changes in cognitive strategies rather than metacognitive or regulatory strategies.

The findings from the first phase of analysis led to a review of the kinds of measures which are generally used to assess communicative competence on this type of task and it was argued that, particularly for the children participating in the current study, this type of approach may not be the most appropriate. It was also argued that changes in performance on a task such as the Map Task after the kind of intervention programme employed in this study may be explained by changes in different kinds of communicative strategies for different children.

The second phase of analysis sought to address these two issues and the case studies reported in chapter six and the analyses reported in chapter seven appeared to confirm these claims. By performing a detailed analysis of the range of cognitive and metacognitive strategies that a sample of children were employing and considering the appropriateness of such strategy use, the case studies highlighted the fact that improvements in the Map Task could be explained in different ways for different pairs of children. The series of analyses presented in chapter seven supported this claim and indicated two typical sources of change in the children's strategy use which could explain changes in Map Task performance. Specifically these included strategies which typify a view of the task as being one which revolves around the information giver giving instructions and responding to their partner when such instructions are queried; and strategies which serve a more specific regulatory function within the interaction. An important element of the examination of these strategies during the second phase of analysis was the decision to assess the appropriateness of strategy use, thus both categories of change incorporate some assessment of the children's metacognitive or self-regulatory behaviours.

In addition to the analyses of children's strategy use, the thesis also sought to answer a wider question about the implications of changes in regulatory communicative behaviours for other school-type tasks. The data presented in chapters two and three enable tentative claims to be made about the relationship between communication and these kinds of task; significant associations between communication skill and reading skill were observed before the intervention (chapter two) and, unlike children who demonstrated no changes in the measure of communication, children who demonstrated improved communication performance were also shown to make gains on tests of reading and IQ (chapter three).

The thesis raises a range of issues, both theoretical and methodological, which are explored further below. These include:

- how Vygotskian assumptions about the nature of the zone of proximal development and the process of internalisation can be demonstrated over the course of an intervention programme and what factors contribute to successful outcomes via this process;
- the role of self-regulation in the development of competent communication for this group of children;
- the challenge of interpreting individual contributions within collaborative interactions and the potential problems associated with more traditional methodologies;
- the difficulties associated with making claims about gains in performance for a population which demonstrates high variability in performance.

8.2 Theoretical issues

The central theoretical framework of this thesis is a Vygotskian one. Higher level cognitive processes are realised during interactions with others. When taking part in social interactions children are observing, experimenting with and practising using a range of behaviours which gradually become internalised and employed on an intra-individual level. By scaffolding these interactions such that these strategic behaviours were made explicit, the intervention programme provided the opportunity for the children to apply these strategies across a range of collaborative tasks and transfer this competence to new situations.

The results of the first phase of analysis reported in chapter three provided empirical support for Vygotsky's concept of the zone of proximal development (ZPD). Learning through collaboration with others is most likely to occur when your partner is able to provide a level of interaction that is within your ZPD. As demonstrated in this chapter, the majority of pairings of the children at pre-test constituted a more able and less able child. The second explanation offered in chapter three is also consistent with the Vygotskian notion of the ZPD. Alongside the abilities of the children within each pair, the other factor which may have an effect on learning outcomes is the level of support offered by the adult scaffolding the dyads over the course of the intervention. It was suggested that this level of support was too low for the more able children to maximally benefit from the experience.

However, the outcomes of the second phase of analysis presented in chapter seven indicated that the story is not so simple. These results suggested that there may be particular types of strategic functioning which are particularly receptive to the kinds of collaborative interactions provided by this type of intervention and may be candidates for explaining the changes in performance. In addition to this, the results suggested that this reception might be influenced by the level at which these strategies were being used by the children in the first place. It appears that this type of intervention is most effective in raising the self-regulatory skills of those children who demonstrated at least some understanding of the effectiveness of these strategies before they started the programme. At the same time, where the intervention was successful in promoting more task-specific strategies such as information provision, the children demonstrated poor initial use of these strategies.

As discussed above, one of the important claims resulting from the second phase of analysis was that using an approach which required attention to be paid to the *appropriateness* of strategy use within any one interactional context meant that the metacognitive aspects of these behaviours were being observed. The analysis demonstrated that what made a difference to communication performance for these children was not just whether they employed a range of communicative devices but whether they were able to use these appropriately. The claim here is that for effective communicators participating in tasks which require transfer of information and negotiation of mutual knowledge, the communicative devices are used appropriately – appropriateness of strategy use in part defines what competent communication is. Of course, what is also being argued here is that in order to ensure one's communications are effective in this way entails a degree of self-regulation. It appears that what the intervention programme reported in this thesis has done is first to increase the frequency with which the children employ communicative devices which are already at their disposal and then, for some of the children, to increase the appropriateness with which these strategies are used. With regard to the self-regulatory process, it could be argued that at one level, certain aspects of regulatory skill have been enhanced for all the children. Knowing you need to do more asking and more answering, for example, reflects a degree of understanding about the effectiveness of your own strategies and the effects these are having on your partner. However, what turns out to be much more important for these children is not the knowledge that these things are beneficial, but the much finer-grained knowledge about how to make them optimally beneficial. This necessarily requires close monitoring of the situation, your own understandings and misunderstandings and the degree of intersubjectivity that you and your partner have achieved.

It was suggested towards the end of chapter seven that some of the regulatory skills that turn out to be important seem to serve the function of regulating the interaction. This may be indicative of what (Puustinen, 1998) refers to as 'shared regulation'. In her analysis of children's help-seeking behaviours, she distinguishes between those children who seek and use help appropriately (self-regulators) and those who demonstrate an absence of awareness that they need help, and thus still rely on more able others to regulate their behaviours (other-regulators). Somewhere between these two levels of regulation Puustinen proposes an intermediate stage whereby children are able to take some responsibility for their own regulation but their efforts are not always effective. In the present study, true self-regulators would demonstrate no difficulty with the task, other-regulators would depend heavily on their partners' skills or, in the case of the intervention tasks, the adult who is providing the scaffolded support. Shared-regulators would demonstrate some evidence of regulating their own behaviours and monitoring the progress of the interaction, but may still lack optimally appropriate strategies. Of course, one of the key differences between the present study and Puustinen's is that in the latter, the children requested help from the adult researcher, who provided it appropriately. In the present study, the children are dependent on another child who may themselves be using less than appropriate strategies.

Perhaps one of the most significant aspects of these findings is how they relate to the findings of other researchers who are specifically concerned with teaching self-regulatory skills. The present findings support claims made by Brown and her colleagues (for example A. L. Brown et al, 1984) that scaffolded, collaborative interactions can be effective contexts for supporting some children who find school learning difficult. But most significantly, the present study offers the beginnings of an understanding of the types of processes that the children are engaging in during the interactions which produce the effective outcomes which are reported. In Brown's studies of children's reading comprehension, for example, the intervention phase teaches the children to make use of a range of regulatory strategies specifically related to the reading process. By the end of the intervention, the children are observed to have improved in their reading. In the present study, the children were taught to use regulatory strategies specifically related to communication and by the end of the intervention the children were observed to have improved in their communication. However, what the present study offers over and above what has been previously offered is an attempt to provide evidence that the outcome gains are indeed the result of changes in regulatory behaviours as is predicted.

8.3 Methodological issues

One of the major themes emerging from the thesis has been the implications it has on the development of our approach to measuring processes of change within a collaborative situation. It was demonstrated that gains over the course of the intervention programme could come about through different processes of change for one or both of the children and that simply counting the frequency of certain behaviours in these situations was inappropriate, and likely to mask important aspects of the children's behaviours. An alternative approach is proposed. This approach consists of making detailed qualitative analyses of children's behaviours, taking into account the co-dependencies of these behaviours and the contexts in which these behaviours are taking place, and supporting this by a formal quantitative analysis of the strategic behaviours that are highlighted. The study provides a clear example of the kind of refinement in methodology which is required in order to truly understand the nature of collaborative dyadic interactions.

A second but related methodological issue which is raised by the thesis concerns the high variability in performance of this group of children with moderate learning difficulties (within group variability in this sample exceeds between group variability). Any measures of pre- to post-test gains over a period of time for this population is necessarily going to fall victim to this high variability which makes systematic change difficult to tease out statistically. A second reason for taking a qualitative approach to the analysis, then, is so that the small effects which might have remained hidden in a quantitative analysis can now be observed.

8.4 Implications for practice

The results of the intervention demonstrate that it is possible, under certain conditions, to improve aspects of MLD children's communication skills by providing them with opportunities to practise regulating their communicative interactions with a peer under the contingent support of an adult. This has important implications for those who work with children with learning difficulties. Communication skills can be improved by directing intervention at a strategic level rather than at specific aspects of linguistic competence.

The profile study reported in chapter two provided a picture of the inter-relationships between various aspects of MLD children's academic performance and several biographic variables. The resulting model claimed a predictive relationship between these children's communicative abilities and their performance on an IQ and reading test. This finding has important theoretical and practical implications for the design of effective teaching programmes or interventions for this group of children. It would seem that interventions directed at aspects of these children's communication may have associated benefits for other school-type tasks.

Indeed, results of the present study suggest that at least for some children the programme might have been successful in promoting the generalisation of strategic skills to new situations. Although the gains in reading and IQ were small, they were significant given that many of these children seem to reach a plateau in aspects of their school learning at this age. After a relatively short period of time (each child had a maximum of ten hours) children who have found much of school learning difficult have been show to make significant gains in tasks which were not directly targeted by the intervention programme.

The thesis also draws attention to a range of factors which may be useful to consider when working with these children in the classroom. These include the effects of pairing children of different abilities, the kinds of tasks which might be particularly suited to these kinds of collaborative interactions, the nature of effective adult support and the range of communicative and strategic behaviours which may be useful to observe in order to assess changes in performance.

8.5 Directions for future research

The thesis has made some suggestions about what aspects of self-regulatory behaviour might be discerned through studies of communication. The method that has been used here in order to do this has involved expert judges assessing the appropriateness of communicative strategies. What is needed now is an operationalised account of appropriateness that enables researchers to evaluate the appropriateness of strategy use more precisely. In order to be of maximum use, this approach will need to be applicable to a range of tasks. What the analysis presented in this thesis has provided is some indication about the kinds of factors to which attention might be usefully directed. For instance, strategies which demonstrate that the child is monitoring the extent of mutual knowledge within the partnership seem to play a significant part in children's performance in this task. The thesis can also make some preliminary suggestions about the principles of such an approach. For example, account will need to be taken of the general and specific features of the task; the history of the participants' use of strategies; the understanding by the participants of the task's requirements, and so on. The findings of the study also indicate that such an approach would need to consider the initial abilities of the participants, with respect to the strategies of interest and the participants' understandings of the requirements of this task. Such a scheme would necessarily go beyond the coding of individual utterances and adjacency pairs, rather like Conversational Games Analysis does as it considers both the broad chunks of an interaction and the individual utterances within these chunks.

The data presented in this thesis addresses the concern of (Gauvain & Rogoff, 1989) that close analysis of the children's behaviours *during* interactions is necessary, over and above outcome measures, in order to truly understand the nature of change in regulatory practices; the children's communication skill was assessed using both an outcome measure of performance and through analysis of the processes of communication evident during interactions. To strengthen the claim about the generalisation of these regulatory behaviours to tasks outside the domain of communication, detailed analysis is required of the children's behaviours during the assessments of reading and IQ. For example, miscue analysis of the children's reading may provide useful indications of the extent of the children's monitoring of the effectiveness of their reading and would therefore go some way to providing crucial evidence of generalisation which is required in order for stronger claims to be made.

The data highlights beginning and end points of change in self-regulatory abilities for a particular communication task and in doing so goes some way towards addressing claims made by researchers such as (Freund, 1990) and (Elbers et al., 1992) who argue that without longitudinal data, strong conclusions about the nature of the development of self-regulatory abilities can not be drawn. In order for stronger claims to be made, longitudinal data which outlines the progression of this change over time is required. Tracking the strategies of individual children over the course of such a programme would provide useful evidence in support of the initial claims being made here.

As discussed in chapter one, a limitation of much research which has set out to examine the effects of scaffolding regulatory activities within the ZPD has been that there has been little analysis of how the adult or more able other adapts and modifies their behaviour in accordance with the child's behaviour (Baker, 1994). Analysis of the adult's role through the activities which make up the intervention programme may shed some light on the processes by which regulatory behaviours move from the shared plane to the individual plane.

8.6 Conclusion

The thesis has presented details of an intervention programme designed to promote the use of self-regulatory skills within a communicative context for a group of children with moderate learning difficulties. The evaluation of the effectiveness of the intervention raised important issues concerning how we assess the causes of change in dyadic interactions and our assumptions about what constitutes effective communication. The thesis offers some preliminary suggestions about how these issues might be addressed in future work in the field.

The thesis also poses an intellectual challenge in its proposal of a relationship between self-regulatory strategies and performance on measurements of communication, reading and IQ for this group of children with learning difficulties. The diversity of change in strategy use argued to contribute to improved performance on these measures, raises questions about the range of factors which might contribute to children's performance on these types of tasks.

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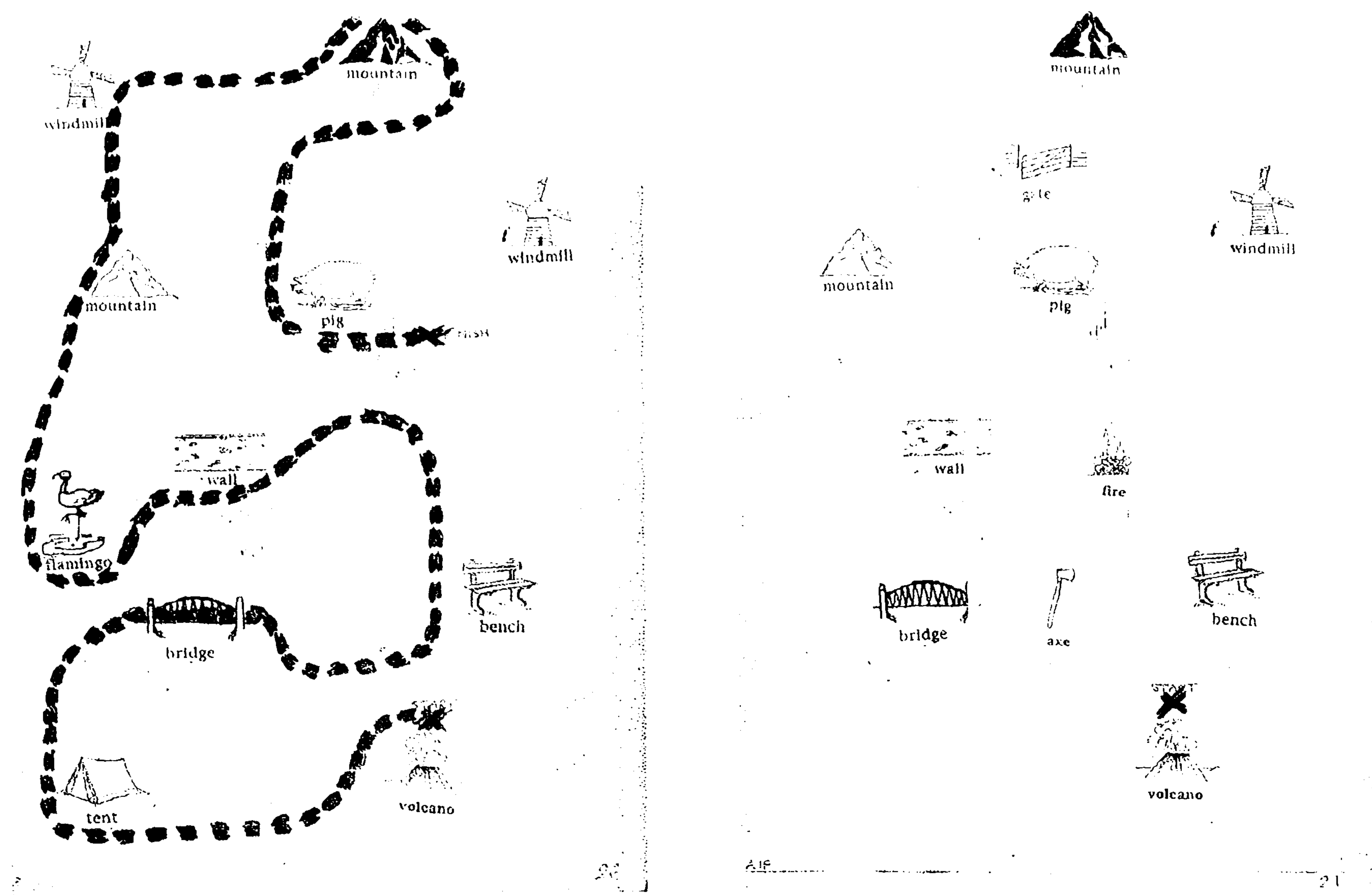
Appendices

Appendix A: The intervention activities

Static tasks	1. Map Drawing (adapted from *Concept 7-9*; Schools Council; 1972)
	2. Playing cards (adapted from G. Brown et al., 1984)
	3. Furniture (adapted from Palim & Power, 1990)
	4. Counters
Dynamic tasks	5. Cartoons
	6. Lego
	7. Cartoons (repeated)
Collaborative tasks	8. Spot the difference
	9. Shopping (adapted from Radziszewaska & Rogoff, 1988)
	10. Tower of Hanoi
Static tasks	11. Shapes
	12. Playing cards (repeated)

Further details of the intervention tasks can be found in (Lamb, 1996).

Appendix B: Example pair of maps from the Map Task



Appendix C: Key to transcription symbols

(From MacWhinney, 1995)

#	pause between words
+/	interruption
+^	quick uptake
[?]	best guess
xx	unintelligible speech
[>]	overlap follows
[<]	overlap precedes
<text>	overlapping utterance

Appendix D: Items in coding frame

Information giver: Provision of information

Type of information contained within instructions

- IG instructions contain **feature** information

never occasionally sometimes often nearly always always

- IG instructions contain **directional** information

never occasionally sometimes often nearly always always

- IG instructions contain **prepositional** information

never occasionally sometimes often nearly always always

Accuracy of information-giving

- Features are correctly described by the IG using the label provided on the map or an appropriate alternative

no features few features most features all features

- Directional information in IG instructions is correct and unambiguous

never occasionally sometimes often nearly always always

- Prepositional information in IG instructions is correct and unambiguous

never occasionally sometimes often nearly always always

Characteristics of feature information provision

- The IG's description of the route includes:

no features few features most features all features

- How many features are described in the correct order according to the route on the IG map?

no features few features most features all features

- Are the double features disambiguated?

never sometimes always neither feature is mentioned

Manner of information provision

- The IG indicates s/he is about to give the next instruction

never occasionally sometimes often nearly always always

- The IG describes the route one 'chunk' of information at a time

never occasionally sometimes often nearly always always

- The IG waits for a verbal or behavioural acknowledgement from IF indicating that the instruction has been acted upon

never occasionally sometimes often nearly always always

Information giver: Use of information

- When the IF provides information about his/her map the IG responds by ignoring the IF information

never occasionally sometimes often nearly always always

- When the IF provides information about his/her map the IG acknowledges this and responds by explicitly telling the IF to move on to the next feature without any attempt to give an alternative description of that particular section of route

never occasionally sometimes often nearly always always

- When the IF provides information about his/her map the IG responds by changing his/her instructions in order to take into account the information which the IF has provided

never occasionally sometimes often nearly always always

Information giver: Regulation

Regulating the interaction

- The IG checks IF attention, agreement or readiness or that both members of the dyad are aligned with respect to their position on the map or understanding of the task

never occasionally sometimes often

- The IG checks the IF's understanding or accomplishment of an instruction

never occasionally sometimes often nearly always always

- The IG repeats or changes his/her instructions to make the meaning clearer without being prompted by the IF

never occasionally sometimes often

- In response to queries from the IF, the IG repeats or changes his instruction to make the meaning clearer

never occasionally sometimes often nearly always always

Regulating one's own behaviour

- The IG monitors his/her own performance

never occasionally sometimes often

Information follower: Provision of information

- The IF tells the IG about his/her own map

never occasionally sometimes often

- The IF tells the IG that s/he is ready for the next instruction

never occasionally sometimes often nearly always always

Information follower: Use of information

- The IF correctly follows the IG's instructions about which feature to advance to

never occasionally sometimes often nearly always always

- The IF correctly follows the directional information provided in the IG's instructions

never occasionally sometimes often nearly always always

- The IF correctly follows the prepositional information provided in the IG's instructions

never occasionally sometimes often nearly always always

Information follower: Regulation

Regulating the interaction

- The IF draws attention to potentially available information missing from the IG utterance

never occasionally sometimes often

- The IF checks the route once it has been completed

yes no

Regulating one's own behaviour

- The IF asks a question if s/he needs something clarifying or repeating

never occasionally sometimes often

- The IF responds to instructions which are ambiguous or unclear by informing the IG that the instruction has been understood or completed

never occasionally sometimes often nearly always always

- The IF uses self-guiding comments

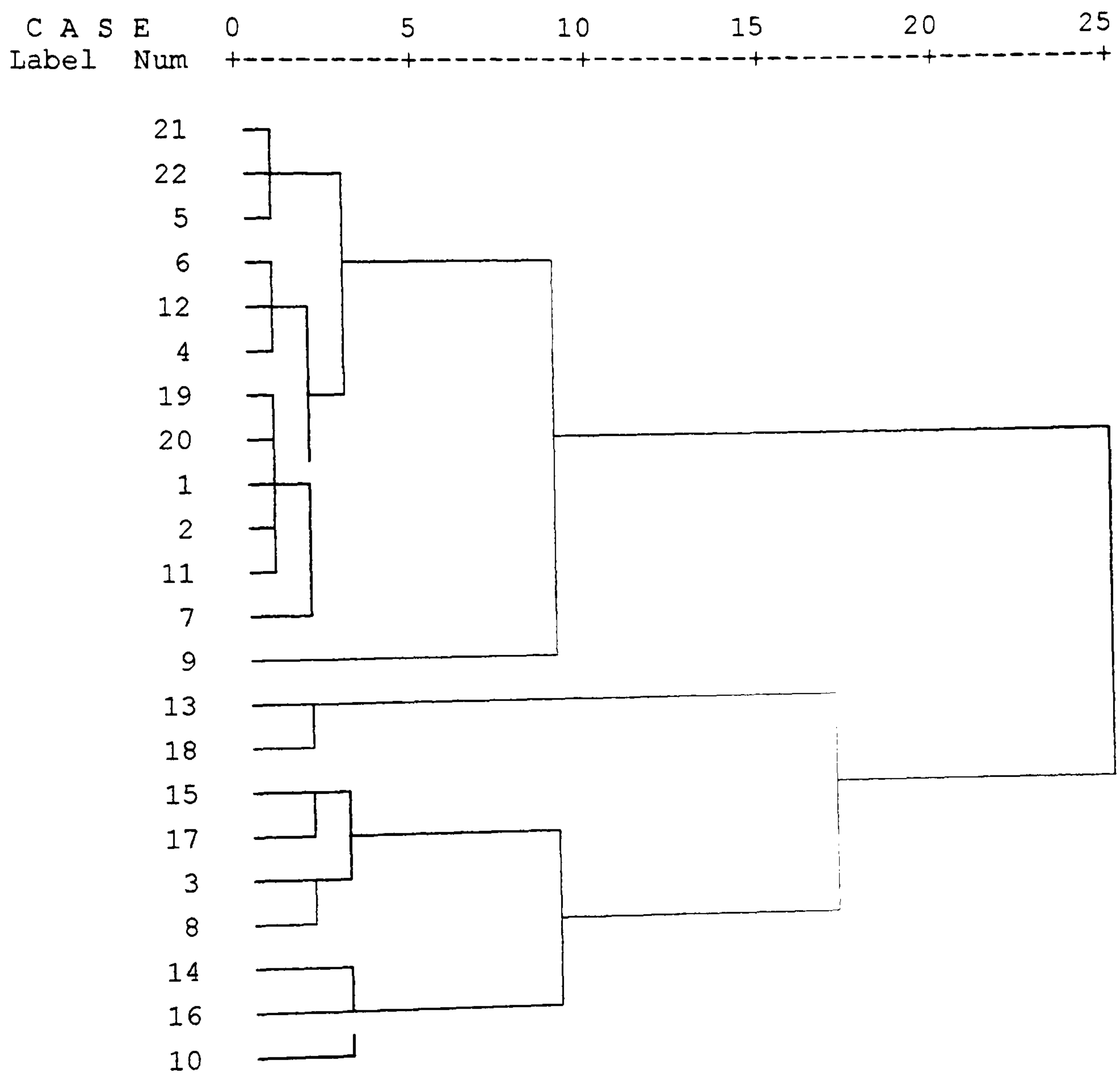
never occasionally sometimes often

Appendix E: Hierarchical cluster analysis: Dendrograms

Pre-test: Set 1 (IG: Type of information contained in instructions)

Dendrogram using Average Linkage (Between Groups)

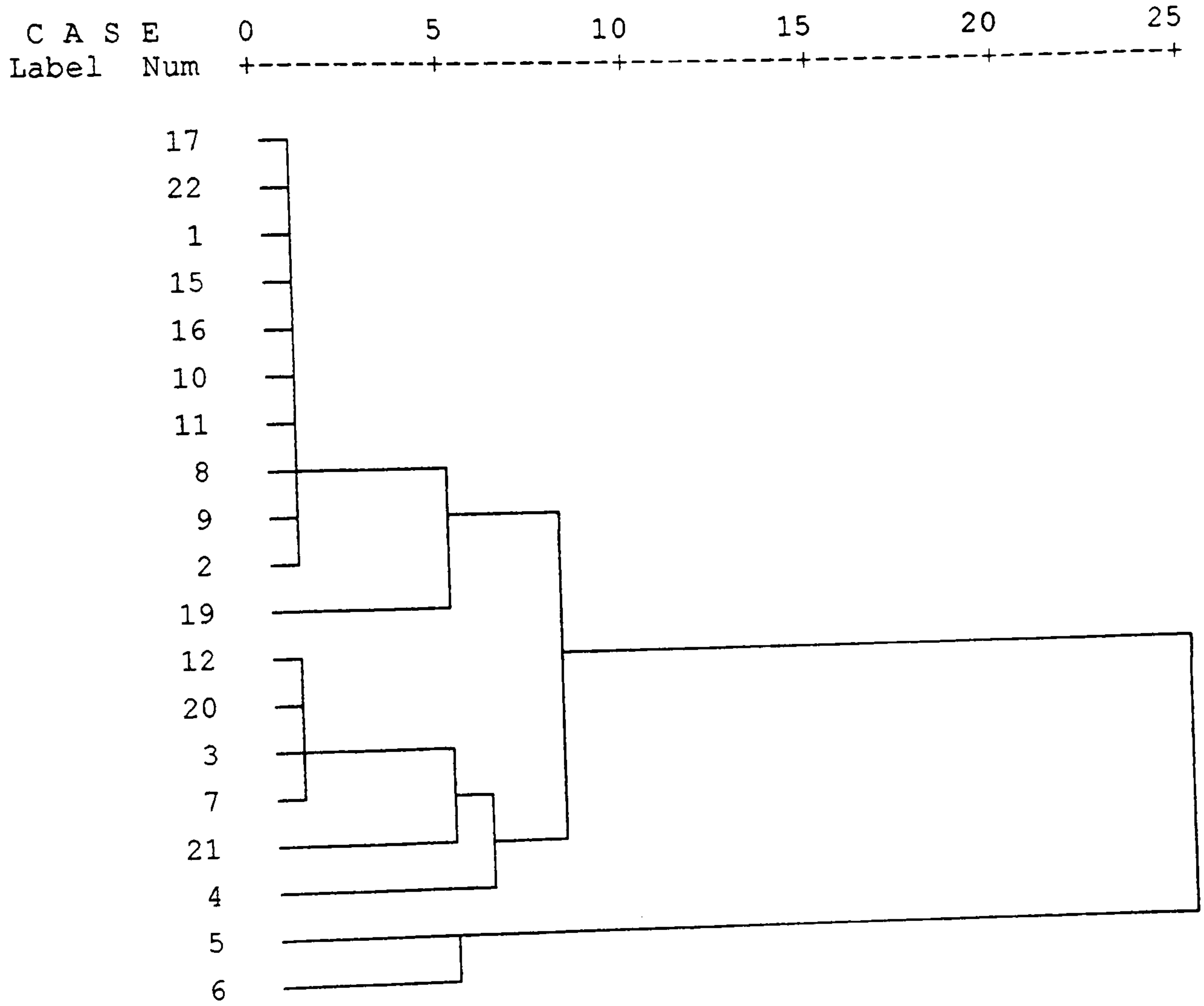
Rescaled Distance Cluster Combine



Pre-test: Set 3 (IG: Characteristics of provision of feature information)

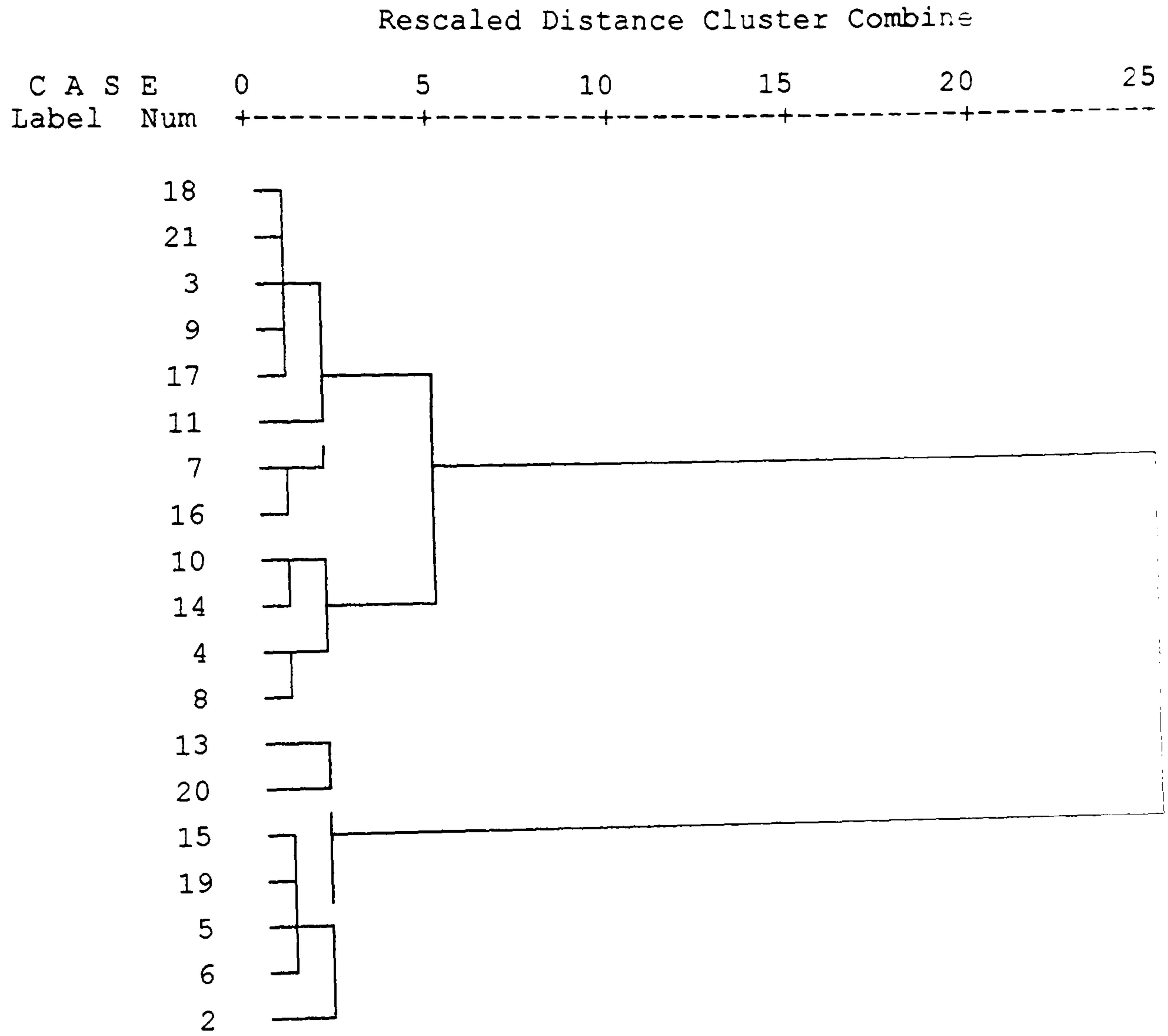
Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine



Pre-test: Set 6 (IG: Repetition and reformulation of instructions)

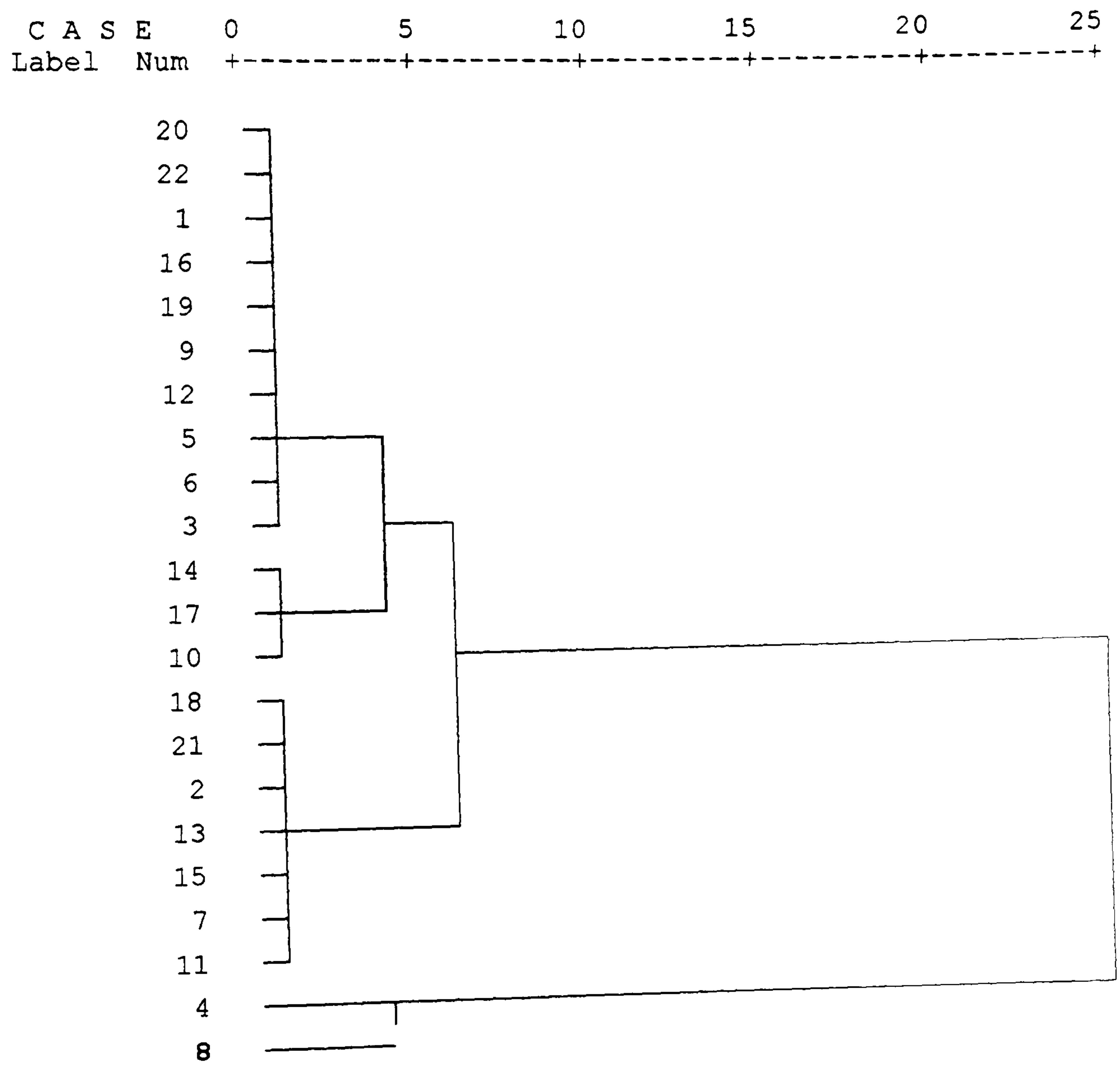
Dendrogram using Average Linkage (Between Groups)



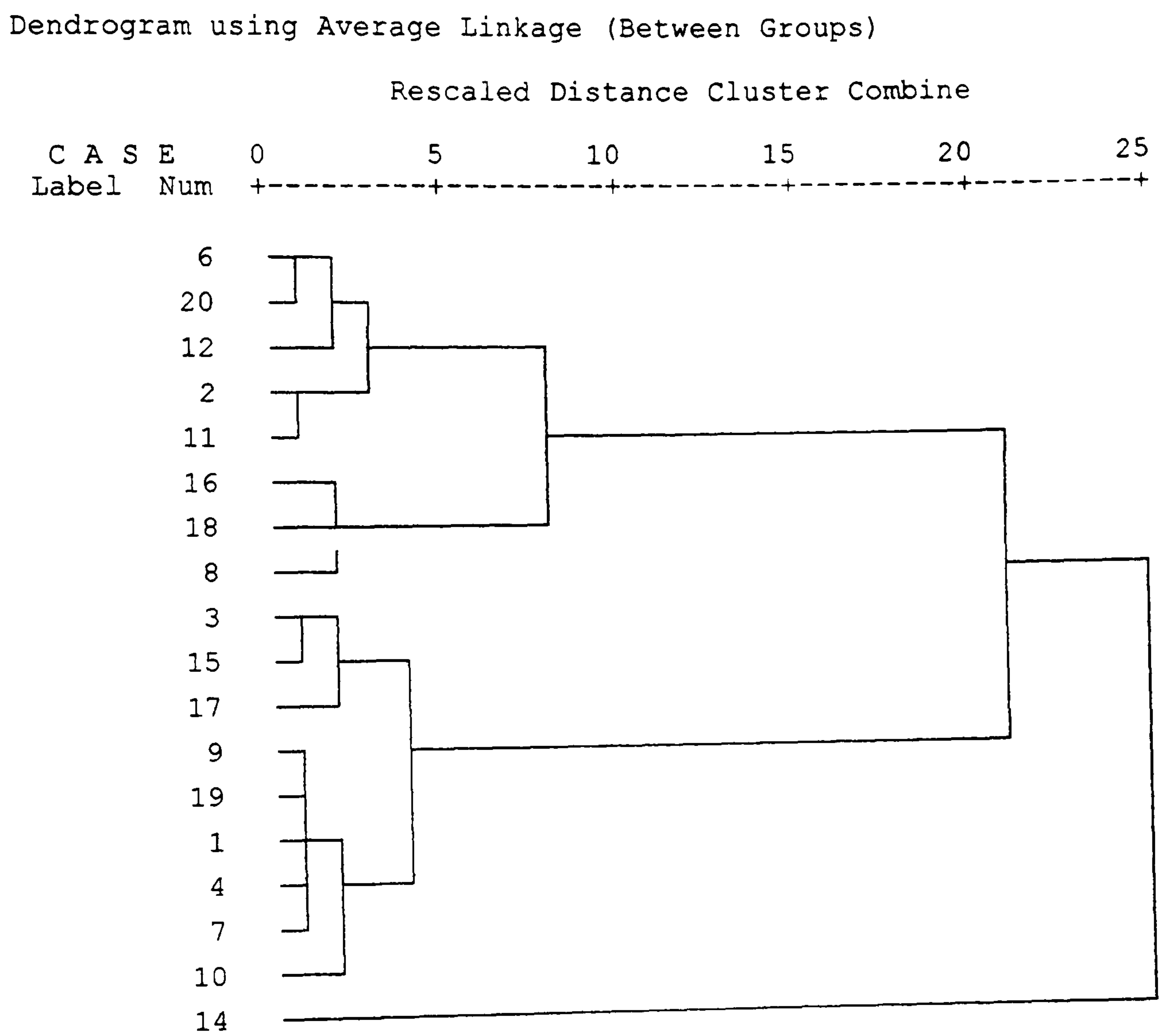
Pre-test: Set 7 (IG: Monitoring own performance)

Dendrogram using Average Linkage (Between Groups)

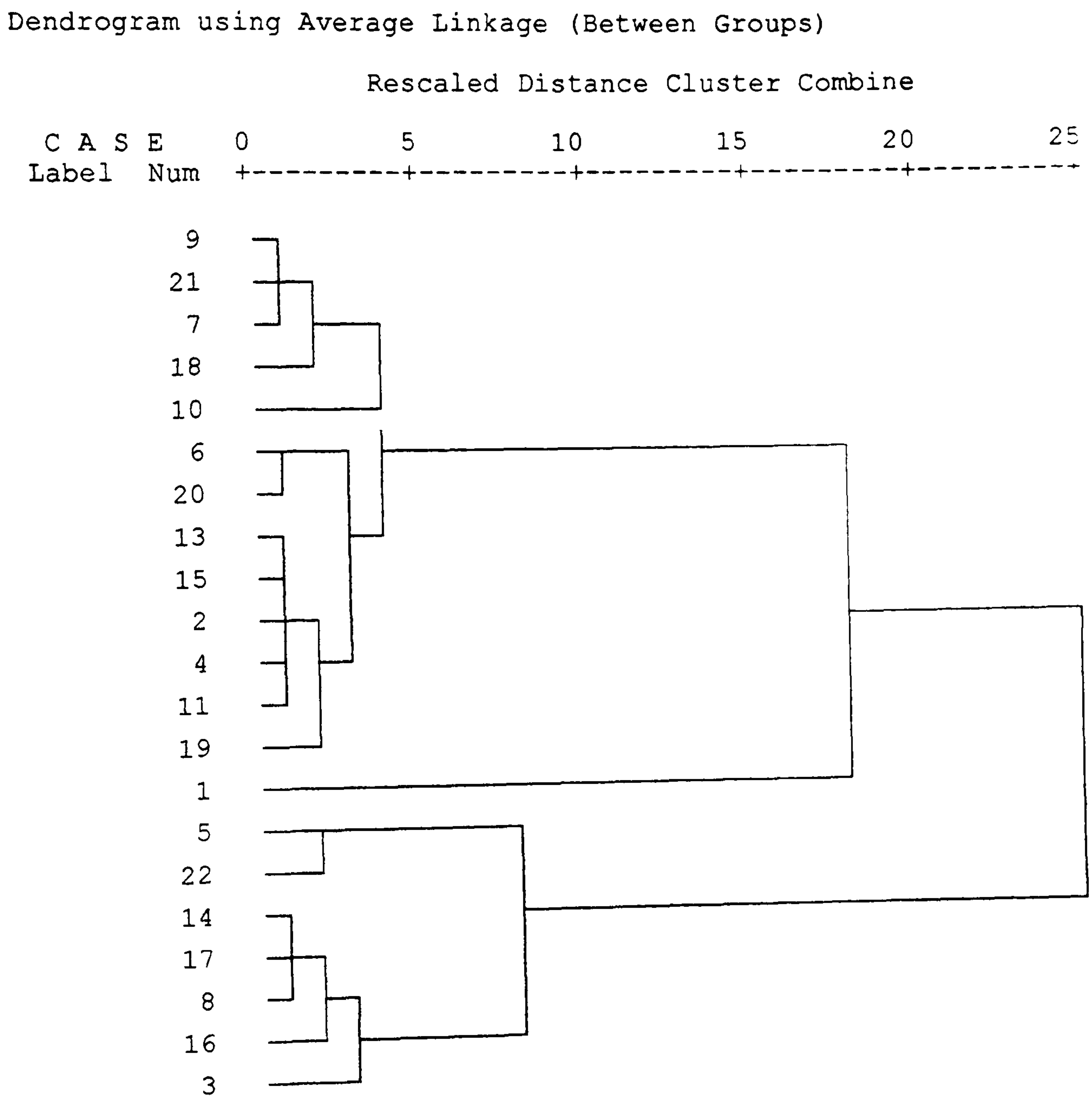
Rescaled Distance Cluster Combine



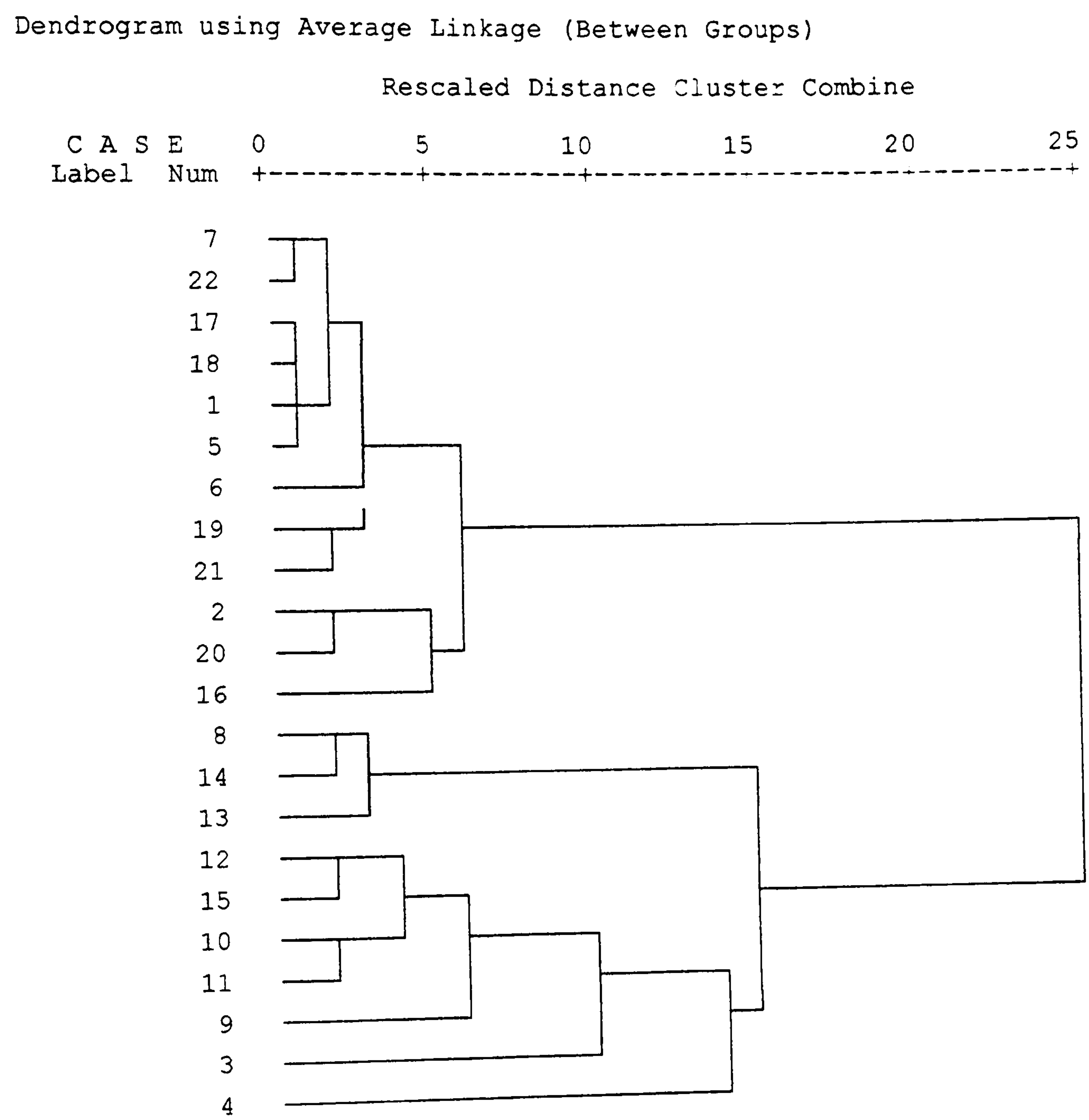
Pre-test: Set 8 (IF: Correct following of information)



Pre-test: Set 10 (IF: Responses to misunderstandings/mishearings)



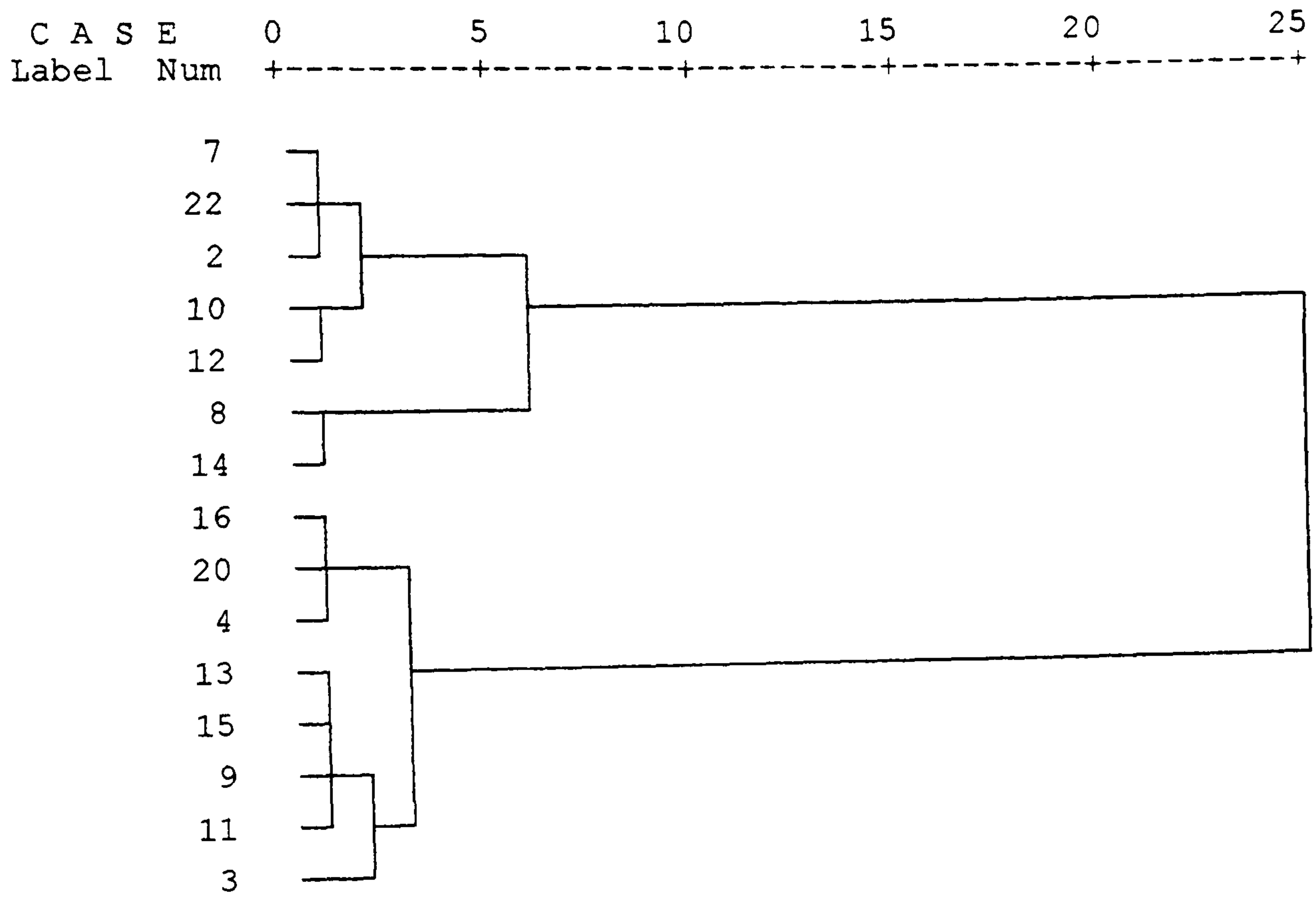
Post-test: Set 1 (IG: Type of information contained in instructions)



Post-test: Set 2 (IG: Accuracy of information-giving)

Dendrogram using Average Linkage (Between Groups)

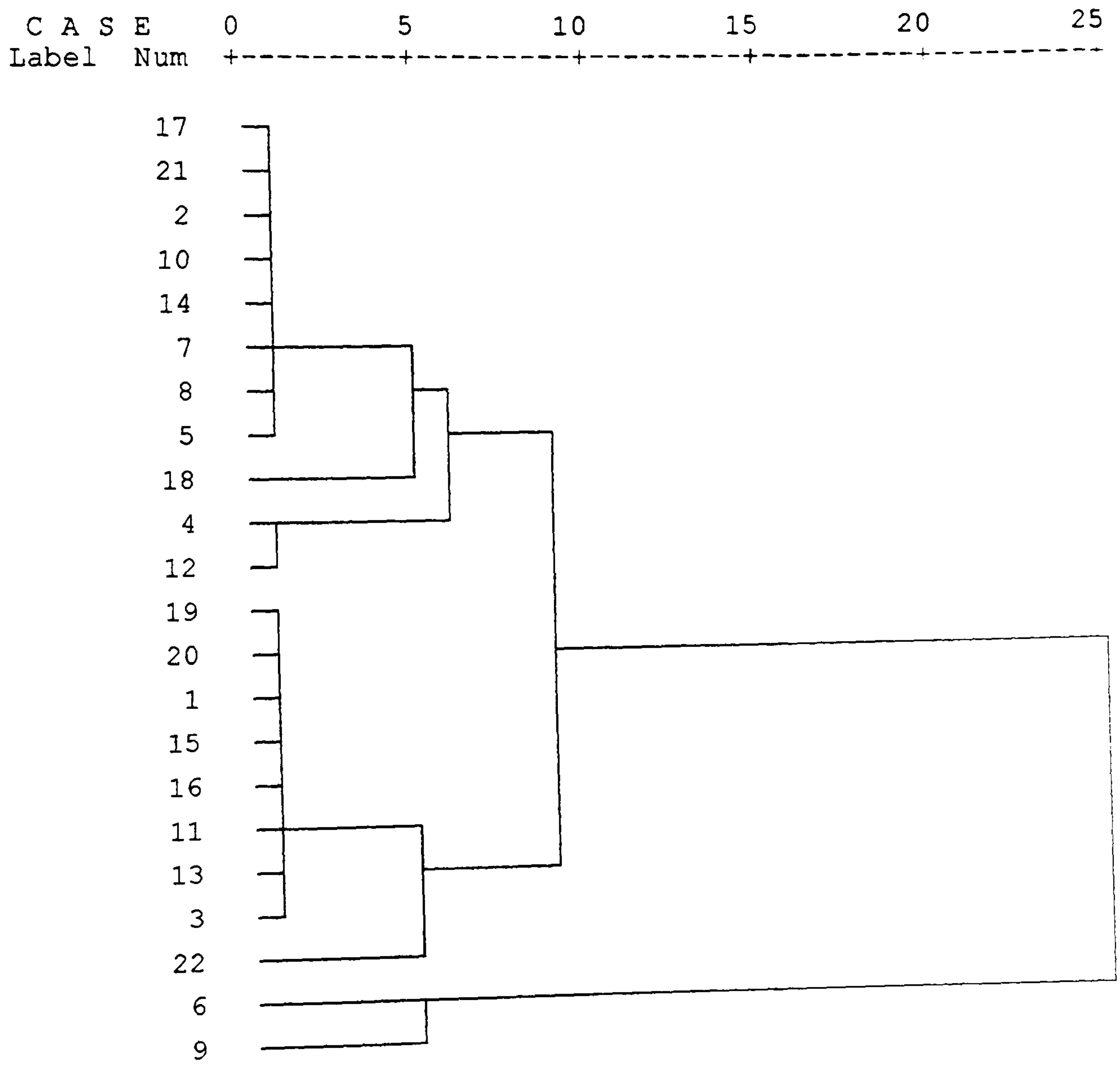
Rescaled Distance Cluster Combine



Post-test: Set 3 (IG: Characteristics of provision of feature information)

Dendrogram using Average Linkage (Between Groups)

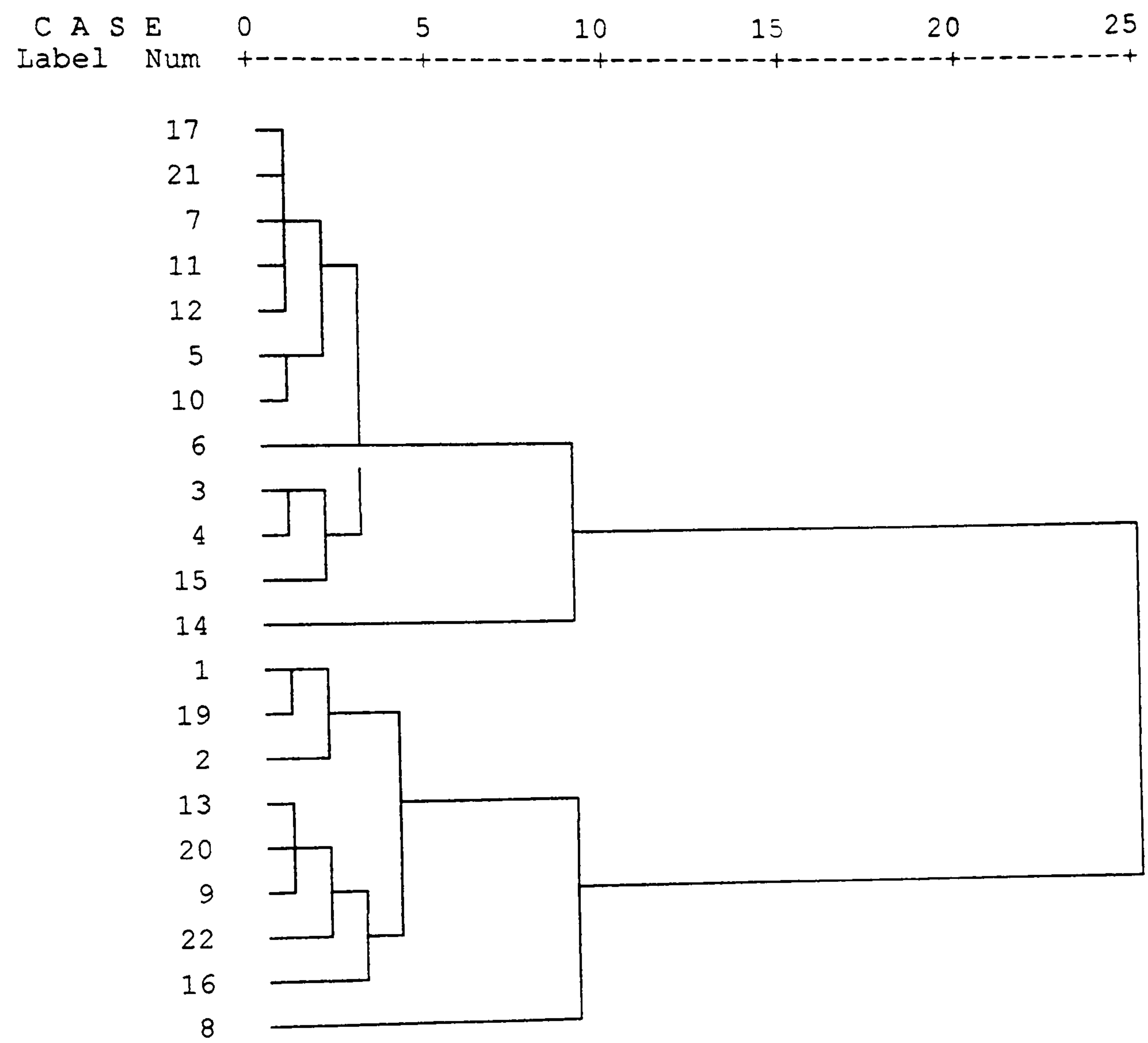
Rescaled Distance Cluster Combine



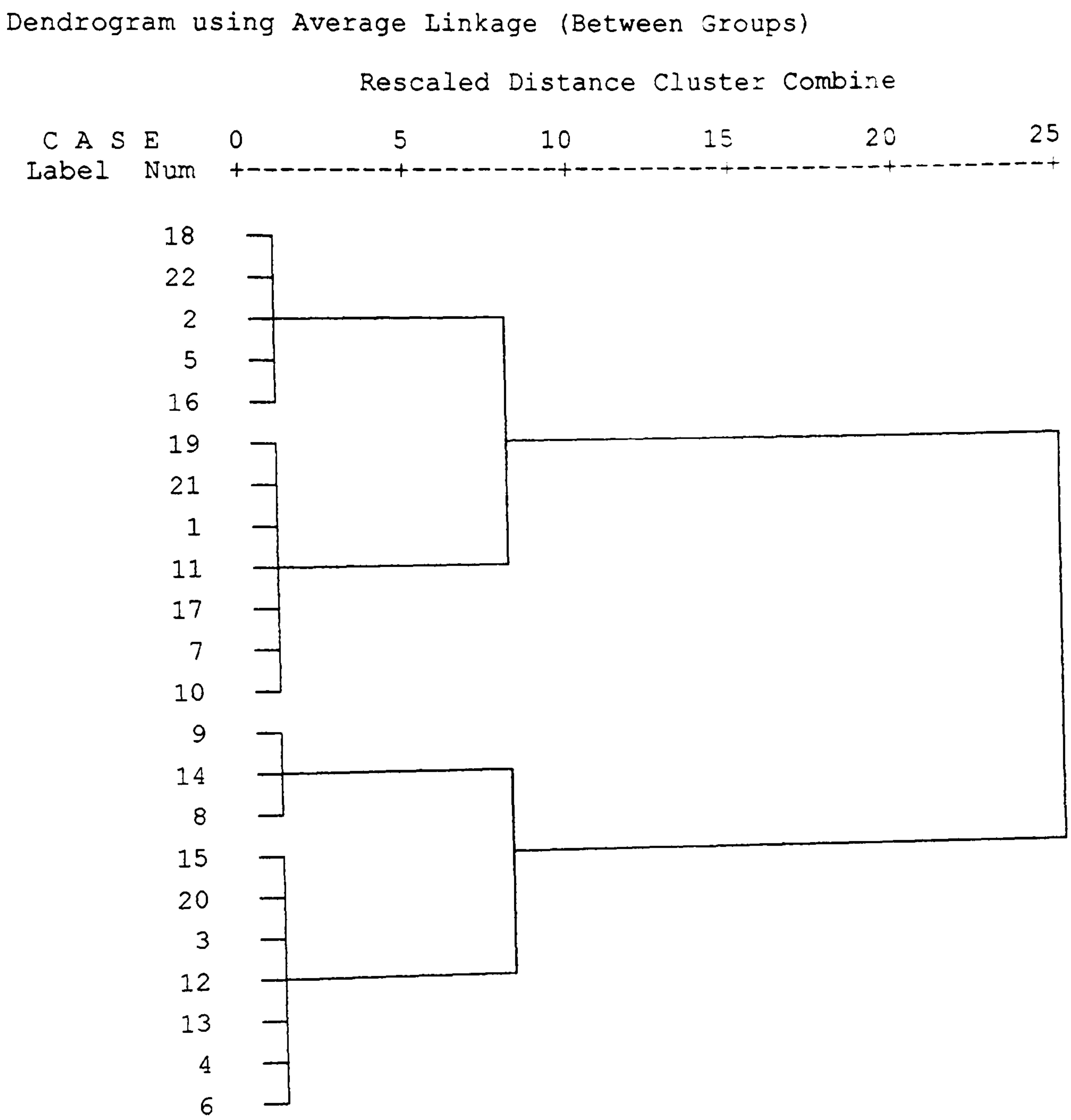
Post-test: Set 6 (IG: Repetition and reformulation of instructions)

Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine



Post-test: Set 7 (IG: Monitoring own performance)



Post-test: Set 10 (IF: Responses to misunderstandings/mishearings)