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**A Sociocultural Approach to Memory Development:
Private Speech and Culture as Determinants of Early
Remembering**

By

Abdulrahman S. Al-Namlah



18 JUN 2003

Thesis submitted to the University of Durham
Department of Psychology
For the degree of Doctor of Philosophy
October 2002

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A Sociocultural Approach to Memory Development: Private Speech and Culture as Determinants of Early Remembering

Submitted for the degree of Doctor of Philosophy

By Abdulrahman S. Al-Namlah

2002

Abstract

The main purpose of the studies reported in this thesis was to investigate young children's memory development within a Vygotskian (1934/1986) theoretical framework in an attempt to understand the mechanisms via which socio-cultural factors impact on children's remembering.

The central hypothesis of the studies undertaken for this thesis was that children's use of language to regulate their own behaviour involved the mechanism via which individual differences in social and cultural background impact on children's memory development. In particular, children's use of *private speech* as a means of using language strategically to regulate their behaviour was examined in its relations to their remembering performance on the assumption that effects of social and cultural factors on memory development will be reflected through the extent to which children in both the British and the Saudi societies tended to use this verbal behaviour.

The phenomenon of private speech represents the developmental and functional relationship between social processes and the child's mental functioning in the sense that this verbal behaviour is assumed to underlie the developmental course of the child's internalisation of social processes. Therefore, establishing links between private speech and children's memory development signifies the notion concerning the inseparability of the individual and the act of remembering from their social and cultural contexts (Mistry, 1997).

Chapter 1 is dedicated to discuss the development of working memory processes and their determinants aiming to highlight the fact that several authors have argued for the importance of investigating effects of children's social and cultural contexts on their remembering behaviour in order to identify those mechanisms that are assumed to underlie developmental changes in children's memory performance. Chapter 2 reviews theories on the cultural processes influencing memory, and previous research on cross-cultural differences in memory development. Chapter 2 also outlines the theoretical framework of the studies reported in this thesis.

Study 1 reported in Chapter 3 examined the incidence and function of private speech as well as its developmental and social aspects within and between the two cultural groups of children: the British and the Saudi Arabian. The findings indicated that private speech is a universal stage in children's cognitive development and its developmental and functional aspects are considered to be a function of cultural variations in children's socialisation between the two cultures.

Study 2 reported in Chapter 4 was designed to address the possibility that private speech as a self-regulatory verbal behaviour may explain children's individual differences within and across the two cultures in terms of use of the subvocal rehearsal within the model of working memory. This issue was examined by linking private speech to the

phenomenon of phonological similarity effect that is assumed to signify children's tendency to employ the subvocal rehearsal (Gathercole & Baddeley, 1993). The findings showed that in both cultures, children who relied more on private speech to regulate their behaviour were more susceptible to the phonological similarity effect and their overall remembering performance was better than children who were less dependent on private speech. These results suggest that the regulating capacity inherent in private speech enhances strategic remembering in verbal working memory.

The relationship between private speech and remembering was further examined in Study 3 reported in Chapter 5. Study 3 aimed to investigate how children's individual differences within and across the two cultures in terms of using private speech would relate to their autobiographical narratives. Based on the dominant cultural norms, early socialisation of autobiographical memory involves teaching children the appropriate cultural way of reporting past personal memories in an organised narrative style when participating in memory talks with others, particularly parents. In this regard, children use language to achieve two main goals, the first is to share memories with others and the second is to use language internally in order to develop a self-reminding capacity (Nelson, 1993c; Nelson & Fivush, 2000). By representing the genetic link between social processes and mental processes, private speech may underlie the developmental shift from using language externally as in parent-child memory conversations towards applying it internally in order to enhance the development of self-reminding talk. Therefore, within Study 3, it was hypothesised that children's use of self-regulatory private speech might be the mechanism via which social interactions and cultural practices affect children's autobiographical memory.

The findings of Study 3 provided support for a strategic use of language via private speech in the development of children's personal memories. In both cultures, children who were dependent more on private speech were better able in reporting more autobiographical narrative in a more organised way than children who relied less on this verbal behaviour. There was also a cultural effect on children's personal memories in the sense that the British than the Saudi children have reported more autobiographical memories in a more detailed way.

The final chapter summarises the main findings of the three studies and indicates issues arising from these findings.

Acknowledgments

I am extremely grateful to my supervisor, Dr. Elizabeth Meins, for her time, support, encouragement and constructive suggestions during the production of this thesis. I would also like to thank Dr. Madeline Eacott for the initial joint supervision. Thanks to Dr. Simon Liversedge, Dr. Michelle Turner and Dr. Sue Leekam for their useful comments and suggestions during the appraisal meetings throughout the last four years. My appreciation also goes to Dr. Charles Fernyhough for his insightful ideas and support.

My mother and my wife, along with my children, deserve special thanks for their patience, support and love they extended to me.

Particular thanks are due to the British and the Saudi parents and their children without whose cooperation the studies reported here would not have been possible. Thanks to Ms C. Leybourne the Head Teacher of Finchale Primary School and to the school staff for their help during the testing phases carried out with the British children. Thanks to Dr. I. Al-Aqeel, the General Director of Riyadh Najed Private Schools, and the schools staff in both sections: the girls and the boys for their assistance during the testing phases carried out with the Saudi children.

Thanks are also due to Dr. A. Al-Hakami, the General Director of Measurement and Evaluation at the Ministry of Education, and Dr. A. Al-Barrak, the General Director of the Private Education at the Ministry of Education, for their help during the fieldwork conducted in Saudi Arabia.

I am also grateful to Mr. A. Al-Nasser, the Saudi Cultural Attaché in the United Kingdom and Republic of Ireland, and Dr. H. Al-Mihrej, the General Director of the Academic Affairs at the Saudi Cultural Bureau in London for their strong support throughout my years of research.

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Chapter 1

Working Memory: Development and Determinants

1.1. Introduction

Most researchers agree on the fundamental factors that reveal the development of memory: memory capacity or short-term store, memory strategies, metamemory, and general knowledge or semantic memory (Brown, 1975; Flavell, 1985; Paris, 1978; Siegler, 1983/1991; Weinert, 1988). There is also a general consensus that: (i) as children grow older, their abilities to remember effectively increase, and (ii) the development of memory does not mean the development of one function or skill, but rather the development of many different functions (Kail, 1984/1990). But despite this general agreement, and the intensive experimental investigation of memory processes over the last forty years, surprisingly little is known about the mechanisms underlying developmental changes in memory processes. This chapter begins with a general review of the development of the working memory system (specifically verbal recall), before discussing the factors that have been considered as determinants of working memory development in the preschool and early school years. Although much is now known about the considerable feats of memory demonstrated by infants (see Rovee-Collier & Hayne, 2000, for a review), the focus here is on the development of working memory processes and their determinants in children aged between 4 and 8 years, the theoretical focus and target age group for studies reported here.

1.2. Working Memory Development

Unlike approaches to other areas of human cognition (such as theory of mind, reasoning, language comprehension and production), the field of working memory is unusual since there is no uniquely developmental approach to how we come to remember information. Developmental accounts borrow on the systems identified in the classic papers from adult memory research (Atkinson & Shiffrin, 1968,1976; Baddeley & Hitch, 1974; Craik & Lockhart, 1972), and those working on adult memory tend to rely on neurological patients and data, rather than infants and children, when they wish to investigate the origins of memory.

The most widely-used model in the developmental literature is Baddeley and Hitch's (1974; Baddeley, 1986, 2000) conceptualisation of working memory as a complex multi-component system consisting of three separate components: a central executive and two subsidiary slave systems, the articulatory loop and the visuo-spatial sketchpad. The articulatory loop is involved in remembering phonologically-encoded information, whereas the visuo-spatial sketchpad is responsible for processing visual information. Phonologically-encoded information can be rehearsed in the articulatory loop in order to refresh the traces of the encoded material. The articulatory loop thus consists of a passive phonological store and an active subvocal rehearsal process. This store can be accessed by auditorily presented material or through registering "visually presented but nameable material... by means of articulation" (Baddeley, 2000, p.83). Thus, the articulatory loop is thought to hold materials in terms of their acoustic-verbal-linguistic features, whereas the visuo-spatial sketchpad is dedicated to visual imagery and spatial processing (Baddeley & Hitch, 1974; Best, 1999; Haberlandt, 1994; Morris, 1986). Two major developmental shifts occur in children's use of rehearsal and phonological recoding of material within the articulatory loop at around the age of 5 or 6 years: (i)

children become able to adopt mnemonic rehearsal strategies to aid their recall, and (ii) children move away from visuo-spatial coding of visually presented material, and begin to recode such material phonologically (e.g., Ford & Silber, 1994).

The use of conscious strategies to improve memory marks a major milestone in memory development. While there is a common consensus among researchers on the importance of memory strategies in enhancing memory performance and interpreting age-related improvements, “little is known about the origins of the strategies” (Ornstein, Baker-Ward & Naus, 1988, p. 33). In general, it is assumed that acquisition of strategic behaviour is based on associationist principles, where all strategies – including memory strategies – are acquired and developed during learning operations and are subject to the laws of learning (La Barba, 1981; McGilly & Siegler, 1989). Consequently, with increases in learning opportunities, simple strategies will be integrated and compounded to result in more effective strategies (Fischer & Farror, 1987; Myers, 1983).

From a developmental point of view, it is evident that the period between 3-4 years of age witnesses the emergence of memory strategic behaviour, when a child becomes able to identify activities that help in remembering from those of no clear purpose, especially when engaged in different play settings (see Wellman, 1988). Thus, by observing his/her own behaviour and its consequences, as well as through others’ comments and feedback, a child will gradually begin to remember things voluntarily, without prompting, which is the cornerstone of acquiring and using different memory strategies (Baker-Ward, Ornstein & Holden, 1984). Accordingly, “the starting point for any deliberate mnemonic act is the realisation that there is a need to remember” (Kail, 1984, p. 42). As a result, a child will recognise that a particular situation demands deliberate effort for encoding and retrieving specific information (Harris, 1978).

This awareness usually appears before the end of the third year of life (Neimark, 1976). However, the child must be considerably older before the ability to use and produce rehearsal strategies result in appreciable memory improvements. For example, Baker-Ward et al. (1984) found that 4-, 5- and 6-year-olds all evidenced behaviour indicative of attempts to remember information when they were told that they would be required to recall a subset of items available for play. Unlike the children who were not warned about the memory test, children who were instructed to remember the items tended to name and attend to the target items. However, this behaviour only resulted in significant improvements in memory performance compared with control groups for the 6-year-olds. Ornstein, Baker-Ward and Naus (1988) therefore concluded that “successful memorisation requires more than the simple intent to remember” (p. 41).

By employing a mnemonic strategy, the individual deliberately makes use of pre-existing knowledge or “knowing how to know” (Brown, 1975). Thus, “the heart of strategic remembering is the deliberate selection of appropriate actions to achieve specific ends” (Paris, 1988, p. 222). Mnemonic techniques include a variety of different activities ranging from simple actions, such as naming or labelling items to be remembered, to complex rehearsal of large numbers of items (Baddeley, 1985; Hagen & Stanovich, 1977; Paris, 1988). Mnemonic techniques can involve either verbal or visual strategies, and may function in aiding storage or retrieval of information (Kail, 1984; Ornstein & Naus, 1978). That is, some strategies fit more in the phase of entering an item – at input – such as different types of rehearsal, whereas other strategies (such as grouping or classification) are more applicable in the process of retrieving – at output (Bjorklund and Douglas, 1997; Cowan, 1997; Kail, 1984).

Rehearsal has been used to aid memorisation and learning at least since Ancient Greek times (Noll & Turkington, 1994). Studies on memory generally emphasise the role of rehearsal as the process whereby the to-be-remembered stimuli are transferred from short-term to long-term memory (Ornstein & Naus, 1978; Reber, 1985). All of the different multistore models (Atkinson & Shiffrin, 1968,1976; Baddeley & Hitch, 1974; Craik & Lockhart, 1972) have highlighted the importance of rehearsal in maintaining, transferring and refreshing information within short-term memory.

The specific way in which the to-be-remembered material is rehearsed depends on two factors: (i) the characteristics of the to-be-remembered stimuli, and (ii) the rehearsal strategy selected by the individual (e.g., literal repetition of a presented item or deployment of additional mnemonic activities, such as adding meaning or associating between the to-be-remembered items). Thus, Baddeley (2000) summarised the memory outcomes of the different types of rehearsals as follows: “processing a word in terms of its visual appearance leads to little learning. Phonological processing in terms of sound is somewhat better, whereas deeper semantic processing leads to the best retention” (p.82). Baddeley (2000) thus draws on previous literature on levels of processing accounts of memory development (e.g., Craik & Lockhart, 1972). Within the levels of processing framework, besides holding an item in short term memory by maintenance rehearsal at a given level, items may also be processed at a deeper level, so that “incoming stimuli are processed to different levels, or depths, within the cognitive system, from ‘shallow’ or sensory levels to ‘deeper’ or meaningful levels of analysis” (Brown & Craik, 2000, p. 93).

1.2.1. The Development of Phonological Recoding of Visually Presented Material

Developmentally, visual coding strategies are the first to appear, supporting Piaget's (1952) contention that young children rely on storing visually presented material in visual form. For example, young children are more prone to the "visual similarity effect" - young children are poorer at recalling items that are visually similar than those that are visually dissimilar (Hitch, Halliday, Schaafstal, & Schragen, 1988; Longoni & Scalisi, 1994; Palmer, 2000). Palmer's (2000) results suggest that children then go through a period when they rely on dual coding of visually presented material. Although at first sight, use of a dual strategy might appear to result in poorer recall because of the increased opportunity for interference between the phonological and visual codes, Palmer's data suggest that this strategy is more efficient than the visual strategy, with the dual coders in her study obtaining significantly better results than the pure visual coders. Children eventually become able to use a pure phonological coding strategy for visually presented material - the strategy favoured by adults, and that resulting in best recall (e.g., Palmer, 2000)¹.

At this point, children become prone to another similarity effect - the phonological similarity effect (PSE), whereby phonologically similar items are recalled more poorly than phonologically dissimilar items (e.g. Baddeley, 1966, 1986; Gathercole & Hitch, 1993; Longoni & Scalisi, 1994). Within the WM model, the PSE is attributed to operations carried out by the articulatory loop, specifically the phonological recoding of visually presented material so that it can be rehearsed using the articulatory loop. Whereas spoken material is thought to have access to the articulatory loop and phonological store without the need for articulatory rehearsal, non-phonological inputs

¹ It should be noted, however, that Palmer's work runs counter to conventional wisdom about how the shift from visual to phonological coding occurs.

such as pictures or words must be recoded phonologically so that they can be held in the phonological store (Gathercole & Baddeley, 1993). Figure 1.1 shows how different types of material are proposed to access the phonological store.

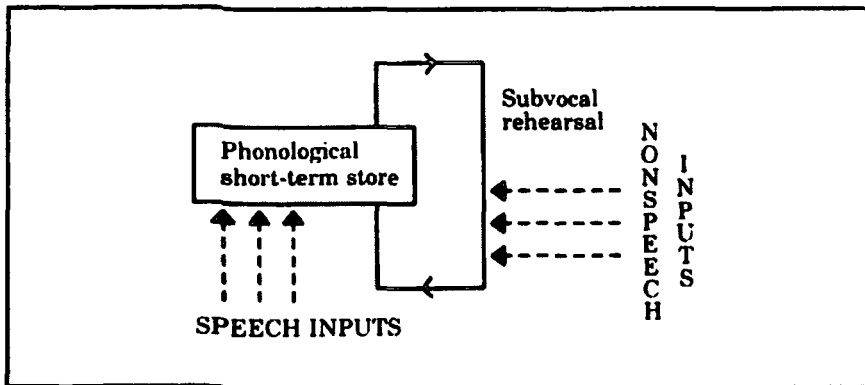


Figure 1.1. A schematic diagram of the articulatory loop model (Adapted from Baddeley, 1986).

The phonological similarity effect (PSE) was first investigated in children by Conrad (1971) who presented children aged between 3 and 11 years with sets of pictures whose names sounded similar (e.g., *hat, rat, tap*) and pictures whose names were phonologically dissimilar (e.g., *spoon, fish, bus*). Conrad (1971) found that children became prone to the PSE at around 6 years of age, with children of this age and above recalling significantly fewer of the phonologically similar items compared with the dissimilar items.

Halliday, Hitch, Lennon and Pettipher (1990) further investigated whether the articulatory loop was responsible for the PSE by testing the effects of suppression on the PSE. They hypothesised that the PSE for visually presented items should be abolished by articulatory suppression if the articulatory loop is involved in the PSE, and that older children should be more affected by articulatory suppression than younger

children because of age-related increases in susceptibility to the PSE. Halliday et al. (1990) tested two groups of children: 5-year-olds and 10-year-olds. Each child had to remember visually presented items in three separate conditions: control, non-articulatory suppression (tapping), and articulatory suppression (repetition of an irrelevant word). The sets of pictures were either phonologically similar items or phonologically dissimilar items. Halliday et al. (1990) reported that in the control condition, the older children showed the PSE, remembering the phonologically similar items less well than the phonologically dissimilar ones. The 5-year-olds showed no PSE. Their findings also revealed significant effects of articulatory suppression among the older children, with this type of suppression abolishing the PSE. Halliday et al. (1990) therefore concluded that, just like adults, the older children were encoding the pictorially presented materials verbally, using the articulatory loop. In contrast, there was no evidence of phonological recoding in the 5-year-olds.

Support for the role of the articulatory loop in the PSE also comes from a study by Hitch, Halliday, Schaafstal and Schragen (1988) who investigated whether children were susceptible to the word length effect for visually presented material. That is, when would children show poorer recall for multi-syllabic words compared with monosyllabic words, thus showing that they are using articulatory recoding and rehearsal in order to remember a set of pictures. Hitch et al. (1988) compared 5- and 10-year-olds' memory for pictures of monosyllabic words (e.g., *pig*, *cake*, *leaf*) and multi-syllabic words (e.g., *umbrella*, *kangaroo*, *banana*). Although both age groups showed poorer recall for the multi-syllabic words, the older children showed a much greater word length effect. Thus, these results also point to age-related increases in children's tendency to phonologically recode pictorially presented materials in order to remember them, marking "a developmental shift from dependence on visual working memory for

the retention of picture sequences towards the use of the phonological loop to retain picture names” (Gathercole & Baddeley, 1993, p. 37).

Ford and Silber’s (1994) study showed that children are able to code visually presented material phonologically before they are able to rehearse, and highlighted how phonological recoding becomes less reliant on overt speech as children get older. For example, the memory performance of the youngest children in their study (aged 3 and 4 years) was facilitated by overt naming of the to-be-remembered items, whereas from around 5 years onwards, children were just as good at remembering the items when they were silent during the task. They therefore concluded that “the reliance on overt speech to facilitate phonological recoding decreases as the child internalises speech and becomes increasingly more able to utilise subvocalisation in cognitive tasks” (Ford & Silber, 1994, p. 173). Ford and Silber’s (1994) results thus replicated those of Hitch, Halliday, Schaafstal and Heffernan (1991) who reported that 5-year-olds were susceptible to the PSE if they were required to name out loud the pictorially presented items, but showed no PSE if they performed the task silently. In contrast, 10-year-olds showed the PSE both when overtly labelling the to-be-remembered items and when performing the task in silence. Hitch et al. (1991) therefore concluded that “activation of the articulatory loop evidently increases as children develop, and when stimuli are labelled at presentation” (p. 228). Consequently, encouraging young children to label to-be-remembered items in order to improve recall is important since their “ability to use inner speech is not fully developed” (Hitch et al., 1991, p. 228). This notion of the internalisation of speech, and the use of “inner speech”, as important determinants of phonological recoding, and memory development in general, we will be returned to later, and forms the theoretical backdrop to the studies reported in this thesis. Although previous studies have suggested that children’s internalisation of speech and use of

inner speech may be potential explanations for the shift to phonological recoding, they have no direct evidence to test this suggestion. The reasons for children moving from visual coding of visually presented material to phonological recoding of such material are therefore at present poorly understood. The studies reported in this thesis therefore seek to address these issues and attempt to provide an explanation for this developmental shift in children's coding of visual material.

1.2.2. Different Types of Rehearsal Strategy

Researchers have distinguished between quantitative and qualitative differences in rehearsal. For example, Cowan (1997) differentiated between two types of rehearsal - rote and elaborative. Rote rehearsal involves going over the to-be-remembered information exactly as it was presented, whereas elaborative rehearsal involves forming "new, meaningful connections between items to be remembered" (p. 176). Other researchers have used alternative terms to distinguish between these two different types of rehearsal: passive and active rehearsal (Ornstein & Naus, 1978), type I and type II rehearsal (Glenberg & Adams, 1978), primary and secondary rehearsal (Shaughnessy, 1981).

This classification of rehearsal into simple and sophisticated techniques has influenced developmental views regarding memory strategies in general, and rehearsal strategies in particular. One can therefore investigate when basic versus sophisticated rehearsal strategies emerge, and whether there are age-related differences in the use of these different forms of rehearsal.

In a landmark study, Flavell, Beach, & Chinsky (1966) investigated the spontaneous use of verbal rehearsal among children aged 5, 7 and 10 years. The children were shown a

set of seven pictures and were asked to remember aloud a subset of two to five pictures either immediately, or after an interval of 15 seconds. Flavell et al. (1966) observed the children for any lip movements as an indicator of their use of a verbal rehearsal strategy. The results showed that lip movements became more frequent as a function of increasing age, and age was also positively correlated with memory performance. Regular use of rehearsal was first observed at around 7 years of age. However, what is of most interest with respect to the focus of the studies undertaken for this thesis is Flavell et al.'s findings that *within each age group* there were individual differences in children's use of verbal rehearsal, and children who used such strategies were better at remembering than their same-age peers who did not use such strategies. This suggests that use of verbal rehearsal is not merely governed by maturational factors, and that some children appear to favour the use of verbal strategies to regulate their behaviour. This issue will be returned to later in this chapter.

In a similar study, Ornstein, Naus and Liberty (1975) investigated rehearsal techniques among children of different ages, averaging 8.5, 11.5 and 13.5 years. In a free-recall condition, a list of 18 unrelated words was presented to the children. They were explicitly instructed to repeat aloud the last word presented, but were told in addition that they could also repeat as many of the previously-presented words as they liked. In contrast to Flavell et al.'s (1966) results, the findings of Ornstein et al.'s study indicated no differences in the amount of rehearsal used by these children of different ages. However, there were clear age-related differences in the *type* of rehearsal strategy employed. The older children tended to rehearse a series of words even though presentation was one word at a time, whereas the younger children only practised repetition of a single word. Ornstein et al. therefore concluded that older children use an active or cumulative rehearsal technique (when combining the last few words with

the newly presented one), but younger children use passive rehearsal. Thus, Ornstein et al.'s findings point to a fundamental developmental change in the quality, rather than the quantity, of rehearsal. That said, the findings of both Flavell et al. and Ornstein et al. show that rehearsal leads to superior memory recall.

Training studies have further highlighted the causal role that rehearsal plays in memory performance. Several studies have involved training young children to use rehearsal as a strategy to aid recall. The general consensus of these studies is that, although these children did not spontaneously use strategies to aid memory, they could be trained to do so (e.g., Cox, Ornstein, Naus, Maxfield, & Zimler, 1989; Ornstein, Naus, & Stone, 1977). Such findings are used to argue for a *production deficit* (Flavell, 1970) in young children's use of mnemonic strategies, rather than a *mediation deficit* (Reese, 1962). That is, young children lack the ability to produce these strategies when conducting memory tasks, but not the conceptual or intellectual ability to use the strategies under instruction.

The more sophisticated types of rehearsal involve, not just basic repetition of information, but organising it into meaningful categories or elaborating on the information before rehearsal. When the to-be-remembered items are randomly presented, adults and older children typically tend to reorganise them into categories - so called "clustering" - in order to aid memorising them (Bjorklund & Douglas, 1997; Lange, 1978; Siegler, 1991). For example, individuals may organise the randomly presented items into categories of clothing, vehicles, foods, etc. So, by recognising conceptual relations between the to-be-remembered items, the individual is organising the material, which in turn makes it easier to use an active or cumulative rehearsal

strategy (Bjorklund & Douglas, 1997; Ornstein, et al., 1975). This highlights how rehearsal and organisation memory strategies facilitate each other.

The developmental patterns associated with organisation are similar to those related to rehearsal, with the tendency to organise material and the quality of organisation increasing with age. For example, preschoolers show no tendency to cluster items to aid recall (Arlin & Brody, 1976; Furth & Milgram, 1973), and only 27% of first grade children categorised pictures to aid recall, even when instructed to do so (Salatas & Flavell, 1976). It is possible that the poor clustering abilities of young children arise because they do not recognise the same taxonomies as adults, and cannot therefore use the superordinate categories to organise the items for rehearsal. However, this does not seem to be the case, since even when children are allowed to impose their own organisational categories on the to-be-remembered items, young children seldom cluster stimuli into meaningful categories, whereas older children will impose their own taxonomies on items to aid recall (Lange, 1978; Myers & Perlmutter, 1978).

The type of organisational strategy, and not just its implementation, is also related to age. Compared to older children younger ones “divide lists into a greater number of categories, each having fewer members” (Siegler, 1991, p. 185), a strategy which is unlikely to aid recall. However, just as with passive rehearsal strategies, training studies have shown that even preschool children are capable of using clustering techniques if the instructions are sufficiently explicit and indicate the importance of organising items according to meaningful categories, and if the organisational properties of the items are highly salient (e.g., Corsale & Ornstein, 1980; Lange & Pierce, 1992). Thus, utilisation of organisational strategies also appears to show a production, rather than a mediation, deficit.

Elaboration strategies are similar to organisation strategies in that they too are based on imposing semantic relations between the to-be-remembered stimuli (Bjorklund & Douglas, 1997; Flavell, 1977). But whereas organisation involves clustering items into meaningful categories, elaboration involves creating an image or otherwise elaborating on the to-be-remembered stimuli (e.g., making a rhyme) to make the items more memorable (Baddeley, 1982,1985). Elaboration strategies are usually investigated by using a paired-associate task in which participants are required to learn pairs of unrelated items and recall the associate item upon presentation of its pair. Thus, in order to perform such tasks successfully, the individual needs to recognise common semantic characteristics between the paired items, so that one item acts as a cue to ease generating the other.

Developmentally, elaboration is considered as an advanced strategy, primarily used by older primary school children and adolescents, with spontaneous elaboration as a memory aid not occurring until adolescence (Pressley & Levin, 1977). However, as with the other rehearsal strategies, younger children can be trained to use elaboration (e.g., Pressley, 1982), once again indicating a production deficit in younger children.

1.3. Determinants of Working Memory Development

A number of factors have been proposed to explain age-related and individual differences in children's mnemonic abilities: (i) information-processing demands; (ii) existing knowledge and "metamemory" skills; (iii) socialisation and education. Each of these is discussed in turn.

1.3.1. Information-processing demands

Ornstein et al. (1988) summarised previous research on the development of memory strategies by proposing a framework based on a "continuum of mnemonic

effectiveness” (p. 38) from pre-strategic behaviour to spontaneous and automatic use of memory strategies. The model is based on the assumption that memory strategies are a cognitive skill that becomes increasingly automatised with age and experience. As such, it has much in common with the accounts of Case (e.g., 1978) and Brainerd (1981, 1983) on the development of other cognitive abilities. This model posits five levels of mnemonic performance:

1. The young child will not be able to deliberately use a specific strategy even if he/she was instructed or trained to do so. This is called “process deficiency” (Craik & Simon, 1980).
2. During the preschool years, a child may behave strategically in some situations, but strategy use might not facilitate memorisation.
3. During the early primary school years, children’s use of mnemonic strategies to aid recall becomes more effective, but strategies are not always employed. This is called “production deficiency” (Flavell, 1970).
4. Later in development, children produce strategies themselves and can use them in a flexible and generalisable manner. The strategies are effective in improving memory.
5. In the final stage, a child will be able to produce and utilise a specific strategy needed with less effort and more effective deployment. This reflects “the routinisation and automatisisation that comes from both practice and the development of certain underlying information handling skills” (Ornstein et al., 1988, p. 38).

Information-processing accounts such as the one proposed by Ornstein et al. (1988) can help to explain why “utilisation deficits” (Miller, 1990, 1994) are seen at certain point

of development. A utilisation deficit is when a child spontaneously employs a mnemonic strategy, but experiences little or no benefit from using it (Bjorklund & Harnishfeger, 1987). The authors explain this lack of effect with respect to the fact that, in early stages of strategy use, implementing the strategy causes such large information-processing demands that it may actually reduce the child's memory capacity. However, as the child becomes more skilled in using the strategy, with strategy use becoming increasingly automatised, the strains on information-processing capacity will be reduced, resulting in benefits to the child's memory performance (see also Guttentag, 1984; Miller, Seier, Probert, & Aloise, 1991).

1.3.2. Existing Knowledge² and Metamemory Skills

Knowledge as a determinant of memory development acts when an individual, in everyday remembering, tries to match a new experience with an existing one. Flavell and Wellman (1977) argued that this process of matching or association is involuntary, since needing to deploy deliberate, voluntary and self-conscious activity in order to remember most things would make the organism poorly adapted to its environment. As older individuals utilise developmental advances in the structure of their knowledge to conduct any memory task, children's available state of knowledge plays a major role in facilitating their memorising performance (Ornstein et al., 1988). Since knowledge is accumulated over time, the use of knowledge to aid memory can explain age-related increases in children's memory performance. However, knowledge also functions as a good explanatory factor when chronological age is *not* a good predictor of memory performance. For example, Chi's (1978) classic study showed that children who were expert chess players were better at recalling chess board configurations than adults who had no knowledge of chess, but no such advantages were found for recall of other

² Note that the influence of pre-existing knowledge on memory performance is further discussed in Chapter 2.

information. Findings such as these have led to an increasing agreement among researchers on the effects and influences of knowledge base on memory and strategy use (Ornstein et al, 1988; Chi, 1988; Wellman, 1988; Borkowski et al, 1988; Nelson & Hudson, 1988; Siegler, 1991).

This emphasis on the importance of “content knowledge” as a determinant of memory efficiency is rooted in Tulving’s (1972) distinction between two types of memory: episodic and semantic. Tulving (1983) stated that “ episodic memory is concerned with unique, concrete, personal experiences dated in the rememberer’s past; semantic memory refers to a person’s abstract, timeless knowledge of the world” (preface). Greene (1987) maintained that episodic and semantic memories can be seen as two types of knowledge, where semantic memory is equivalent to content knowledge or knowledge of the world. This, presumably, reflects the harmonising, interactive and mutual nature of the relationship between content knowledge (“memory in the wider sense”) and memory performance (“memory in the strict sense”) (Piaget & Inhelder, 1973). Thus, Perlmutter (1988) argued that the “increasing world knowledge base that accrues during development accounts for some of the age-related improvement in memory performance that is observed” (p. 368). Accordingly, throughout the course of cognitive development, general, content knowledge or semantic memory (memory in the wider sense) accrues and becomes an automatic action invoked in any remembering context. These views thus support Flavell and Wellman’s (1977) contention that knowledge improves memory not by any conscious strategy, but has “involuntary, and usually unconscious effects... on one’s memory behaviour” (p. 4).

Flavell and Wellman (1977) also highlighted another influence on memory development: *metamemory* or “people’s awareness of their own memory processes”

(Holland & Kurtz-Costes, 1997, p. 275). Since metamemory is one's overall knowledge and understanding of one's memory processes, it represents an advanced, conscious and deliberate mental activity (Flavell & Wellman, 1977; Noll & Turkington, 1994). Thus, "a person has metamemory if he knows that some things are easier for him to remember than others" (Flavell & Wellman, 1977, p.4). Metamemory has therefore become used to "name any aspect in the relationship between awareness and memory" (Best, 1999, p. 336). Specifically, metamemory or knowledge about memory can be divided into three types of knowledge: (i) understanding and beliefs about the ability of one's own memory, (ii) knowledge about different characteristics of memory tasks or demands, and (iii) knowledge about which strategies are appropriate for different remembering situations (Flavell & Wellman, 1977; Flavell, 1977; Cohen, Kiss, & LeVoi, 1993; Best, 1999; Metcalfe, 2000). Research on the development of metamemory has focused on two main areas. First, developmental differences in the content of metamemory; and second, the relation between metamemory and memory performance.

Classic studies on the development of metamemory have shown that young children do not accurately perceive their memory capabilities. For example, Kreutzer, Leonard and Flavell (1975) reported that, in contrast to older children, most 5-and 6-year-olds denied that they had ever forgotten anything, and believed that a delay in recalling information would not adversely affect their performance. Young children also believe that verbatim memory recall is as easy as recalling the gist (Rogoff, Newcombe, & Kagan, 1974) and vastly overestimate their memory abilities. For example, the 5-year-olds in Flavell, Friedrichs and Hoyt's (1970) study stated that they would be able to remember the whole set of the pictures, and insisted upon their prediction even after they had performed the actual task and recalled just a small number of items. In contrast, older

children of around 7 years of age made accurate predictions regarding their performance.

However, preschool children do have some accurate awareness of their memory capabilities. For example, they know that information decays rapidly within the short-term store and that their memory performance would be better if they were familiar with the material and given longer to study it before recall (Kreutzer et al., 1975). They also realise that it is more difficult to remember a large number of items rather than a small number (Yussen & Bird, 1979). But even when young children's metamemory is accurate, they are rarely able to justify their answers (Kreutzer et al., 1975).

In sum, it is assumed that the difference between what children predict they will remember and their actual performance is relatively large among younger children and will decrease with age (Brown, 1978). Thus, "with age and experience, appraisals of one's memory capabilities become considerably more sober" (Siegler, 1991, p. 190).

More surprising is the lack of any clear evidence for a positive correlation between metamemory and memory performance until well into the school years. Hasselhorn (1992), for example, reported that strong relations between metamemory and memory performance are not stable until 10 years of age. The general consensus of opinion in this area is that the relation between metamemory and memory performance is complex and bidirectional, varying as a function of age and task demands.

Knowledge about memory strategies represents the third component of metamemory. The assumption here is that, the more knowledgeable children are of how strategies aid remembering, the more likely they will be to use them. Research in this area has

therefore tended to involve asking children about the things they would do to help them in different remembering situations, or to evaluate the effectiveness of different strategies. For instance, in Kreutzer et al.'s (1975) study, children were asked what they would do to remember a friend's telephone number. 80% of school-aged children responded that they would write it down on a piece of paper, with this answer being provided by 55% of the preschoolers. However, among the older children 50% said that they would rehearse it, whereas none of the younger children indicated this strategy.

As for children's appraisal of the usefulness of memory strategies, Justice (1986) stated that the age-related differences in this regard are to be found in the *application* of these strategies rather than in evaluating their effectiveness. Justice (1986) presented children with four memory strategies (looking, naming, rehearsing and categorising) and asked them to evaluate each strategy either before or after studying and recalling sets of items. Children at all age levels considered rehearsal and categorising to be more effective than looking or naming. However, only the older children identified the usefulness of the strategy prior to recalling the items.

Clearly, children's existing knowledge and metamemory do improve their memory skills. It is therefore unsurprising that researchers have investigated how a number of potential sources of knowledge and metamemory relate to memory performance: school and family life.

1.3.3. Socialisation and Education

Perlmutter (1988) concluded that "knowing, in general, and memory, in particular, must be viewed within the social, rather than the individual, context" (p.363). Moreover,

Wellman (1988) referred to the need “to form social accounts” (p. 26) in order to explain strategy development, and Flavell and Wellman (1977) stated, “since metamemory refers to cognition about a type of human activity, it is of course a form of social cognition” (p.4). The training studies discussed above clearly illustrate how the social environment can have a considerable impact on children’s approach to remembering. The consideration of social influences on memory development is not, therefore, a new topic. The most obvious aspects of the social environment likely to influence children’s memory are the family and education. However, there is surprisingly little research on social-environmental influences on children’s working memory development.

Carr, Kurtz, Schneider, Turner, and Borkowski (1989) investigated the relations between the amount of parental instruction and children’s memory skills in groups of American and German parents and children. Specifically, Carr et al. (1989) tested the effects of parents’ metacognitive instruction on their children’s performance on a sort-recall memory task, a metacognitive test, their responsiveness to strategy instructions, and a post-test memory and strategy assessment. In addition, they carried out a 6-month follow-up assessment of strategy maintenance. Carr et al. found that German parents provided their children with more metacognitive instruction than the American parents, and that this instruction provided by German parents enhanced their children’s memory performance. That is, compared to US parents, German parents were found to present their children with home activities concerning strategy use and strategic thinking which resulted in promoting the remembering performance of their children.

With regard to younger children’s production deficiency in using memory strategies, research has shown that instruction in how to improve memory performance is more

effective if the instructions are given by people who are familiar to the child (Flavell, 1970; Flavell & Wellman, 1977; Paris, 1988; Wellman, 1988).

Other researchers have highlighted how children's knowledge about different aspects of memory shows a rapid progress as a result of entering school. Apparently, this is due to the demands for remembering skills within different learning settings in everyday classrooms (Siegler, 1991). Therefore, recognising the relation between children's knowledge of memory, strategy use and school performance may reveal potential mechanisms via which metamemory develops (Holland & Kurtz-Costes, 1997).

Although the first studies investigating relations between metamemory and academic performance were generally not promising (Geary, Klosterman & Adrales, 1989), the findings of more recent studies illustrate that school environment and the nature of different syllabuses, as well as teachers' skills, do influence children's metamemory and memory development. For example, Moely, Hart, Leal, Santulli, Rao, Johnson, and Hamilton (1992) reported that children whose teachers used explicit cognitive strategies suggestions more frequently when teaching were more responsive to a memory training session, but only if the children were of average or low achievement. For children who were high achievers, memory performance was positively affected by the training session regardless of their teachers' use of cognitive strategies. Moely et al. (1992) also found that these lower achieving children were more likely to use organisation strategies to aid recall and to recall more items if their teachers had frequently used strategy suggestions. Across all children, metamemory skills, in the form of being able to recollect and articulate the main features of the training procedure, were better if their teachers had frequently employed strategy suggestions in the classroom. Moely et al. (1992) therefore concluded that "high strategy" teachers appear to be able to influence

children's metacognitive learning ability as well as their memory performance through offering strategy suggestions as part of their general teaching strategy. Moreover, they maintained that "although the strategies suggested in the classroom are relatively specific to subject matter taught... students exposed to a high strategy teacher seem to be acquiring some more generalised tendency to be amenable to the teaching of cognitive processing activities" (p. 668). Thus, the cooperative nature of some learning situations allows children to participate dynamically in generating and evaluating different strategies in a routine manner which results in increasing their knowledge about memorisation skills (Moely et al., 1992; Pressley et al., 1991/1992).

Accordingly, these attitudes have contributed to the notion of studying memory socially. That is, "socialization of memory implies that basic memory functions, skills, strategies, and practices are affected by social learning; that in some way and for some purposes memory is improved, generally in accord with dominant cultural values, through exposure to training or practices by socialization agents, parents, teachers, or other adults" (Nelson & Fivush, 2000, p. 283). This perspective thus highlights the idea of studying memory development in its social and cultural context.

1.4. Summary and Synthesis

The main points of Chapter 1 can be summarised as follows. First, although we know that subvocal rehearsal is central to children's working memory development, researchers in this area have admitted that little is known about the how use of this type of strategy develops. Second, one of the most important developmental progressions is a gradual shift from visual coding of visually presented material to recoding this material phonologically. Third, some authors have suggested that a potential explanation for this shift is the child's increasing internalisation of speech (e.g., Ford & Silber, 1994). The

results of other researchers who have not stated this claim explicitly also support this contention. For example, the lip movements observed in Flavell et al.'s (1966) study are indicative of the use of internalised speech to aid memory performance. Moreover, if children's speech and phonological memory strategies are increasingly internalised with age, this can help to explain older children's increasing skill in using complex elaborative rehearsal strategies. Fourthly, there is increasing recognition of the social and cultural influences on the acquisition and use of strategic memory behaviour. A greater consideration of such influences on memory development, and outlining potential theoretical frameworks for understanding cultural and social-environmental influences on memory development, is therefore the topic of the next chapter.

Chapter 2

Social and Cultural Approaches to Memory Development

2.1. Introduction

The last chapter highlighted how several authors have argued that it is crucial to consider how the child's social and cultural context influences memory development. This chapter reviews theories on the cultural processes influencing memory, and previous research on cross-cultural differences in memory development. Studying memory development within social and cultural domains has been undertaken by researchers from various disciplines, such as in anthropology, philology and psychology (see Cole & Scribner, 1977). Within psychology, two theoretical approaches have formed the basis for modern cross-cultural research on memory: (i) Bartlett's (1932/1964) social schema theory; and (ii) Vygotsky's (1934/1986) socio-cultural approach. Each of these theories is reviewed in turn.

2.2. Bartlett's Social Schema Theory

Assessing memory experimentally by the use of meaningful measures, as opposed to nonsense syllables as was popular until that time (e.g. Ebbinghaus, 1885), was first proposed by Bartlett (1932/1964), and motivated him to refer to the importance of social aspects of memory. He stated that, "both the manner and the matter of recall are often predominantly determined by social influences" (p. 244). According to Bartlett (1932/1964), culture is a provider of meanings, ideals and customs, and thus affects the selection of information among any society members, which in turn affects their ways of remembering. These cultural factors are defined in Bartlett's account as "social

tendencies”, where the experience of remembering is supposed to be the outcome of their influence. Thus, people usually come to a situation where remembering is required with a previous knowledge or a pre-existing cognitive representation, which is referred to as a mental schema in Bartlett’s account. These mental schemata will be determined by the individual’s “social tendencies”.

Bartlett (1932/1964) came to this conclusion when he observed that, when people were asked to retell stories, they typically tended either to elaborate or omit some details. This seems to represent a process of matching a new experience with an old one through which reconstructive recall can operate (Cole & Scribner, 1977). Any new experience is thus reconstructed with reference to previous knowledge. Likewise, the new experience has the capacity to modify the pre-existing knowledge (Cohen et al, 1993; Haberlandt, 1994; Richardson, 1998). According to this account, one factor fundamentally determines what is remembered: the familiarity of an experience or its “situation components”. This familiarity drives the process of matching a new experience with an old one. As a result, the whole process could be seen as dependent upon mental representations or schemata.

According to Bartlett (1932/1964), the principles governing memory are considered to be universal, but cultural differences in remembering should be found because of the way specific schemata are generated within any society to fit any to-be-remembered materials. Therefore, Cole & Scribner (1977) inferred that “cross-cultural studies of recall must carefully specify the way in which the materials and conditions of recall ‘fit’ existing schemata” (p.264). For example, Bartlett attributed the unusual capacity of Swazi herdsmen to remember every single detail of their cattle to the fact that having cattle is of social and economic importance to individuals in Swaziland. This indicates

that social properties, or what Bartlett called “social tendencies”, play a major role in organising the experience of remembering in any given culture. Therefore, according to Bartlett, it is not a matter of superiority in remembering among primitive cultures, rather, it is “a matter of social organisation” (p. 248). This was clarified when Bartlett randomly picked an 11-year-old Swazi boy and asked him to recall a message of 25 words; the boy did no better or worse than his European counterpart.

Bartlett contrasted this reconstructive recall of material with a low level type of recall, similar to rote recapitulation. Contrary to reconstructive recall, rote remembering in Bartlett’s account is not socially determined; it is more individual, or as Bartlett indicated, “it is characteristic of the person of few interests, and those largely unorganised and concrete in nature” (p. 265). Rote recall is expected to take place when the group has “plenty of time, in a sphere of relatively uncoordinated interest, where everything that happens is about as interesting as everything else” (Bartlett, 1932/1964, p. 266). Such an atmosphere will witness a developing interactive process between “the individual temperament and the social organisation” (p. 266), which will result in producing and maintaining a specific way of remembering (a new schema) where “events will be recalled in the order of their occurrence” (Cole & Scribner, 1977, p. 246).

2.2.1. Direct Testing of Bartlett’s Theory

Two studies are considered to be a close and direct examination of Bartlett’s theory on remembering (Cole & Scribner, 1977). The first was conducted by Nadel (1937), and the second by Deregowski (1970). Nadel (1937) was interested in testing Bartlett’s account regarding the influence of social tendencies on memory performance. On a story recall task, he compared the performance of two groups of schoolboys aged

between 16 and 18 years from the Nupe and Yoruba tribes in Northern Nigeria. Although ethnographic studies indicated that neighbouring Nupe and Yoruba tribes shared many cultural features, such as languages, ecology and socio-economic institutions, there were stark differences in two important factors: their religions and their art (Cole & Scribner, 1977). That is, “The religion of the Yoruba is characterized by an elaborate and rationalized hierarchical system of deities... the Nupe have no such system; their religious beliefs centre round a concept of magic of the ‘mana’ type, i.e. the concept of abstract, impersonal power” (Nadel, 1937, p. 424). Furthermore, in contrast to the Nupe’s art, the art of the Yoruba was enriched by a variety of activities, such as decoration and drama. This gave Nadel (1937) the opportunity to investigate whether such cultural differences would be reflected in memory, with the Yoruba producing more elaborate stories. Nadel composed a story that would be familiar to both cultural groups, and analysed the content of the stories recalled by the Nupe and Yoruba. Analysis of the two cultures’ stories revealed omissions and additions. Namely, while the Yoruba subjects tended to elaborate by formulating new logical links between different events, the Nupe retold the story events one by one without trying to create “an inner cohesion in the narrative” (Nadel, 1937, p. 428). Thus, Nadel’s findings supported Bartlett’s position regarding the influence of social tendencies on remembering.

Support for Bartlett’s emphasis on the effect of social tendencies on memory performance also came from an experiment carried out by Deregowski (1970). Deregowski tested the hypothesis that remembering time concepts would be easier among “groups where their importance is stressed than those where no such stress exists” (p. 38). Since schooling and urbanisation tend to enhance the importance of time, Deregowski compared the memory performance of two groups: (i) schoolboys of about 13 years of age, with an average of 6 years of schooling, who lived in Lusaka, the

capital city of Zambia; and (ii) women with relatively little or no schooling experience (mean of schooling years = 1.1) who lived in Lundazi, a rural area where consideration of time was not important. Deregowski presented the two groups with a story containing a set of eight numbers, four of which related to temporal phenomena and four of which related to non-temporal events. The two groups were then asked to recall these numbers. Deregowski found that, while there was no significant difference between rural women and urban schoolboys on recalling numbers not associated with time, a significant difference between the two groups on remembering the numbers of temporal indications was established in favour of the schoolboys. On the basis of this study, Deregowski therefore concluded that Bartlett was correct in claiming that culture is a determinant of memory.

2.2.2. Indirect Testing of Bartlett's Theory

Although other researchers did not set out with the explicit intention of testing Bartlett's theory, their results from various types of memory task are relevant. For example, based on the assumption that visual memory will be superior among nonliterate individuals, Kleinfeld (1971, cited in Cole and Scribner, 1977) compared how rural Inuit and urban Caucasian 9- to 16-year-olds recalled visual patterns. Her findings showed that the Inuit participants were superior in visual memory, thus confirming her hypothesis. Kleinfeld (1971) explained these results in terms of the social, genetic and linguistic factors that enhanced the ability of Inuit children to recall visual stimuli. Similarly, Wagner (Wagner, 1974; 1978; 1981; Wagner & Spratt, 1987) carried out a series of developmental studies among samples of children and adults from different places in the United States, Mexico and Morocco, in order to determine the influence of urbanisation and schooling on the development of verbal and visual memory.

Wagner (1974) assessed the use of rehearsal among individuals of different ages (ranging from 7 to 35 years of age), all of whom lived in a major city in Mexico. Their performance was compared with that of individuals from a rural area of Mexico, whose educational opportunities were limited. Wagner's results showed that the urban subjects were more likely than their rural counterparts to use rehearsal in order to improve their task performance, leading him to argue that urbanisation and schooling are important for the acquisition and development of mnemonic strategies.

2.3. Shortcomings of Cross-cultural Memory Research

Although both Bartlett and subsequent cross-cultural studies on memory used children as participants, these approaches were not concerned with actual memory *development*. For example, Cole and Scribner (1977) pointed out that Bartlett's theory was not developmental in its approach, and others noted that the cross-cultural research conducted during the 1970s was not "particularly noteworthy for its contributions to research on child development" (The Laboratory of Comparative Human Cognition, 1979, p. 827).

Others have commented on the fact that Bartlett's theory is an account of 'group remembering' (Bakhurst, 1990), rather than a consideration of how an individual becomes able to remember information. Consequently, within Bartlett's theory, social and cultural factors are viewed as independent variables, rather than being seen as playing an active role in an interactional relationship between an individual and other individuals in that culture (The Laboratory of Comparative Human Cognition, 1979; Mistry, 1997; Rogoff & Chavjay, 1995). Thus, although Bartlett's work and subsequent research highlighted how different social and cultural factors (e.g. schooling, urbanisation) result in cultural variations in remembering, Mistry (1997) argued that

“research that simply documents differences in remembering as a function of such variables does not really elaborate the *cultural context* of remembering” (p. 351, emphasis added).

This point is well illustrated by the fact that neither Bartlett’s theory nor more modern cross-cultural work can explain how members of some primitive or non-literate societies show remarkable memory skill in certain areas. For example, as mentioned previously, Swazi herdsman can recall in minute detail the characteristics of their cattle, and nonliterate Inuit children have excellent visual memories. However, how these ‘islets of ability’ in memory come to arise is relatively unclear. Since it seems unlikely that specific memory strategies will be deliberately employed in these circumstances (indeed, identifying a strategy for how to remember the individual characteristics of cattle is difficult, if not impossible), it seems that their engagement in daily routine activities produces “excellent recall as an incidental by-product” (Cole and Scribner, 1977, p. 267). Thus, remembering for its own sake is not the final goal for people in these societies; rather, it is a means by which their everyday life can continue. This highlights the fact that memory strategies or mnemonics are not always appropriate determinants of memory performance, or the only way by which remembering can be improved, especially in everyday memories (Cole and Scribner, 1977; The Laboratory of Comparative Human Cognition, 1979; Mistry, 1997). Despite this fact, the use of memory strategies has been of central importance in cultural studies so far (e.g. Wagner’s research, discussed above). Seemingly, this focus represents a reflection of the domination of the working memory model and information-processing in research on memory development (see Chapter 1).

An exception here is research that has dealt with children's autobiographical memory development. Autobiographical memory is a type of long-term memory that deals with retrieving personal experiences and events from the past (Tulving, 1983). There is a much more well established tradition of considering social environmental influences on autobiographical memory development. Work by Nelson and by Fivush and their colleagues has identified the crucial role played by parents in children's developing autobiographical memories (e.g., Fivush & Fromhoff, 1988; Haden & Fivush, 1996; Haden, Haine, & Fivush, 1997; Nelson 1993; Nelson & Fivush, 2000). In particular, parents' elaboration of their children's past experiences and memories is strongly related to better autobiographical memory recall and coherence in children. Thus, in research on the development of autobiographical memory, the impact of children's social environment has received much greater consideration than in research on the development of other types of memory. (Note that autobiographical memory and its development are discussed in greater detail in Chapter 5.)

Cole and Scribner's (1977) views contributed to the crucial shift "from looking at culture as an independent variable affecting cognition to regarding cognitive processes as inherently cultural" (Rogoff & Chavjay, 1995, p. 873). This shift is clearly seen in a new interest in Vygotsky's (1934/87, 1978) sociocultural approach and its use as an explanatory framework for the child's cognitive development (Laboratory of Comparative Human Cognition, 1983; Mistry, 1997). The next section will therefore be devoted to discussing the main principles of Vygotsky's theory.

2.4. Vygotsky's Sociocultural Approach

According to Wertsch (1985) there are three basic, interconnected themes that characterise Vygotsky's theoretical approach to mental functioning. The first is the

necessity for a genetic or developmental method; the second is the hypothesis that the higher mental functions are social in their origin; and the third focuses on the claim that higher mental processes are mediated by means of tools and signs (semiotic mediation). Each of the three themes will be dealt with in turn.

2.4.1. The Genetic Method

Within Vygotsky's framework, development indicates the state of change and movement in an individual, which is essential to understand the nature of any given thing; he stated that "it is only in movement that a body shows what it is" (Vygotsky, 1978, p. 65). This highlights Vygotsky's emphasis on the need for a developmental analysis, or genetic method, to understand different psychological phenomena (Cole & Scribner, 1978). Thus, mental processes can only be understood by looking at what they develop from and what they will develop into.

Arguing that tracing human mental functions back to their primitive forms will allow for discovering their nature, Vygotsky (1978) identified two lines of development: (i) the natural or biological line; and (ii) the cultural or social/historical line. The relation between these two lines of development underlies Vygotsky's distinction between the "elementary mental functions" and the "higher mental functions" (Bakhurst, 1990; van der Veer & Valsiner, 1993). The higher mental functions are characterised by voluntary control and conscious awareness, and are exemplified by phenomena such as voluntary attention, goal-directed thought and mediated memory. Moreover, the higher mental functions are derived from social interaction. The development of these functions establishes the cultural line of development. On the other hand, the elementary mental functions are involuntary, unconscious and environmentally determined. The development of these functions constitutes the natural line of development. Viewing

culture as a dynamic process underlying the development of mental functioning means that Vygotsky's adoption of the genetic analysis is not limited to the investigation of the ontogenetic domain but can also be applied to phylogenesis and microgenesis (developmental transition within a very short period of time, e.g. during a task).

2.4.2. The Social Origin of Higher Mental Functions

Vygotsky argued that individual mental functioning is derived from social and cultural processes. He proposed that the "higher psychological processes carried out by individuals are direct reflections of social processes in which individuals participated at an earlier stage of ontogenesis" (Vygotsky, 1981a, p. 146). This shows that Vygotsky considered social processes to be his starting point for an explanation of the development of the higher mental functions, as his "general genetic law of cultural development" illustrates:

"Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category... Social relations or relations among people genetically underlie all higher functions and their relationship" (Vygotsky, 1981a, p. 163).

Clearly, then, within Vygotsky's theory, the role of caregivers and peers is instrumental in the child's attainment of higher mental functions. Indeed, several researchers have highlighted how higher mental functions retain some of the characteristics of the social interaction from which they originated (Rogoff and Wertsch, 1984; Fernyhough, 1994). For example, thinking is described as an activity that is distributed between individuals and 'shared' (e.g., Fernyhough, 1994; Rogoff, 1990), and claims have been made for

higher mental functions being dialogic in nature (Ferryhough, 1996; Tomasello, Kruger & Ratner, 1993; Wertsch, 1981).

Thus, the transformation of the interpsychological processes into the intrapsychological functions, or the internalisation of social processes, is the process via which the higher mental functions are established. Internalisation represents the relation between the external (social) and the internal (psychological) aspects of development. Wertsch & Stone (1985/1999) argued that the central theme of Vygotsky's theory is not merely that there is a relation between external and internal mental activity "but that it is a *genetic* or *developmental* relationship in which the major issue is how external processes are *transformed* to *create* internal processes" (p. 364, original emphasis). Two main assumptions follow from this account. First, internalisation is not a simple action of copying the external practices into the internal domain (Frawley, 1997; Wertsch, 1985), nor is it assimilating an external activity to pre-existing internal structures (as in Bartlett's account regarding the relationship between the mental schema and the previous experience, mentioned above); rather, internalisation is the process by which the internal (intrapsychological) plane is *formed* (Leont'ev, 1981). Second, internalisation (and hence the higher mental functions) is mediated by different sign systems that regulate social processes. Typically verbal language acts as the mediating system, but any symbolic system in operation during the interaction between the child and caregiver (e.g., gesture) can mediate the internalisation process. Wertsch and Stone (1985/1999) therefore argued that "internalisation is the process of gaining control over external sign forms" (p. 368). These points will be extended when discussing Vygotsky's third theme – semiotic mediation.

2.4.3. Semiotic Mediation

The third theme in Vygotsky's theory is based on the assumption that the higher mental functions are mediated by signs or "psychological tools". Vygotsky was influenced by the writings of Marx and Engels regarding labour as a process that denotes human activity and constitutes human consciousness (Wertsch, 1985/1991). In particular, Vygotsky appealed to the analogy between material tools and psychological tools by applying Engels's idea of "instrumental mediation" and its role in "the emergence of labour activity" to psychological tools and their influence on the higher mental functions (Kozulin, 1986; Wertsch, 1985, p. 77; Wertsch, 1991, p. 28). According to the sociocultural approach, the same psychological tools used to mediate human behaviour in the social (interpsychological) domain – language, diagrams, maps, mnemonic techniques – are also assumed to mediate the higher mental functions within the intrapsychological domain (Wertsch, 1991). Thus, as mentioned above, the higher mental functions will be characterised by some of the features of the social processes from which they are derived.

Developmentally, children are at first unable to regulate their own behaviour through the use of psychological tools and sign systems. The young child's behaviour is therefore initially regulated by others, such as parents. Vygotsky argued that the thought and language systems come together at around 2 years of age, enabling the child to engage in *verbalised* thought for the first time. Children can then begin to 'borrow' the psychological tools used by other people in order to be able to regulate their behaviour by themselves. An example of how regulatory speech is transferred from adult to child during a puzzle task provides an ideal example of the transition from other- to self-regulation. Wertsch and Hickmann (1987) observed preschool children and their mothers collaborating on completing a jigsaw of a lorry with a cargo that consisted of

differently coloured blocks. The children were given a completed copy of the puzzle to copy, but too many cargo pieces were provided; the child could thus only successfully complete the puzzle by referring to the model puzzle and by selecting the correctly coloured pieces. Wertsch and Hickmann (1987) reported the following exchange to demonstrate how the child “borrows” and internalises the mother’s language to show the transfer from other- to self-regulation:

Episode 9

M: Now what’s the next colour we need?

C: [Looks at model] White. It’s white.

Episode 11

M: Goodness. You’re almost done with your truck.

C: [Looks at model] Now purple. Purple.

Thus, “both the organisation and the means of social activity are taken over entirely by the individual and ultimately internalised, leading to the development of mediated, voluntary, historically developed mental functions” (Minick, 1999, p. 36). In this regard, language as a means of communication and social interaction is considered to be of crucial significance in Vygotsky’s account of the development of the higher mental functions (Wertsch, 1991; Frawley, 1997; Minick, 1999).

2.5. Vygotsky’s Theory and Memory Development

Vygotsky frequently used differences in memory to illustrate his distinction between the higher and the elementary mental functions. He distinguished between two types of human memory: natural and mediated. Natural memory is an elementary mental function, “characterised by the nonmediated impression of materials, by the retention of actual experiences as the basis of mnemonic (memory) traces” (Vygotsky, 1978, p. 38).

This highlights two qualities of natural memory. First, remembering in natural memory indicates memory in its elementary or premature phase, where “experienced scenes and events are imprinted in memory” but they will not be “recalled at the proper time” until the individual interacts with the physical and social environment (Cole & Scribner, 1977, p. 244). Second, there is no special effort or activity involved in storing or retrieving memories from natural memory. Thus, the Swazi herdsmen’s memory for their cattle would be an example of natural memory.

Once individuals deliberately employ external devices in order to aid memory, they will begin to have control over their remembering behaviour. Such control indicates the start of more advanced, *mediated* memory. These external mnemonic devices are first found in simple forms of memory aids, such as a notch in a stick or string around the finger, which indicate an early stage of cultural development (Cole & Scribner, 1977; Vygotsky, 1981). At a later stage of cultural development, these external devices will be produced on the individual level, i.e. internally as Leont’ev (1960) indicated (cited in Cole & Scribner, 1977). Thus, younger children, who are more dependent on the natural form of memory, will be less able to make use of external memory aids than older children. Meanwhile, older children’s increasingly skilled performance on memory tasks either with or without the reliance on memory external aids indicates “their ability to use internal mediators, rendering external mediators superfluous” (Cole & Scribner, 1977, p. 245).

Vygotsky (1978) used Leont’ev’s (1981) ‘forbidden colours’ task to illustrate the distinction between natural and mediated memory. In this task, children were asked various questions, some of which required a colour name as the answer. The task was then made more difficult; first rules were introduced forbidding children to use two

particular colours and from using any colour name twice. After having participated in this “forbidden colours” trial, the child then took part once again in an identical trial, the only difference being that the child was given nine coloured cards and told that “these cards can help you to win”. Children aged between 5 and 13 years, as well as a group of adults, took part in this task. The results showed that 5- and 6-year-olds made the greatest number of errors and did not benefit from having the cards. In contrast, the children aged between 8 and 13 years benefited from the cards and made far fewer errors when the cards were available. For example, one child put the forbidden colours cards to one side and turned over each of the other colour cards as she used them to answer the questions, thus helping to remind her which colours had already been used. Adults made very few errors even when the cards were not available, and having the cards did not appreciably improve their performance. Vygotsky (1978) used these results to show how natural memory becomes mediated. Unlike the older children, the 5- and 6-year-olds were not able to use the cards as external cues to aid or mediate their memory. Compared with the adults, the older children needed the help of external aids to mediate their memory performance, whereas the adults were able to use internal memory strategies to mediate their performance.

For both Vygotsky and Leont'ev, language is the key mediational means via which natural, primitive, nonmediated memory develops into the more advanced higher mental form of memory.

2.6. A Sociocultural Approach to Memory Development

By providing a genetic explanation of the relation between individual human mental functioning and its social-cultural milieu, Vygotsky's theory makes it difficult, if not impossible, to deal with either of the two domains independently. Consequently,

Wertsch (1991) maintained that “the basic goal of a sociocultural approach to mind is to create an account of human mental processes that recognises the essential relationship between these processes and their cultural, historical, and institutional settings” (p. 6).

There is now wide agreement among researchers on the practical usefulness of the sociocultural approach in revealing the nature of children’s cognitive development (Laboratory of comparative Human Cognition, 1983; Rogoff & Chavjay, 1995). Moreover, some researchers in contemporary memory developmental research have recognised the usefulness of the sociocultural approach (e.g., Hudson & Fivush, 1990; Mistry, 1997). For example, Mistry (1997) proposed a sociocultural perspective of remembering, based on three central themes: (i) the individual is regarded as inseparable from his or her social and cultural context, (ii) remembering is derived from and constituted by social and cultural practices, and (iii) memory should be viewed as a culturally-organised activity, rather than as a measure of individual cognitive attainment.

Mistry’s (1997) approach is based on the work of Wertsch (1991; Wertsch & Tulviste, 1992) which argued for memory and other forms of cognition being understood “not as attributes or properties of the individual, but as functions that may be carried out intermentally or intramentally” (Wertsch & Tulviste, 1992, p. 549). Thus, one should “begin the analysis of mental functioning in the individual by going outside the individual” (Wertsch & Tulviste, 1992, p. 548). This approach requires a shift in viewing memory, not as a measure of the individual’s cognitive development or capacity, but as an activity mediated by cultural tools, such as books, computers, written and spoken language, etc. For example, if memory is viewed as “the action of remembering in a particular activity” (Mistry, 1997, p. 350) and not as a context-free

skill or ability, culture automatically becomes an integral part of every act of remembering. The goals and procedures used in remembering have all been learnt through interacting with more capable members of our own society. In turn, this shift means that culture is seen as essential for understanding the *mechanisms* of development, rather than just highlighting differences in development between different cultural groups (Cole, 1995).

But although these sociocultural approaches to memory and more general cognitive development argue that they are better able to identify the mechanisms and processes responsible for development than information-processing accounts, they have as yet been unable to deliver any great insights on what these mechanisms of change actually are. The central hypothesis of the studies undertaken for this thesis is that children's use of language to regulate their own behaviour is the mechanism via which individual differences in social and cultural background impact on children's memory development. In particular, the focus here is on the children's use of *private* or *egocentric speech* as a determinant of children's remembering.

Private speech has a central role in Vygotsky's theory. According to Vygotsky (1929/1930), the development of speech is considered to be the best example highlighting the relation between interpsychological functioning (interpersonal interaction) and intrapsychological functioning. Speech has two main functions, a social function (communication), and an intellectual function as the major form of semiotic mediation for the formation of the higher mental functions (Wertsch, 1985). That is "speech is first a communicative function. It serves the goals of social contact, social interaction, and the social coordination of behaviour. Only afterwards, by applying the same mode of behaviour to oneself, do humans develop inner speech" (Vygotsky,

1929/1930, cited in Wertsch, 1980, p. 153). Vygotsky's views on the developmental progression from social to inner speech elucidates his genetic analysis of the social origins of intellectual ontogenesis, where private speech "as a separate linguistic form is the highly important genetic link in the transition from vocal to inner speech" (Vygotsky, 1986/1999, p. 35).

As discussed in Chapter 1, the use of speech (either overt or covert) is also vitally important to the functioning of the articulatory loop and rehearsal strategies within the working memory system. But before the hypotheses regarding links between private speech and memory development can be outlined in greater detail, it is necessary to spend some time describing the phenomenon of private speech and how it has been researched.

2.7. Private Speech

Piaget (1932) was the first to document the fact that, when playing together, children frequently engage in speech that has no apparent communicative function. For example, Piaget (1932) reported that 45% of the utterances of two 6-year-old boys consisted of "remarks that are not addressed to anyone... and that... evoke no reaction adapted to them on the part of anyone to whom they may chance to be addressed" (p. 35). Piaget (1932) distinguished between three types of egocentric speech:

- Echolalia – the repetition of words in playful sense: "the child repeats them for the pleasure of talking, with no thought of talking to anyone" (Piaget, 1932, p. 9).
- Monologue – children's use of speech to accompany their own behaviour.
- Collective monologue – non-social speech that appears to be stimulated by the mere presence of an audience.

Piaget maintained that none of these forms of speech had any developmental function beyond playful reduction of tension, and therefore concluded that they were another indicator of young children's egocentrism. This conclusion was seemingly supported by the finding that this type of speech begins to die away around the age of 7 (the traditional demarcation between pre-operational and concrete operational thought), with its peak incidence being between the ages of about 3 and 7 years. Piaget therefore named the phenomenon egocentric speech, proposing that it was replaced by more mature, socialised speech, which had a clear communicative function.

Vygotsky (1934/1986) also documented the phenomenon of "speech to self", but although he used Piaget's term egocentric speech, Vygotsky's views on its role in development were diametrically opposed to those of Piaget. Rather than accepting the Piagetian transition from egocentric to socialised speech, Vygotsky maintained that egocentric speech *originated* from social speech, describing egocentric speech as a transitional or intermediate stage of development between social speech and inner verbal thought. Vygotsky argued that egocentric speech is essential in helping children to begin to control and regulate their behaviour through the use of words (psychological tools). Thus, within Vygotsky's theory, egocentric speech is not a dead end, but a mid-point between social speech and internalised inner speech, with egocentric speech gradually "going underground" to form semiotically-mediated verbal thought. Note then, that both Piaget and Vygotsky made the same prediction about egocentric speech dying away with increasing age, but for very different reasons. For Piaget, it was simply replaced with mature social speech, but for Vygotsky it was internalised to form verbalised thought. Thus:

For Piaget:

Egocentrism → Socialised intellect
Egocentric speech *Social speech*

For Vygotsky:

Social interaction → Individual intellect
Social speech *Egocentric Speech* *Inner speech*

(Note: Vygotsky's individual intellect is also socialised since it is derived from social activity.)

The term egocentric speech has now been replaced by the term *private speech* (Flavell, 1966) due to the challenges made to Piaget's views on early egocentrism and the fact that research has supported Vygotsky's conceptualisation of children's speech to self (see below). The term private speech thus stresses speech-for-oneself rather than the lack of social communication among children (Berk, 1992). The term private speech will therefore be used for the remainder of the thesis.

2.7.1. Support for Vygotsky's Views on Private Speech

Vygotsky (1978) made three general predictions that would test his theory on the origins and role of private speech in development. First, there should be evidence of private speech (PS) being internalised to produce inner speech or verbal thought. Second, PS will be "parasocial" (Kohlberg, Yaeger, & Hjertholm, 1968) in nature because it is derived from social speech. That is, the occurrence of PS should be dependent upon an audience, or the illusion of an audience, and PS should bear similarities to social speech. Third, children should use PS to regulate their behaviour

since it is a verbal manifestation of thought; for Vygotsky, PS is how verbalised thought is formed.

2.7.1.1. Evidence for the Internalisation of PS

Vygotsky stressed the use of language as a mediating tool for problem-solving activities. According to Vygotsky, children engage in PS because they cannot think or linguistically direct their actions in a purely covert fashion as can older children and adults. He therefore argued that children's private speech is equivalent in content and function to inner speech: "the first feature uniting the inner speech of adults with the egocentric speech of children is its function as speech-for-oneself" (Vygotsky, 1986/1999, p. 32). This means that PS as a form of verbal thinking is an expression of inner speech in its early phases of ontogenesis, so that "our schema of development [is] first social, then egocentric, then inner speech" (Vygotsky, 1999, p. 35).

From a developmental point of view, Vygotsky (1999) stated that overt PS, or "thinking aloud", is most prevalent among preschool children, but is very similar to older children's covert thinking behaviour. That is, although when given a task to complete or a problem to solve, the older children "scrutinised the problem, thought (which was indicated by long pauses), and then found a solution" (Vygotsky, 1999, p. 30), when asked what were they thinking about, they "voiced mental operations much like those the preschoolers had verbalised" (Berk, 1992, p. 22). This supports Vygotsky's (1999) view that PS is transformed into soundless inner speech by school age.

Modern research on the internalisation of PS has focused on attempts to establish age-related changes in the quantity of PS, and whether inner speech is dialogic in nature (thus betraying its origins in social and private speech). As discussed above, both Piaget

and Vygotsky predicted that the overall incidence of PS will increase during the preschool years, but then decrease from around the age of 7, thus constituting a curvilinear developmental trend. This claim has been supported by both cross-sectional and longitudinal studies revealing an age-related decrease in audible and task-relevant PS. However, in support of Vygotsky's argument that this decrease in PS is due to internalisation, and not a Piagetian replacement by social speech, researchers found that the decrease in audible PS was paralleled by an increase in external manifestations of inner speech, such as inaudible muttering and lip and tongue movements (Berk & Garvin, 1984; Berk, 1986; Berk & Potts, 1991; Bivens & Berk, 1990; Frauenglass & Diaz, 1985; Kohlberg et al., 1968).

But despite this supporting evidence for Vygotsky's views, some of these studies found no age-related differences in the *overall* incidence of PS between 5 and 10 years (Berk & Garvin, 1984; Berk & Potts, 1991), suggesting that "the process of private speech internalisation takes place over a much longer age span than Vygotsky anticipated" (Berk, 1992, p. 33). This also highlights the fact that there are likely to be considerable individual differences in children's use of PS at any age, so that age may not always be the best indicator of children's use of PS.

Research on the dialogic function of inner speech has been largely driven by Wertsch (1980) highlighting Vygotsky's contention that inner speech is an "internal collaboration with oneself", which "strongly implies that inner speech is dialogic" (p. 154). However, in order to be dialogic, inner speech needs not to occur in a fully expanded form since "the self, after all, is an extremely understanding listener" (Berk, 1994, p. 79). Indeed, researchers have known for a long time that, as children grow older and gain mastery over their behaviour, their PS becomes "abbreviated and short-

circuited” (Kohlberg et al., 1968, p. 696). Goudena (1992) reported that 74% of utterances in a sample of 41/2-year-olds showed this kind of abbreviation. For example, one child said, “this one, fits, done” while performing the task, showing how PS can be considerably abbreviated even in relatively young children. Similarly, Feigenbaum (1992) demonstrated how the syntax of PS fragments with development. This research shows that with development, PS is being internalised to form inner speech, rather than being replaced by social speech.

2.7.1.2. *The Parasocial Nature of PS*

Classic studies by Vygotsky and his colleagues (e.g., Vygotsky & Luria, 1993) showed that removing the impression of an audience vastly decreased the incidence of PS. For example, in one experiment children were paired with other children who were unable to understand or respond to their speech either because they were deaf and mute or spoke a different language. In another experiment, children were simply observed playing or performing tasks in isolation, and in a further study, an orchestra was hired to play loudly outside the testing room so that it was difficult for the children to hear one another. In all of these experiments, children used considerably less PS, supporting the notion that it is a parasocial phenomenon.

More recent research has addressed the issue of the parasocial nature of PS largely by investigating relations between social speech or interpersonal interaction and PS. Kohlberg et al. (1968) were among the first researchers to investigate the phenomenon of PS since Piaget and Vygotsky. They identified various structural similarities between PS and social speech utterances; for example, they reported that many PS utterances consisted of self-answered questions, such as *Where's the next piece? Here it is*. These self-answered questions are clearly identical to the types of exchange one might expect

in a social dialogue between a child and another person engaged in a task. Kohlberg et al. (1968) also examined correlations between communicative or cooperative attitude and the incidence of PS among preschool and young primary school children. They reported a positive and significant correlation ($r= 0.68$) between PS and social interaction. In line with this finding, Berk and Garvin (1984) reported a positive correlation between the use of social speech and PS, but only for the youngest children in their sample of 5- to 10-year-olds. This suggests that social speech is only related to the immature beginnings of PS, leading Berk and Garvin (1984) to conclude that “social experience supports the development of early forms of private speech but is relatively unrelated to the more mature varieties” (p. 283).

Furrow (1984, 1992) is one of the few researchers who has investigated PS in very young children, and who has charted longitudinal changes in PS. Furrow (1984) investigated links between social speech and PS in a sample of 2-year-olds, and concluded that PS clearly develops out of children’s social speech with others in the way Vygotsky proposed. But from the results of this study and his subsequent longitudinal study (Furrow, 1992) Furrow argued that, although social speech and PS are genetically related, these two types of speech become functionally distinct from quite early in development, with children frequently engaging in inaudible muttering and self-directed comments in PS, but not using social speech for these functions.

2.7.1.3. PS as a Means of Self-regulation

The early experimental work carried out by Vygotsky and his colleagues (Vygotsky, Luria, Leont’ev and Levina, 1930) and more contemporary researchers has generally supported the self-regulatory role played by PS. For example, in a classic study, a child of 3 years and 7 months was asked to recover “some candy on top of a cupboard”, i.e. a

place that was out of the reach of the child. The experimental situation also included a stick “hanging on the wall” and a chair (Levina, 1981). The child approached finding a solution to this task by talking to herself through her options. Noticeably, most of the child’s utterances throughout involved describing the surrounding environment and actions taken: *It’s very high...We have a tall cupboard...Papa puts things up there, and I can’t get them...No, I can’t reach it with my hand...I’m still little* (She stands up on a chair) *There we go... I can get it better from the chair* (She reaches. She stands on the chair, and swings the stick. She takes aim at the candy) (Levina, 1981, p. 286). What is perhaps most interesting about the way in which this child approached the task is the fact that, even though the practical tools were offered and used, she still relied on PS to organise the situation and regulate her behaviour. Vygotsky and Luria (1993) therefore concluded that “the child solves a practical task with the help of not only eyes and hands, but also speech” (p. 109).

According to Vygotsky (1999), private utterances that accompany activities are of particular importance because they indicate “the verbal representation of ongoing actions” and precede that form of speech “used for planning” (Levina, 1981, p. 285). Consequently, PS in Vygotsky’s account is not “a fixed phenomenon: its role in the child’s behaviour changes; also, its functional correlation with action and its role in action change” (Levina, 1981, p. 285). To illustrate this point, Vygotsky (1999) referred to an experiment where a child of 5½ years was required to draw a streetcar but found that the point of his pencil was broken. At first, the child tried hard to overcome this obstacle by using the broken pencil, but the result was a colourless line. Then, he “muttered to himself, ‘It’s broken’”. The situation went on describing how the boy put the broken pencil aside and completed the task by using watercolours to draw in this case; “a *broken* streetcar after an accident, continuing to talk to himself from time to

time about the change in his picture” (Vygotsky, 1999, p. 30). Thus, this situation indicates that the child used PS in order to comprehend the problem and find a solution (Berk, 1992).

The developmental course of PS as a regulator of task performance can be summarised as follows. At first PS “follows action, occurring as an afterthought” (Berk, 1992, p. 21), e.g., “There, I putted that car inna barn” (Rubin & Dyck, 1980, p. 219). Next, PS occurs simultaneously with behaviour, e.g. “I’m makin’ a big haunted house” (Rubin & Dyck, 1980, p. 219). Finally, PS precedes action and “assumes a critical self-regulatory function” (Berk, 1992, p. 21), e.g. “I’m gonna frow that ball” (Rubin & Dyck, 1980, p. 219-220).

Vygotsky’s other assumption regarding PS as a regulator of task performance was that the incidence of PS will increase with task difficulty. Several studies have found support for this assumption, but only when the tasks are not so difficult that they are beyond the child’s level of ability. Thus, PS is maximised when children are performing the most difficult tasks of which they are capable, but if the task is beyond their grasp, the incidence of PS declines. Some authors, however, have questioned whether the observed relation between task difficulty and PS is best explained with reference to the self-regulatory function of PS. For example, Zivin (1972) argued that the rise in PS associated with working on more difficult tasks was largely due to emotional expressions, rather than self-regulatory PS utterances. In support of this argument, Fuson (1979) reported that affective PS increased with task difficulty. However, Berk (1992) pointed out that emotional and affective PS may serve an important self-regulatory function since “even affect expressions can be self-regulating if they help children adjust their emotional state to a suitable level of arousal so they can remain

productively engaged in the task at hand” (p. 37). Modern coding schemes for PS thus classify certain affect expressions as self-regulatory (see below). More importantly, this research highlights the importance of tailoring tasks used to elicit PS to the individual child’s cognitive ability, since if the task is too easy or too difficult, it is unlikely to provide an accurate index of children’s tendency to use PS to regulate their behaviour.

2.8. Different Levels of Private Speech

Although contemporary research largely supported Vygotsky’s three predictions, later studies have also highlighted the fact that PS is a more complex phenomenon than was first thought. A focus on age-related changes in the *quality* of PS, rather than the quantity of PS perhaps best embodies the difference between classic and modern research on PS. Modern researchers have moved away from Vygotsky’s conceptualisation of PS as a unitary entity, serving only the function of self-regulation, to considering different types of PS and how they relate to children’s task performance (Berk, 1992; Berk & Garvin, 1984; Berk & Spuhl, 1995; Diaz, 1992; Kohlberg et al., 1968).

In their studies of PS, Kohlberg et al. (1968) identified a five-stage developmental hierarchy of private speech forms, proposing that children begin at Level 1 and gradually progress to Level 5, with the more advanced types of PS replacing the more basic types. These levels are as follows:

Level I. Presocial self-stimulating language

This level indicates word play and repetition, where PS serves no planning or self-regulatory function. A child repeats words or phrases for their own sake.

Level II. Outward-directed private speech

This level includes two sub-types of PS: (i) remarks that are addressed to nonhuman objects, and (ii) remarks describing one's own activity.

Level III. Inward-directed or self-guiding private speech

This level also consists of two types of PS: (i) self-answered questions, and (ii) self-guiding comments.

Level IV. External manifestation of inner speech

In this level, the child will engage in inaudible muttering, such as "statements uttered in such a low voice that they are indecipherable to an auditor close by" (p. 708)

Level V. Silent inner speech or thought

Although they found it methodologically difficult to discriminate between speech that accompanies actions (describing one's own activity) and that precedes them (i.e. self-guiding), Kohlberg et al.'s (1968) findings revealed that age trends "were consistent with this assumed developmental order" (p. 732). Further, the assumption of the developmental hierarchy was supported by strong intercorrelations between subtypes of PS close to one another in the hierarchy. Accordingly, Kohlberg et al. (1968) concluded that PS "is a relatively unitary category with a common functional meaning" (p. 732). This conclusion has not, however, been supported by subsequent research.

For example, Berk and Garvin's (1984) findings did not support Kohlberg et al.'s (1968) notion of a prescribed developmental order of PS subtypes, since they found no evidence for the early-appearing forms of PS enhancing the development of the ones placed higher up on Kohlberg et al.'s hierarchy. They therefore argued for PS categories being considered as "functionally different types of speech, each of which runs its own unique developmental course" (Berk and Garvin, 1984, p. 284). Consequently, Berk and Garvin (1984) simplified Kohlberg et al.'s (1968) categorisation scheme, proposing

three levels of PS. Kohlberg et al.'s underlying scheme is largely preserved, but Berk and Garvin (1984) added categories dealing with affect expression and did not impose any rigid developmental progression from level 1 to level 3. Their coding scheme for PS is as follows:

Level 1

Task-irrelevant private speech ('outward-directed'):

- a) Word play and repetition
- b) Task-irrelevant affect expression
- c) Comments to absent, imaginary or nonhuman others (including 'egocentric' utterances)

Level 2

Task-relevant externalised private speech ('inward-directed'):

- a) Describing one's own activity and self-guiding comments
- b) Task-relevant, self-answered questions
- c) Reading aloud and sounding out words
- d) Task-relevant affect expression ('I did it!', 'This is hard!')

Level 3

Task-relevant external manifestations of inner speech:

- a) Inaudible muttering
- b) Lip and tongue movements

Berk and Garvin's (1984) scheme has now become the coding scheme of choice for research on children's PS (e.g., Berk & Spuhl, 1995; Fernyhough, 1994; Fernyhough & Russell, 1997).

2.9. Environmental Influences on PS

Given Vygotsky's argument for PS being derived from social speech, and the general support that this view has gained from subsequent research, it is clear that the child's environment will play a crucial role in whether, and to what extent, PS is manifested and used to regulate behaviour. It is therefore surprising that so little research has been carried out on the way in which environmental factors influence PS development. The small number of previous studies in this area has focused on the role played by caregivers and educational practices in children's use of PS.

Goudena (1987) investigated the relation between children's PS and the presence of a collaborative adult. Goudena (1987) extended Vygotsky's theory by arguing that PS during problem solving should be viewed as having a dual nature: (i) children should be engaged in PS in response to task demands, and (ii) PS can be seen as an indirect appeal for assistance from a potentially helpful person. Goudena hypothesised that children should use more PS during a problem-solving task after interacting with a collaborative adult than after interacting with a non-collaborative adult. The results supported Goudena's hypothesis, and suggest that the availability of a helpful other is an important determinant of children's PS use.

In a similar study, Behrend, Rosengren, and Perlmutter (1989) investigated how the presence of a collaborative parent during a task related to task performance and children's PS. Task performance and PS (i) when the parent and child collaborated on the puzzle task, and (ii) when children completed the puzzle by themselves. Behrend et al. (1989) reported that the strongest positive correlations between PS and task performance were seen when the parent was present, with the strength of this relation increasing with task difficulty. Once again, these results suggest that the presence of

another person relates to children's use of PS, and moreover, to how successful PS is in helping children attain task success.

Behrend, Rosengren, and Perlmutter (1992) reanalysed the data from their 1989 study to address how differences in caregivers' responsiveness to the child, structuring of the task, and control of the task situation related to children's PS during a puzzle task. Responsiveness was defined in terms of the adult's ability to respond to the child's motivational and emotional state; structuring was defined in terms of the way the adult used verbal instruction and physical intervention to adjust the task demands using feedback from the child's performance; control indicated the adult's ability to teach the child how to take over strategic responsibility for the task and thus regulate their behaviour independently. These three indices formed a composite measure of parental "scaffolding", whereby an effective scaffolding strategy combined relatively high levels of responsiveness and structuring with a willingness to give over responsibility for strategic control of the task to the child. They investigated the relations between parenting style, PS and task performance (i) during concurrent task performance, and (ii) when the task was completed one week later.

Behrend et al. (1992) reported that the composite parental scaffolding index was moderately positively correlated with concurrent task performance, but was less strongly correlated with task performance at time 2. There was only a weak positive correlation between task performance and children's concurrent use of PS, but Behrend et al. (1992) found a significant positive correlation between PS at time 1 and task performance at time 2. This result suggests that improvements in task performance associated with PS should not only be expected for concurrent task performance, but also for children's subsequent attempts at the task. As for the relations between parental

scaffolding and PS, Behrend et al. (1992) found positive correlations between the two variables at time 1 among the younger group (3-year-olds). On the other hand, negative correlations were reported between parental verbal control and PS produced by the 5-year-olds at time 1. Within Behrend et al.'s (1992) study, no other correlations were found between parental scaffolding and PS produced at time 2.

Behrend et al. (1992) concluded that the relation between PS and parental style and children's task performance is a complex issue. In terms of the regulatory aspects of PS and parental style, the direction of effects may be difficult to discern because "parents and children may have different goals for their interaction during problem solving" (Behrend et al., 1992, p. 97). In order to understand the relation between parental scaffolding, children's PS and task performance, Behrend et al. proposed "a conceptual model of the manner in which self-regulation and social regulation relate to each other and contribute to task performance (p. 95). The model is based on the strong synchronic relation between parental scaffolding and task performance, and the strong diachronic relation between children's PS and task performance, taking into account the fact that effective parental scaffolding should keep the task within the child's level of ability. The key issue in this proposal is that the effects of parental intervention or social regulation should not necessarily be expected to relate directly to children's later task performance; rather any effects of parental scaffolding on task performance will be mediated by children's use of PS.

Berk and Spuhl (1995) investigated the relation between preschool children's use of self-regulatory PS and two measures of parent-child interaction: (i) global parenting style (two factors: authoritative/uninvolved and authoritarian/permissive); and (ii) microanalytic indices of "scaffolding" behaviour (two measures: contingent shifting and

use of the child's region of sensitivity to instruction). Berk and Spuhl (1995) hypothesised that children's self-regulatory PS would be related to an authoritarian parenting style and to parental scaffolding of the child's behaviour during the task.

Berk and Spuhl's (1995) correlational analysis showed that the global index of parenting style was more highly associated with PS and task performance than the microanalytic indices of scaffolding. Parents who adopted an authoritative style had children who engaged in more PS and who performed better on the task. In addition, Berk and Spuhl's (1995) results suggested that the strong and positive relation between authoritative parenting and the 4-year-olds' task success was mediated by the children's PS, concluding that "private speech served as an important mediating link between effective parenting and task success" (Berk & Spuhl, 1995, p. 165). Taken together, these studies suggest that global measures of parental interactive style are important determinants of children's self-regulatory PS, which in turn will affect their ability to perform the task effectively.

Berk and Garvin (1984) addressed the issue of parental influences on children's PS in a somewhat different manner. They conducted a study comparing PS in samples of low-income Appalachian children with those reported in other studies for middle class American children aged between 5 and 10 years. Appalachian culture is generally described as "adult-centred" and children are not allowed to interfere with adult life. Communication between adults and children is reduced to "gestural and nonverbal" levels, and "many families are characterised by verbal silence, with social contacts appearing to be restricted and strained" (Coles, 1967; Dickie & Bagur, 1972; Hanson & Stevic, 1971; Loeff, 1971; Weller, 1965, all cited in Berk & Garvin, 1984, P. 274-75). Furthermore, another traditional feature of Appalachian culture is that women and girls

traditionally talk and use language more often than men and boys (Looff, 1971, cited in Berk & Garvin, 1984). These special cultural differences between the Appalachian and middle class American children gave Berk & Garvin (1984) the opportunity to investigate how the developmental course of PS is derived from and shaped by children's early participation in social speech. Berk and Garvin (1984) predicted that the developmental rate of PS would be slower for the Appalachian children, especially the boys, than that found among previous studies using predominantly middle class children.

The results supported their predictions. Interestingly, the Appalachian children differed from their middle class counterparts only in terms of the speed with which PS developed, rather than in failing ever to use PS. Thus, as reported by Berk and Garvin (1984) and Berk (1994), the Appalachian children moved through the same developmental sequences as their middle class counterparts, but with a lag in age. For example, "at age 10, more than 40 percent of [the Appalachian children's] private speech remained highly audible, whereas Kohlberg's 10-year-olds spoke out loud to themselves less than 7 percent of the time" (Berk, 1994, p. 80).

This delay in the manifestation of the more mature forms of PS among the Appalachian children was interpreted in terms of the scarcity of early social interaction and verbal communication between adults and children, resulting in a scarcity of opportunities for enhancing the internalisation of social speech to produce PS and inner speech (Berk & Garvin, 1984). These results therefore support Vygotsky's views on the social origins of PS and that it is a universal phenomenon used in self regulation.

Next, we turn to educational influences on children's PS. Only one study has investigated links between different educational practices and children's PS. Krafft and Berk (1997) compared the PS used by 3- to 5-year-old children at two different types of school: a Montessori preschool, and two traditional preschools. The Montessori and traditional preschools "differed markedly in philosophical orientation and, therefore, in the learning contexts they offered children" (Krafft & Berk, 1997, p. 2). The educational environment in the traditional preschool was characterised by different kinds of play activities, where fantasy play was encouraged and social interaction and cooperative play among children was emphasised. In contrast, the Montessori preschool environment "emphasised closed-ended problem solving tasks (tasks with a single solution, such as puzzles) and discouraged make-believe play" (Krafft & Berk, 1997, p. 2). Krafft and Berk therefore hypothesised that PS would occur more frequently among children who attended the traditional preschool than those who attended the Montessori preschool. Their results supported this hypothesis. In addition, there was a positive and significant correlation between the total quantity of PS and each of fantasy play and open-ended activities. In contrast, total PS was negatively correlated with closed-ended activities, and constructive play. Krafft and Berk (1997) also reported that self-regulating PS (e.g., describing own activity and self-guiding comments) were more common among children in the traditional preschool.

2.10. Chapter Summary and Synthesis

Cultural and environmental influences on memory performance and development have been acknowledged since the pioneering work of Bartlett (1932). However, research in this area has tended to treat culture and environment as independent variables, rather than "regarding cognitive processes as inherently cultural" (Rogoff & Chavjay, 1995, p. 873). More recently, some researchers have begun to use Vygotsky's (e.g., 1978) theory

and the sociocultural approach as a framework for understanding how environment comes to influence memory development. Although this research promised to identify the mechanisms via which memory develops and the means via which culture and environment may facilitate or constrain memory development, these promises have not yet been delivered.

It was suggested that children's use of private speech (PS), particularly the most sophisticated forms of PS used in self-regulation, might be the mechanism via which culture and environment impact on memory development. This suggestion arose from the fact that the same factors found to relate to poorer memory performance – parenting practices, social interaction, educational environment – also relate to less advanced use of self-regulatory PS. Moreover, given that articulation plays such a central role in the development of memory strategies and sophisticated memory encoding, such as the phonological recoding of visually presented material, it is not unreasonable to predict that children's general tendency to use speech to regulate their behaviour will have consequences for the development and proficient use of the articulatory loop. Testing the relation between memory development and PS was thus the main aim of the studies reported in this thesis.

The second major aim was to investigate cultural differences in children's use of PS and memory development. No study has yet investigated cultural differences in PS by measuring it concurrently in two different cultural groups. Recall that Berk and Garvin's (1984) study collected PS data from Appalachian children, but compared these data with those collected by other researchers. This means that one cannot be confident that PS in both cultures was obtained under the exact same circumstances, and Berk and Garvin's data were compared with PS data collected by Kohlberg et al. (1968) sixteen

years previously. Neither have studies investigated cultural influences on working memory development other than at a very obvious level. Apart from a few noteworthy exceptions (see pp.29-30 above) researchers have investigated working memory performance and development in literate versus non-literate, schooled versus non-schooled, and urban versus rural societies, but have not investigated more subtle cultural and environmental influences on working memory development. We therefore know very little about how different types of educational practice or social interaction relate to working memory performance. The studies reported here addressed these questions by investigating PS and memory development in two culturally distinct groups of children: British children and Saudi Arabian children.

Chapter 3 deals with the relation between culture and children's use of PS. If cultural differences in children's use of PS are to be seen as a viable explanation for cultural differences in memory development, it is first necessary to demonstrate that cultural differences in PS are observed and to investigate their impact on children's ability to regulate their cognitive performance. Chapter 3 therefore focuses on how British and Saudi children used PS to help them complete a series of increasingly complex planning tasks. The differences in children's PS use both between and within cultures identified in Chapter 3 provide the basis for investigating links between PS and memory development in Chapters 4 and 5. Chapter 4 focuses on relations between culture, PS and children's working memory performance and development, whereas Chapter 5 deals with links between culture, PS and autobiographical memory development.

With respect to the relation between PS and working memory, the linguistic aspect of phonological working memory grants the opportunity to hypothesise on the potential role of PS in the development and use of the articulatory loop and phonological store.

The phonological store has been described as an “inner ear” containing material recently heard or articulated by the subvocal rehearsal process which is seen as an inner voice (Smith, Reisberg & Wilson, 1992). PS is considered to be vocalised speech directed to oneself, and inner speech is subvocalised speech directed to oneself. PS and inner speech are therefore considered to be functionally equivalent (Diaz & Berk, 1992; Feigenbaum, 1992; Vygotsky, 1978). There are thus clear parallels between PS or subvocalised speech and the processes involved in articulatory loop functioning. Recall from Chapter 1 that children’s tendency to rely on the articulatory loop to memorise information even when it is presented in the visual modality begins to develop at around 5 or 6 years, at which time children also become susceptible to the phonological similarity effect (PSE). These age-related shifts in phonological working memory development are consistent with the developmental changes seen in PS; in particular, they appear to coincide with the time at which many children will be beginning to internalise PS. This raises the possibility that children who use the most sophisticated types of PS to regulate their task-oriented behaviour *in general* will be those most prone to the PSE. In addition, those children who are sophisticated general users of PS should be better skilled in verbal rehearsal strategies, and should therefore show better overall memory performance than those children who use little or less sophisticated PS. Investigating these possibilities was the focus of Study 2, reported in Chapter 4.

Turning now to the relation between children’s PS and their autobiographical memory, children’s use of narrative and parental influences on autobiographical memory have drawn quite heavily on Vygotsky’s theory and the socio-cultural approach (e.g. Nelson, 1993). These studies have not, however, considered the possibility that children’s use of PS is responsible for the observed relations between the social environment and

children's autobiographical memory. Investigating this possibility was a major aim of Study 3 reported in Chapter 5.

In sum, these studies represent an attempt to investigate the relations between culture and memory development by considering PS as the mechanism via which culture impacts on memory. Figure 2.1. illustrates the theoretical framework of the studies.

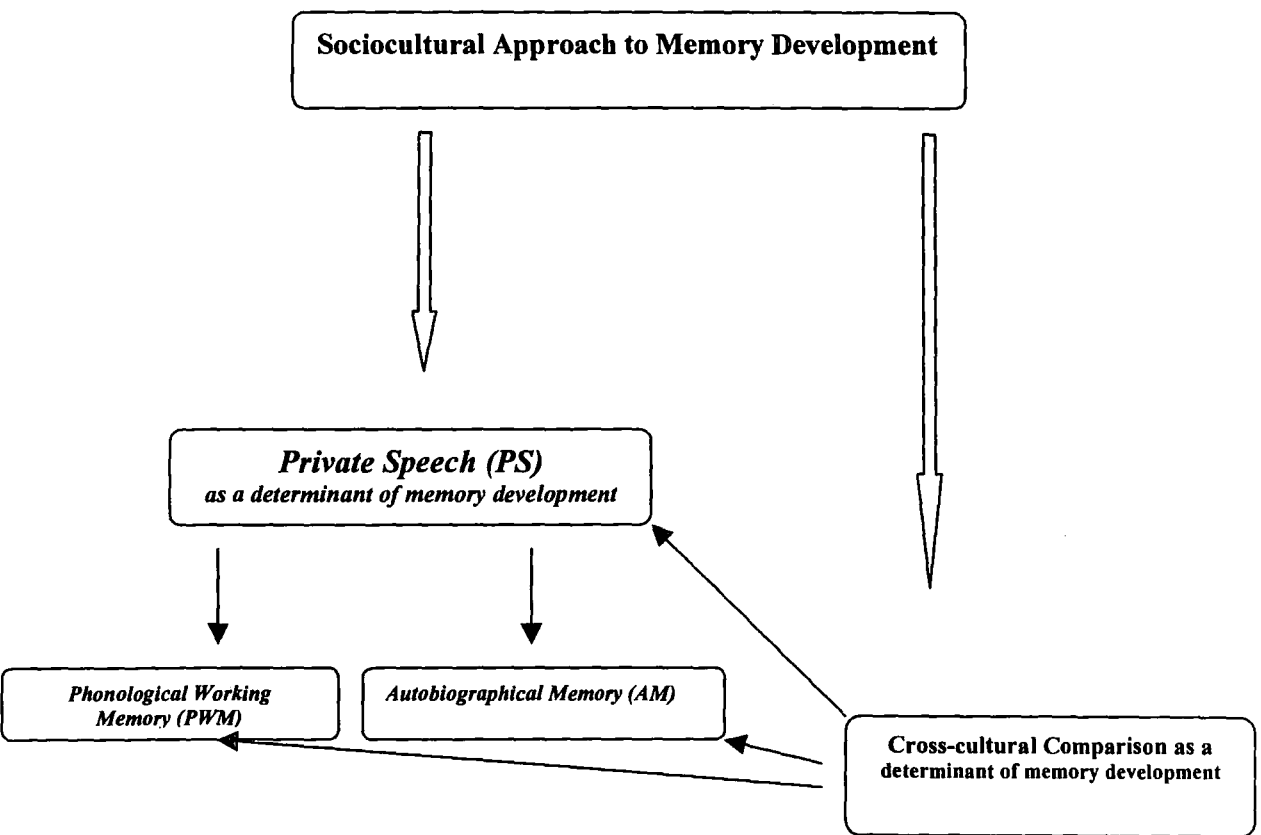


Figure 2.1. Proposed relations between the study different variables.

Chapter 3

Children's use of Private Speech to Regulate their Behaviour: A Cross-Cultural Comparison

3.1. Introduction

The last chapter highlighted how environmental influences on children's PS illustrate the importance of social and cultural contexts in fostering children's use of PS to regulate their own behaviour. The genetic relation between the strategic and emotional characteristics of PS and the social speech children have experienced during interactions with others provides an opportunity to investigate how cultural differences in children's social interactions may also be revealed in differences in PS. As discussed previously, the ultimate goal of this thesis is to investigate how individual differences in the use of PS both within and between cultures relate to children's memory development. But before this goal can be achieved, it is first necessary to identify whether cultural differences do indeed exist in children's PS. The main questions addressed in this chapter are thus: (i) does PS relate to task performance for both British and Saudi Arabian children?; and (ii) are there cultural differences in the occurrence or frequency of PS and in the *function* of PS?

This chapter begins with a summary of those aspects of Saudi Arabian culture that are expected to impact on children's use of PS before moving on to describe the cross-cultural study.

3.2. Saudi Arabian Culture

The phenomenon of private speech, as indicated in Chapter 2, is subject to cultural variations. That is, the degree of verbal communication between adults and children, cultural roles of gender, and educational features that characterise learning contexts in everyday classrooms are reported to influence the development and function of private speech across cultures (Berk, 1994; Berk & Garvin, 1984; Krafft & Berk, 1997; Kohlberg et al., 1968).

Using language as the major means for social communication is considered a typical characteristic of Western societies, where non-verbal behaviour and gestures are seen of less importance during self expression or communication with others (Berk, 1992,1994; Hall & Hall, 1990; Mead, 1990, 1998). In contrast, non-verbal behaviour and gestures are considered important in other cultures, such as the Arabic, Chinese, Korean and Japanese (Mead, 1990, 1998). In addition to spoken language, people in these cultures also utilise the communicative context and “much meaning is conveyed by inference” (Buragga, 2001, p. 23-24; Mead, 1998). Therefore, these cultures are described as “high-context” (Hall & Hall, 1990; Mead, 1998). “Low-context” cultures, such as those of Western countries, are described as being less dependent on inferring meanings from the context and “messages must be made explicit” (Mead, 1998, p. 30). Consequently, individuals in Western cultures, including British culture, can be viewed as concentrating more on verbal communication during social interaction (Berk, 1992,1994), whereas individuals in Arabic cultures, including Saudi culture, may exploit both the verbal and the non-verbal modes as forms of social interaction (Buragga, 2001). One would therefore expect that children growing up in these different cultures will be exposed to differing amounts of verbal and non-verbal communication with parents and other people.

Since PS is a verbal behaviour that is assumed to be ontogenetically derived from early social interactional processes, it would be more common among children who experience a great deal of verbal communication during social interaction (i.e. low context cultures). Conversely, PS might be expected to be reduced among children living in high-context cultures. This possibility was verified by Berk and Garvin (1984) who found a developmental delay in internalising the more mature forms of PS among Appalachian children compared to their Western counterparts (see Chapter 2, pp.57-58). Berk and Garvin (1984) attributed this delay to the mode of social interaction between parents and their children in the Appalachian culture, where parents converse with their children less frequently and “rely more on gestures than on words” (Berk, 1994, p. 80). In Appalachian culture, life is characterised by verbal silence, and social contacts appear to be restricted and strained (Coles, 1967; Dickie & Bagur, 1972; Hanson & Stevic, 1971; Loeff, 1971; Weller, 1965, all cited in Berk & Garvin, 1984). Thus, the Appalachian culture provides a striking example of how a lack of verbal communication between adults and children can contribute to a developmental delay in the internalisation of PS (Berk & Garvin, 1984). The Saudi culture is not as restricted in verbal communication as the Appalachian culture, but the greater reliance in Saudi culture on non-verbal communication is likely also to lead to a delay in the internalisation of PS, compared with the rate observed in Western cultures.

There are also other reasons for predicting that Saudi children will be delayed in their use and internalisation of PS compared with their Western counterparts. Western parents are reported frequently to converse with their children, thus facilitating the genetic transformation from social speech to PS (Berk, 1994; Berk & Garvin, 1984). As for Saudi parents, although there is no formal research indicating the frequency with which they participate in verbal conversations with their children, information on the

types of relationships between parents and children within the Saudi culture lead one to predict that verbal communication will be more restricted than in Western families. Generally, Saudi society is described as being more collectivistic than individualistic (Buragga, 2001). In collectivistic and group-oriented cultures the "individual's behaviour is strongly influenced and organised by others" (Ji, Schwarz & Nisbett, 2000, p. 585). Accordingly, the family occupies a very important position in the collectivistic society, where relationships between its members are considered tied and strong (Hofstede, 1984). Family in the Saudi society "is the basic social unit. It is the centre of all loyalty, obligations, and status of its members" (Al-Banyan, 1980, p. 31). The relationships between parents and their children in the Saudi society are considered "very strong", yet they "are governed by deference and respect" children must show to older members in the family, particularly their parents (Al-Garni, 2000, p. 39; Alsudairi, 2000; Anderson, 2001). Al-Garni (2000) argued that "[I]n this kind of culture, the parent-child relationship is said to be authoritarian and asymmetrical. The parents are the ones who command and order, and the children are the ones who obey and follow" (pp. 39-40). This may create an atmosphere that does not encourage regular conversations between parents and their children. Although some researchers believe that there is a move toward nuclear families in Saudi due to the economic boom and spread of education during the last three decades, the vestiges of the traditional adult-centred approach to parenting still remain in Saudi culture (Al-Banyan, 1980; Alsaif, 1997, cited in: Alsudairi, 2000).

There are also reasons for predicting gender differences in the use of PS between Saudi girls and boys due to different socialisation practices. Although, unlike female children, male children in the Saudi society "have the privilege of sharing in discussions about family matters" (Alsaif, 1997, cited in Alsudairi, 2000, p. 177), it seems that girls are

encouraged to talk and express themselves more than boys. This may be due to the greater opportunities for conversation that girls experience through being frequently involved with women during different social occasions. The same frequency of social opportunities is not available to boys. One would therefore predict that Saudi girls would be more advanced in their use of PS than Saudi boys.

In addition to more family-based cultural practices that influence the development of PS, it is also affected by the different learning contexts that characterise different educational environments (Krafft & Berk, 1997). Within the British educational system, the early years of primary school “are generally dominated by learning through play” (Blackburne, 2002, p.1). This method of teaching, which is also known as “performative knowledge” or “knowing how” (Alotaibi, 1993, p. 11), will grant greater opportunities for children to talk while they are playing, thus social verbal interaction between children themselves, as well as with their teachers, will be enhanced. In contrast, Saudi children are generally taught by a traditional method based mainly on reciting information in order to recall it when needed during exams (Alotaibi, 1993; Alsudairi, 2000). This method of teaching is called “knowing that”, and is characterised by “an emphasis on factual knowledge, lecturing, textbooks, memorisation, homework, discipline and testing” (Alotaibi, 1993, p. 80). One would expect that the Saudi educational setting would eliminate or vastly reduce the incidence of PS, since the children are not required to discover things for themselves, and play activities and free time in the classroom are limited.

In summary, compared to Saudi children, children in British society are likely to experience more verbal communication, both with their parents and through participating in school learning activities that allow for more verbal interaction with

other children and with teachers. Accordingly, one would predict that British children will use more PS and be more advanced in using the most sophisticated forms of PS than their Saudi peers.

3.3. Eliciting PS

Obtaining valid and reliable measures of children's PS presents a number of methodological difficulties. It has repeatedly been noted that children's PS is a phenomenon of high variability (Diaz et al., 1991; Goudena, 1987; Kohlberg et al., 1968). For example, Diaz (1992) reported that approximately half of the children sampled in a number of studies remained completely silent while performing the experimental tasks. Rather than viewing this as evidence militating against Vygotsky's contention that PS was a universal phenomenon, these findings have motivated researchers to reconsider whether the methodological procedures that have been used to elicit and assess children's PS are appropriate (Diaz, 1992; Berk, 1992; Fernyhough, 1994). Hence, familiarity versus difficulty of the task, and naturalistic versus artificial or laboratory settings, as well as the child's level of cognitive maturity are seen to play crucial roles in whether children engage in PS.

As discussed in Chapter 2, the type of PS that appears to be most important developmentally is that which serves to help children to regulate their own behaviour. One must therefore choose a situation suitable for eliciting this type of PS. Some researchers have measured children's PS during classrooms activities, on the argument that PS is produced more under naturalistic than laboratory conditions (Berk, 1986; Bivens & Berk, 1990). However, this method has the obvious problem of obtaining "clean" measures of PS, and it is not clear whether naturalistic conditions have been found to elicit more PS in comparison with laboratory conditions simply because the

former have included social partners, whereas children may have been doing the tasks in comparative isolation in the laboratory. As we saw in Chapter 2, PS is a parasocial phenomenon, so the lack of a social partner or illusion of an audience will reduce its incidence. The availability of a competent partner or helpful adult in the laboratory setting is therefore crucial for enhancing PS production (Azmitia, 1992; Goudena, 1987). Moreover, with respect to adults' intervention, the instructions given to children with regard to how they should proceed with the task have also been found to impact on the production of PS. For example, when children were told explicitly that they were allowed to talk out loud, this had a substantial effect on their use of PS utterances (Frauenglass & Diaz, 1985).

In addition to these methodological considerations regarding the task setting and instructions, the task itself is also crucial. For example, even though puzzles have been used in some classic studies on the shift from other- to self-regulatory speech (Wertsch & Hickman, 1987; Wertsch, McNamee, McLane & Budwig, 1980), Berk (1992) argued that they may not be appropriate to evoke PS because of their familiarity. In this case, the child will easily approach and automatically deal with such tasks because "the essential verbal self-regulating components may have been internalised at an early age" (Berk, 1992, p. 40). On the other hand, if the experimental task is too alien or difficult, it will not elicit PS since the highest levels of PS are observed during tasks that are challenging but within the child's level of cognitive competence (Behrend et al., 1989; Diaz, 1992).

Berk and Spuhl (1995) summarised the solution to the methodological problems associated with PS research as follows: careful selection of the experimental task and the assessment of PS across more than one session compensate for testing PS within

artificial settings. The study reported here therefore used this conclusion as the starting point for its design, and employed the tasks and procedures described by Fernyhough (1994; Fernyhough, Meins, Fradley, & Ford, 2002). These studies used the Tower of London (Shallice, 1982) as the task to elicit children's PS due to the fact that this type of executive planning task is likely to cause children to use self-regulatory PS, and because its level of difficulty can be varied systematically without any resulting increase in its perceptual complexity. Fernyhough et al. (2002) reported that children's use of self-regulatory PS during the Tower of London (ToL) was significantly related to children's concurrent task performance, with children who used more of this PS solving the ToL trials in fewer moves. The study reported here sought to replicate and extend the results of Fernyhough et al. (2002) by investigating children's use of PS on this task in two different cultures, and by investigating whether suppressing children's use of PS affects their task performance.

3.4. Obtaining Permission for Fieldwork and Gaining Access to School Children in Saudi Arabia

In order to carry out the experimental work with the Saudi children, four-months' fieldwork in Saudi Arabia was needed. Obtaining permission for this fieldwork began with a request that was supported by a letter from the researcher's supervisor (see Appendices 1 and 2) to the Saudi Arabian Cultural Bureau in Britain. The Saudi Arabian Cultural Bureau in turn sent the request to the Vice-Chancellor of Postgraduate Studies in Al-Imam Muhammad Ibn Saud University (IMISU) in Saudi Arabia, to be sent to the College of Social Sciences and to the Department of Psychology at IMISU.

The process of obtaining authorisation for the fieldwork took over four months, after which the researcher was issued with two letters explaining the nature of the work to be

performed with the sample of Saudi children (see Appendices 3 and 4), in order to gain access to school children in Saudi Arabia. According to Saudi educational policy, collecting data and conducting any type of research in schools are subject to formal permission from the Ministry of Education or the relevant educational authority. General or pre-university education in Saudi Arabia is divided into four levels. These are: kindergarten (3- to 6-year-olds), elementary level (6- to 11-year-olds), intermediate level (12- to 14-year-olds), and secondary level (15- to 18-year-olds) (Ministry of Education, 1996). The kindergarten stage is a nursery level that precedes elementary education, and is not obligatory. The elementary level is thus the first phase of general compulsory education in Saudi Arabia (Ministry of Education, 1996).

Furthermore, except for at the kindergarten stage, the Saudi educational system is characterised by single-sex education, whereby boys and girls are not merely taught separately, but the teachers are also segregated according to their sex. That is, the teachers and administrative staff responsible for education in Saudi boys' schools at all levels are men, whereas girls' schools are controlled by female administrators and teaching staff. Thus, in the Saudi educational system, male researchers are normally restricted from gaining access to girls' schools, and it is usual for female researchers to conduct research or collect data from girls and women. An exception is survey studies or investigations using only questionnaires, inventories, etc. to gather information, where male and female samples can be tested by either female or male researchers.

Given that there are differences in the socialisation of boys and girls in Saudi culture, and in order to obtain a sample of Saudi boys and girls to compare with the British children, it was necessary to gain access to a girls' school in Saudi. But since the present study involved of a series of face-to-face testing sessions that needed to be

videotaped for later coding, transcription and analysis, this presented a serious problem for gaining access to girls in Saudi. To get round this obstacle, the Ministry of Education suggested that the study be performed in a private school, rather than a state school, where it is more likely that girls and boys would be taught at the same school complex, albeit in separate buildings. In terms of their curriculum and other educational programmes and activities, as well as educational ideology, both the public and private schools are generally considered alike. The sample of Saudi Arabian children was obtained from a complex of private schools (Riyadh Najed Schools) located to the Northeast of Riyadh city.

Study 1

3.5. Study 1: Questions and Hypotheses

Study 1 addressed the following issues:

- 3.5.1. Is PS used by all children sampled in the present study, thus adding support to the contention that this verbal behaviour is a universal stage in cognitive development?
- 3.5.2. What is the relation between social speech and PS?
- 3.5.3. How does PS relate to children's general verbal ability?
- 3.5.4. How does PS relate to children's chronological age?

The main hypotheses of Study 1 were as follows: (i) in both cultures, children's use of self-regulatory PS will be positively associated with superior task performance; (ii) task performance of children who frequently use self-regulatory PS to accomplish the task will be more greatly affected by suppressing the use of PS than that of children who rely less on self-regulatory PS; (iii) due to the differences in educational and social practices between British and Saudi Arabian culture, the Saudi Arabian children will produce significantly less PS, particularly with regard to the most sophisticated types of PS, than

their British peers; (iv) Saudi Arabian girls will produce significantly more PS, especially the most sophisticated forms, than Saudi Arabian boys.

3.6. Method

3.6.1. Participants

The sample of British children consisted of 58 children (half of them girls), attending a primary school located in a middle class area of Durham city. All of the children spoke English as their native language, and they ranged in age from 4;5 to 7;8 years ($M= 72.6$ months, $SD= 10.8$ months).

The sample of Saudi children consisted of 63 children (28 girls) attending a complex of private schools to the Northeast of Riyadh city. All of the children spoke Arabic as their native language, and they ranged in age from 4;5 to 8;1 years ($M= 76.6$ months, $SD= 11.2$ months).

3.6.2. Design

In order to obtain the PS and task performance measures, children were seen on three separate occasions, each approximately one week apart. On the first and second occasions, children were required to complete four trials of the Tower of London (see below). Children's performance during the task was video-taped, and these tapes were used to obtain measures of PS and task performance. On the third occasion, children were required to complete four trials of the Tower of London while simultaneously performing either a verbal or non-verbal suppression task. Video-tapes of the third session were used to assess the impact of these suppression measures on children's task performance. Each child was given a gift as thanks for taking part in the study.

3.6.3. Measures

3.6.3.1. Tower of London task

A manual version of the Tower of London (ToL) was used to elicit children's PS in this study. The ToL is an executive planning task derived from the Tower of Hanoi (TOH) puzzle (Best, 1999; Haberlandt, 1994; Russell, Jarrold & Henry, 1996). Since they require the participant to employ planning behaviour and goal-directed processing, both the TOH and ToL have widely been employed in cognitive psychology (Best, 1999; Haberlandt, 1994). Further, as they involve "the generation and the holding in mind of future moves" (Ozonoff, Pennington & Rogers, 1991, cited in Russell et al., 1996, p. 673), they can be used as measures of remembering, especially working memory. Moreover, the ToL has been found to be an appropriate task for eliciting self-regulatory PS (Fernyhough, 1994; Fernyhough et al., 2002).

The ToL used in the present study consisted of a rectangular block of wood with three pegs of differing lengths and three coloured cotton reels (see Figure 3.1). The three cotton reels had holes in them so that they could be placed on the three pegs, with the longest peg being able to accommodate three reels, the middle-length peg two reels, and the shortest peg only one reel. Two identical copies of the TOL were used, one showing the goal configuration of the reels (different positions), the other (which the child manipulated) was always initially presented in a same *standard* configuration.

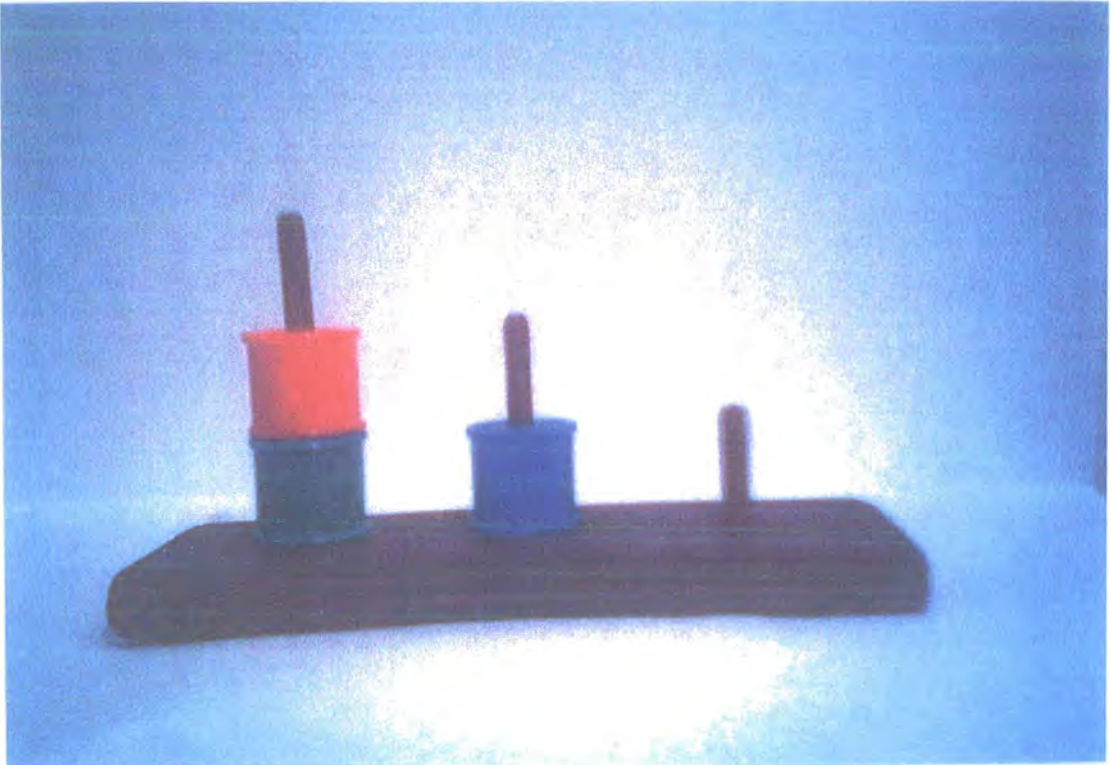


Figure 3.1: Tower of London (standard configuration)

3.6.3.2. Verbal ability

PS has been found to relate to verbal intelligence or verbal maturity (Kohlberg et al., 1968; Frauenglass & Diaz, 1985; Berk, 1986; Berk & Spuhl, 1995). Therefore, in order to control for the potential confounding effects of verbal ability, a measure of children's receptive verbal ability was included in the study reported here. The British children's verbal ability was assessed using British Picture Vocabulary Scale II (BPVS II: Dunn, Dunn, Whetton, & Burley, 1997). The BPVS II is an individually administered scale, in which the child is shown plates consisting of four different black and white drawings; the child is required to point to the picture that matches the target word spoken by the experimenter. This scale is suitable for children between 3 and 15 years. Standardised scores were used in the analyses.

The Saudi children were assessed using the Verbal Development Scale (VDS). The VDS is a sub-scale of the Children's Adaptive Behaviour Scale that was prepared by

Richmond and Hicklighter (1980) and was standardised on Saudi children (boys and girls) aged between 4 and 12 years old by Al-Shukhs (1991) and was revised by the same author in 1998. The VDS is an individually administered scale that measures certain linguistic skills related to articulation, reading aloud, writing and comprehension of different verbal components. The scale consists of 16 questions of varying demands and increasing difficulty. For example, a question asks the child about the things normally used in eating, drinking, writing and transportation, others questions involve showing the child cards containing 4 different colours, 4 different letters, 4 drawings of certain objects and animals ...etc and the child is required to point to and name the contents of each card. Other questions ask the child to write down a sentence and to read it aloud, to give meanings of certain words and expressions. Standardised scores were used in the analyses.

3.6.4. Procedure

For the British sample, on the first day of testing, the researcher was introduced to the children by their teachers in their classrooms, and a brief and simple introduction about the research was given. Parental consent had been obtained previously, and each child was seen individually. Children were tested in the school library, which was a quiet and comfortable place. Children sat at a table, next to the experimenter, and a portable video camera was set up opposite so that the children's faces, as well as the ToL equipment, could be clearly seen.

The Saudi children were tested in the school theatre, which was a quiet place accessible from both the boys' and girls' sections of the school. On the first day of testing children who had been given parental consent to take part gathered in the theatre, and the students' counsellor introduced the researcher to them and gave them a brief

explanation of the study. Children were tested individually, using an experimental set up identical to that used with the British children. By cooperation with the students' counsellor in the boys' section, and by arrangements over the phone with the secretary in the girls' section, each child was brought to the experimenter (see Appendix 5, for the settings of testing PS).

3.6.4.1. Session I

The first session began with the administration of the general verbal ability scale. Children then participated in the manual ToL task. Children were first told that the object of the game was as follows: *You have to make this* (circling the ToL nearest the child) *look like this* (circling the second goal configuration ToL). The child was then told that there were some special rules of the game: (i) that they could only move one reel at a time, and (ii) that every reel had to be on a stick; reels could not be place on the table or held in the hand. To help children to adhere to these rules, they were asked to place their non-preferred hand behind their back. One final important rule was stressed to the child: *Some children like to talk aloud to themselves when they play this game. You can do that if you like. I bet in class you have to be quiet, but when you're playing this game with me, you can talk as much as you like.* This instruction was included due to the fact that children have been found to use more PS when they were encouraged to talk out loud (Frauenglass & Diaz, 1985).

Children were then given two practice trials, each involving only two reels. The experimenter then began the test phase by saying *I'm going to make things different now. I'm going to add this red reel.* The first goal configuration was then prepared, and the other red reel was added to the second ToL which was placed in front of the child in the standard configuration. Each child received four trials, given in increasing order of

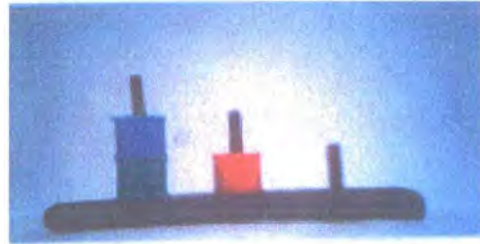
difficulty (the same goal configurations were used for all children). The easiest trial required a minimum of 2 moves to achieve the goal configuration, the next trial required a minimum of 2 moves to achieve the goal configuration, the next trial required a minimum of 3 moves, the next 4 moves, and the final trial 5 moves. In *Session I*, positions 1, 3, 5, and 9 were used (see Figure 3.2). For each trial, the child was instructed to *Make this one* (circling the standard configuration) *look like this* (circling the goal configuration). Two performance measures were obtained: (i) time taken to complete each trial (timing began as soon as the experimenter had finished giving the above instruction), and (ii) number of moves to solution. If a child became distracted or hopelessly stuck, the experimenter intervened, resetting the puzzles if necessary. In these cases (which were rare), only the second attempt at the problem was coded.

Children received *Session I* scores for (i) the total time taken to complete the four ToL trials, and (ii) the total number of moves taken to complete the four ToL trials.

Figure 3.2: Tower of London: Puzzle positions used in *Session I*



Position 1 (2 moves)



Position 3 (3 moves)



Position 5 (4 moves)



Position 9 (5 moves)

3.6.4.2. Session II

Children were given 4 different trials of the ToL at *Session II*: Position 2 (2 moves), Position 4 (3 moves), Position 6 (4 moves) and Position 10 (5 moves) (see Figure 3.3). The experimental procedure for *Session II* was identical to that described above for *Session I*. Children received *Session II* scores for (i) the total time taken to complete the four ToL trials, and (ii) the total number of moves taken to complete the four ToL trials.

Figure 3.3: Tower of London: Puzzle positions used in *Session II*



Position 2 (2 moves)



Position 4 (3 moves)



Position 6 (4 moves)



Position 10 (5 moves)

3.6.4.3. Session III

The aim of *Session III* was to discover how task performance would be affected if children were prevented from using PS. Two suppression techniques were used. The first was a verbal suppression where the child was asked to keep repeating the same word ('see-saw' or its Arabic equivalent) while doing the task. The second was a non-verbal suppression that required the child to tap a doll placed on the table with his/her

other hand while doing the task as usual with the preferred hand. A metronome was used in each of these suppression tasks to ensure that the child tapped or repeated 'see-saw' at a steady pace throughout each trial. The non-verbal suppression was included to control for the general attentional effects of the verbal suppression condition. Children were randomly assigned to the verbal and non-verbal suppression groups. Once again, all children completed 4 trials of the ToL: Position 1 (2 moves), Position 3 (3 moves), Position 7 (4 moves) and Position 11 (5 moves), (see Figure 3.4). Children received Session III scores for (i) the total time taken to complete the four ToL trials, and (ii) the total number of moves taken to complete the four ToL trials.

Figure 3.4: Tower of London: Puzzle positions used in Session III



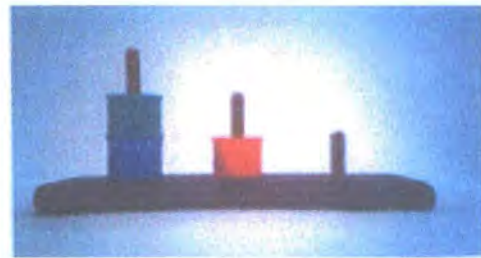
Position 1 (2 moves)



Position 3 (3 moves)



Position 7 (4 moves)



Position 11 (5 moves)

3.6.4.4. Coding the children's utterances

Children's speech utterances from Sessions I and II were coded. Following Furrow (1992), Fernyhough (1994) and Berk and Spuhl (1995), an utterance was defined as any

segment of speech containing (i) no temporal pause that exceeded 2 seconds, and (ii) no semantic discontinuity (i.e. a change of content or subject, whether or not preceded by a 2 second pause). Each utterance made in each session was then first classified as social or private speech.

3.6.4.4.1. *Criteria for social speech*

Utterances were coded as social when they were explicitly directed toward the experimenter, or when accompanied by gestural features such as turning the body in the direction of the experimenter or looking at him while speaking. The following objective criteria were used to identify social speech (adapted from Diaz, 1992; Furrow, 1992; and Goudena, 1992 and used by Fernyhough, 1994; Fernyhough & Russell, 1997; Fernyhough et al., 2002). C = child, E = experimenter:

1. Eye Contact: If C showed sustained eye contact with E during or within two seconds of an utterance, the utterance was coded as social. It was not necessary for the eye contact to be reciprocated by E.

2. Behavioural: The utterance was coded as social if, within two seconds of the utterance:

- a) C's behaviour involved E (through physical contact, or approach, or extension of arms toward E).
- b) E's behaviour involved C (through physical contact or an action attracting the C's gaze).

3. Content Markers: The utterance was coded as social if:

- a) The utterance had the same topic as E's preceding utterance (one that ended no more than two seconds before C's began).
- b) The utterance was a question directed to E, where an answer appeared to be expected (indexed by rising intonation).
- c) If the utterance contained a vocative or name.

4.Temporal Contiguity: The utterance was coded as social if it occurred less than two seconds after any Social Utterance.

Accordingly, any utterance that did not meet the above criteria for social speech was classified as private. All PS utterance were further categorised in terms of their overtness and relevance to task behaviour.

3.6.4.4.2. *Coding of private speech*

Children's PS was coded according to following scheme (adapted from Berk & Garvin, 1984; Fernyhough, 1994 and used by Berk & Spuhl, 1995):

Level 1 (PS1)

Task-irrelevant private speech 'outward-directed':

- a) Word play and repetition.
- b) Task-irrelevant affect expression.
- c) Comments to absent, imaginary or nonhuman others (including 'egocentric' comments).

Level 2 (PS2)

Task-relevant externalised private speech ('inward-directed'):

- a) Describing one's own activity and self-guiding comments.
- b) Task-relevant, self-answered questions.

- c) Reading aloud and sounding out words.
- d) Task-relevant affect expression ('I did it!', 'This is hard!').

Level 3 (PS3)

Task-relevant external manifestations of inner speech:

- a) Inaudible muttering.
- b) Lip and tongue movements.

Social speech and PS were coded from the video-taped sessions using Private Speech Score Sheets (see Appendix 6). For the purposes of the analyses, PS was treated in two different ways. First, children received a raw frequency score for the number of PS utterances used at Sessions I and II. Second, children received a proportional PS score for both Session I and II, the number of PS utterances in the session was divided by the total number of utterances produced in the session. The latter scores are described as Coefficient of PS scores (CPS) and control for children's use of social speech. Raw and CPS scores were calculated for children's *total* use of PS throughout the testing session, and also for the three separate levels of PS described above.

3.6.4.4.3. Reliability

All of the ToL sessions were coded for social speech and PS by the author, and a randomly chosen quarter of the tapes was coded by a second rater. Inter-rater agreement for assignment of speech across the social speech and three PS categories was $\kappa = 0.77$. Disagreements arose mainly from distinguishing whether children's lip movements indicated Level 3 PS. The disagreements between the coders were resolved by discussion.

3.6.5. Results

3.6.5.1. Overall Incidence of PS (in response to Question 3.5.1., p. 73)

Only one of the 58 British children failed to engage in PS in either *Session I* or *II*, with 54 of the children using PS in both sessions. The mean incidence of PS across Sessions I and II was 13.93 (s.d. 8.85), and PS accounted for 51.76 % of children's utterances across the two sessions. In order to test the consistency of children's use of PS over time, correlations between PS and its types used in Sessions I and II were calculated. There was a positive and significant correlation between the total amount of private speech (i.e. levels 1,2 & 3) used in *Session I* and *Session II*: $r[56] = 0.28, p < .05$, two-tailed. Moreover, there was a positive and significant correlation between the use of the more advanced types of PS (i.e. PS2 & PS3) across the two sessions: $r[56] = 0.34, p < .01$, two-tailed. There was also consistency across the two sessions in children's use of PS1 ($r[56] = 0.25, p < .05$, two-tailed), and use of PS3 ($r[56] = 0.42, p < .001$, two-tailed), but the positive correlation between PS2 use at the two sessions was not significant ($r[56] = 0.19, n.s.$). These relations can be considered as an indication of the consistency of PS in children's behaviour across time.

With respect to the Saudi children, all but two of them engaged in PS in *Session I* or *II*, with 51 of the 63 children using PS in both sessions. The mean incidence of PS across *Sessions I* and *II* was 10.60 (s.d. 8.43), with PS accounting for 48.13 % of the Saudi children's utterances across the two sessions. Once, again, total PS in *Sessions I* and *II* was positively and significantly correlated ($r[61] = 0.51, p < .001$, two-tailed), as was the correlation between the use of the more advanced types of PS across the two sessions: $r[61] = 0.49, p < .001$, two-tailed. In addition, there were high rates of consistency between the two sessions for Saudi children's use of the three levels of PS: for PS1 $r[61] = 0.50, p < .001$, two-tailed; for PS2 $r[61] = 0.63, p < .001$, two-tailed; for PS3

$r[61] = 0.31, p < .01$, two-tailed. These results suggest that PS use is consistent in both cultures, and the fact that it is used by the vast majority of both the British and Saudi children participating in the present study suggests that PS may also be universal.

3.6.5.2. *Relations Between Social Speech, PS and Verbal Ability (in response to Question 3.5.2. and Question 3.5.3., p. 73)*

In order to address these two questions, correlations between children's use of social speech (SS) and PS in *Session I* and their verbal ability (VIQ) were calculated. Table 3.1 shows the relations between these variables for the British children. It should be noted that conducting multiple correlations increases the risk of Type 1 error.

Table 3.1: Correlation matrix for relations between PS, Social Speech (Session I) and Verbal Ability for the British Children ($N = 58$).

	PS1	PS2	PS3	PS2+3	TPS	SS	VIQ
PS1	–						
PS2	0.39**	–					
PS3	0.15	0.13	–				
PS2+3	0.33*	0.67†	0.82†	–			
TPS	0.59†	0.69†	0.74†	0.96†	–		
SS	0.55†	0.17	0.15	0.20	0.35*	–	
VIQ	-0.05	-0.02	0.09	0.06	0.04	-0.22	–

* $p < .01$, ** $p < .005$, † $p < .001$

As Table 3.1 shows, British children's use of PS1 and PS2 were positively correlated, but PS3 was not correlated with PS1 or PS2. The composite PS scores (self-regulatory PS [PS2+3] and total PS [TPS]) were positively correlated with each other and each was

positively correlated with the three separate levels of PS. Social speech was positively correlated with total PS and with PS1, but not with PS2 or PS3. Verbal ability was not related to any of the speech measures.

Table 3.2 shows the relations between social speech, PS used by the Saudi children in *Session I* and their verbal ability.

Table 3.2: Correlation matrix for relations between PS, Social Speech (Session I) and Verbal Ability for the Saudi Children ($N = 63$).

	PS1	PS2	PS3	PS2+3	TPS	SS	VIQ
PS1	—						
PS2	0.04	—					
PS3	0.04	0.21	—				
PS2+3	0.04	0.86†	0.67†	—			
TPS	0.23	0.85†	0.66†	0.98†	—		
SS	0.09	0.14	0.31*	0.25*	0.24*	—	
VIQ	0.06	0.22	0.00	0.16	0.17	-0.23	—

* $p < .05$, † $p < .001$

As Table 3.2 shows, none of the pairwise correlations for the three levels of PS were significant. Self-regulatory PS (PS2 + PS3) was positively correlated with PS2, PS3 and total PS, but not with PS1. Total PS was positively correlated with self-regulatory PS, with PS2 and with PS3, but not with PS1. Social speech was positively correlated with PS3, with self-regulatory PS and with total PS, but not with PS1 or PS2. Verbal ability was not related to any of the speech measures.

3.6.5.3. Age-related Changes in Children's Use of PS in the British Children (in response to Question 3.5.4, p. 73)

Table 3.3 shows the mean frequency scores for social speech and PS for the youngest group of British children. Table 3.4 presents the same data for the middle age group of British children, and Table 3.5 shows these data for the oldest group of British children.

Table 3.3: Means of frequency of incidence change in SS, PS and its levels produced by Group 1 (4.5-5.5 yrs) of the British children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	8.44 (7.25)	1.44 (2.48)	1.44 (2.89)	2.78 (2.60)	5.67 (6.14)
S2	7.78 (9.56)	1.94 (3.19)	1.83 (2.20)	3.44 (2.31)	7.22 (5.17)

(Figures in brackets are s.d.)

Table 3.4: Means of frequency of incidence change of SS, PS and its levels produced by Group 2 (5.6-6.5 yrs) of the British children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	9.10 (8.38)	0.60 (0.88)	2.10 (2.94)	4.30 (3.08)	7.00 (5.08)
S2	4.85 (6.43)	1.45 (2.06)	1.95 (3.98)	4.15 (3.25)	7.55 (7.74)

(Figures in brackets are s.d.)

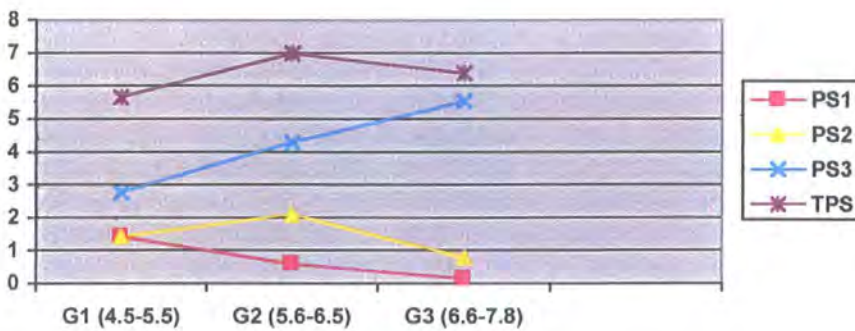
Table 3.5: Means of frequency of incidence change in SS, PS and its levels produced by Group 3 (6.6-7.8 yrs) of the British children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	4.05 (4.31)	0.15 (0.37)	0.80 (1.06)	5.55 (3.35)	6.40 (3.93)
S2	4.35 (4.18)	0.60 (1.39)	1.70 (3.48)	6.15 (4.12)	7.85 (4.99)

(Figures in brackets are s.d.)

Children's PS data from *Session I* were used to investigate age-related changes in the British children's use of the different types of PS. Given the positive correlations between PS use at *Sessions I* and *II*, it was decided only to investigate age-related changes in PS using *Session I* data. Figure 3.5 shows the cross-sectional trends in children's use of PS.

Figure 3.5: Cross-sectional trends of the mean incidence of PS and its three levels in *Session I* for the British Children.



As Figure 3.5 shows, the mean of the total incidence of PS (TPS) appears to peak in the middle age group, and then to decline in the oldest age group. The individual types of PS show different developmental progressions. PS1 shows a steady decline with age (with its mean incidence for the oldest age group being close to zero), whereas PS3 shows a steady increase with age. Use of PS2 shows the same developmental progression as that of total PS, with its incidence peaking in the middle age group. These age-related trends appear to support Vygotsky's (1934/1986) contention that PS should show a curvilinear progression with age, and different developmental pathways for the three levels of PS support the notion that PS is being internalised with age, rather than simply dying away.

The relations between age and PS were further investigated using correlational analyses and ANOVAs. PS1 was negatively correlated with age ($r[56] = -0.37, p < 0.005$, two-

tailed); PS3 was positively correlated with age ($r[56] = 0.29, p < 0.05$, two-tailed); PS2 was not related to age ($r[56] = -0.15$, n.s.).

The mean scores for the three types of PS for each age group were entered into a 3(Age group) \times 3(PS-type) mixed ANOVA, where the three types of PS were designated as within-subject factors, repeated at the three age groups. The test revealed a highly significant effect of the levels of PS: $F[1.63, 89.79] = 44.11, p < 0.001$, as well as a highly significant age by levels of PS interaction: $F[4, 110] = 5.67, p < 0.001$. However, there was no main effect of age: $F[2, 55] = 0.33, "n.s."$.

The non-significant main effect of age may indicate that the total quantity of PS (TPS) did not change significantly across the three age groups. This suggestion was supported by the result of a one-way ANOVA that was used to test possible differences in TPS between the three age groups. The test showed no significant differences between the three age groups in terms of their total use of PS: $F[2, 55] = 0.33, "n.s."$. Taken together, these results suggest that the relation between age and PS are best understood in terms of an interaction between age and the individual levels of PS, rather than the total use of PS.

3.6.5.4. Age-related Changes in Children's Use of PS in the Saudi Children (in response to Question 3.5.4, p. 73)

Table 3.6 shows the mean frequency scores for social speech and PS for the youngest group of Saudi children. Table 3.7 presents the same data for the middle age group of Saudi children, and Table 3.8 shows these data for the oldest group of Saudi children.

Table 3.6: Mean of frequency of incidence change of SS, PS and its levels produced by Group 1 (4.5-6.0 yrs) of the Saudi children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	10.81 (10.06)	0.57 (0.93)	2.24 (2.98)	1.95 (2.06)	4.76 (4.30)
S2	6.43 (6.30)	0.24 (0.54)	2.48 (4.14)	2.57 (2.13)	5.29 (5.25)

(Figures in brackets are s.d.)

Table 3.7: Mean of frequency of incidence change of SS, PS and its levels produced by Group 2 (6.1-7.0 yrs) of the Saudi children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	8.14 (7.50)	0.27 (0.88)	2.18 (3.43)	3.05 (2.54)	5.50 (5.01)
S2	2.55 (3.62)	9.091E-02 (0.43)	2.55 (4.17)	2.23 (1.97)	4.86 (4.97)

(Figures in brackets are s.d.)

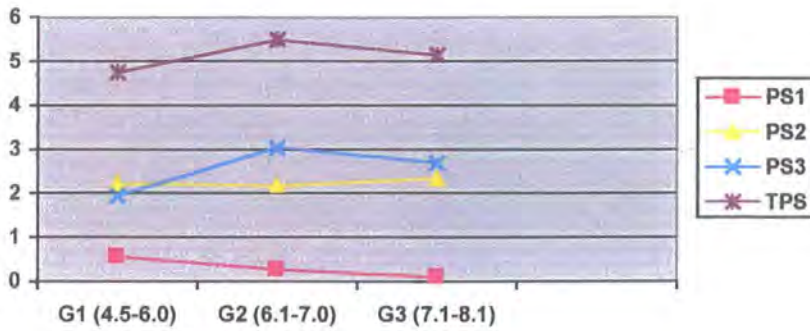
Table 3.8: Mean of frequency of incidence change of SS, PS and its levels produced by Group 3 (7.1-8.1 yrs) of the Saudi children.

Sessions	Social Speech (SS)	Private speech and its levels			
		PS1	PS2	PS3	TPS
S1	4.00 (5.70)	0.10 (0.31)	2.35 (3.48)	2.70 (1.78)	5.15 (3.90)
S2	2.15 (2.64)	0.00 (0.00)	2.50 (3.80)	3.80 (4.15)	6.30 (5.87)

(Figures in brackets are s.d.)

Children's PS data from *Session 1* were used to investigate age-related changes in the Saudi children's use of the different types of PS. Figure 3.6 shows the cross-sectional trends in children's use of PS.

Figure 3.6: Cross-sectional trends of the mean incidence of PS and its three levels in Session I for the Saudi children.



The age-related trend in the total amount of PS (TPS) is similar to that observed in the British children, and again shows a curvilinear progression, peaking in the middle age group of children. The developmental progression of PS1 is also similar to that seen in the British children, showing a steady decline to near zero for the oldest group of children. The developmental patterns for PS2 and PS3 for the Saudi children are, however, different than those seen in the British children. The incidence of PS2 is practically static across the three groups, and the incidence of PS3 shows a curvilinear progression, peaking in the middle age group, in contrast to the steady increase seen in the British children.

Once again, age-related changes in PS were investigated using correlational analyses and ANOVAs. PS1 was not correlated with age ($r[61] = -0.13$, n.s.); PS2 was not correlated with age ($r[61] = 0.08$, n.s.) and PS3 was not correlated with age ($r[61] = 0.18$, n.s.).

The mean scores for the three types of PS for each age group were entered into a 3(Age group) \times 3(PS-type) mixed ANOVA, where the three types of PS were designated as within-subject factors, repeated at the three age groups. The test revealed a significant main effect of the levels of PS: $F [1.62, 96.87] = 19.52$, $p < 0.001$, the effect of children's age on the development of PS types was non-significant: $F [2, 60] = 0.15$, "n.s.", as was the interaction between age and PS types: $F[4, 3.42] = 0.73$, "n.s."

These results indicate that British and Saudi children may have different rates of PS development.

3.6.5.5. Relations Between PS and Concurrent Task Performance at Session I in the British children

The first hypothesis concerned relations between children's use of PS and task performance. Relations between these areas were investigated first using data on concurrent task performance. Table 3.9 shows the correlation matrix for the relations between the raw frequency scores for the PS measures, total SS, total number of moves taken and total time taken during the four ToL trials for the British children. The British children's chronological age in months and their standardised BPVS II scores are also included in Table 3.9.

Table 3.9: Relations between PS, Social Speech, Task Performance, Age and Verbal Ability for the British Children ($N = 58$).

	PS1	PS2	PS3	PS2+3	TPS	SS	NM	TT	Age	VIQ
PS1	–									
PS2	0.39†	–								
PS3	0.15	0.13	–							
PS2+3	0.33**	0.67††	0.82††	–						
TPS	0.59††	0.69††	0.74††	0.96††	–					
SS	0.55††	0.17	0.15	0.20	0.35**	–				
NM	0.29*	0.12	0.05	0.10	0.18	0.50††	–			
TT	0.51††	0.28*	0.22	0.32*	0.44††	0.89††	0.66††	–		
Age	-0.37†	-0.15	0.29*	0.13	-0.01	-0.31*	-0.32*	-	–	
VIQ	-0.05	-0.02	0.09	0.06	0.04	-0.22	-0.11	-0.25	0.07	–

* $p < .05$, ** $p < .01$, † $p < .005$, †† $p < .001$

As Table 3.9 shows, children's use of the lowest level of PS (PS1) was positively correlated both with the number of moves (NM) and the time taken (TT) to complete the ToL trials. Children's use of Level 2 PS (PS2) was also positively correlated with the time taken to complete the ToL trials, i.e. a *negative* relation with task performance. The highest level of PS (PS3) was not associated with either of the ToL task performance measures. Time taken to complete the ToL was positively correlated with children's self-regulatory PS (PS2+ PS3) and their total PS (TPS). Children's social speech (SS) was positively correlated with the number of moves and the time taken to complete the ToL trials. Children's chronological age was negatively correlated with both the number of moves and the time taken on the ToL task. Children's BPVS II scores were negatively correlated with the time taken to complete the ToL task, although the correlation coefficient fell just short of significance ($p = .06$, two-tailed).

Partial correlations were computed for the relations between PS and task performance, controlling for age and verbal ability. Partialling out age and BPVS II scores, the relation between PS1 and time taken to complete the ToL remained significant: $r[54] = 0.45$, $p < .001$, two-tailed. However, with age and BPVS II scores partialled out, the relation between PS1 and number of moves was no longer significant: $r[54] = 0.19$, n.s. The relation between children's use of PS2 and time taken to complete the ToL remained significant after age and BPVS II scores had been partialled out: $r[54] = 0.28$, $p < .05$, two-tailed. Partialling out age and BPVS II scores also resulted in a non-significant bivariate correlation becoming significant: children's use of PS3 was positively correlated with the time taken to complete the ToL ($r[54] = 0.37$, $p < .005$, two-tailed). In summary, controlling for age and verbal ability, use of PS at all three levels was associated with taking longer to perform the ToL trials for the British children. With age and verbal ability partialled out, there were no associations between

any of the different levels of PS and the number of moves taken to complete the ToL trials.

Due to the fact that social speech was positively correlated with some PS measures, relations between task performance and children's coefficient of PS were also investigated. The coefficients of PS were calculated by dividing the number of PS1, PS2, PS3 and total PS utterances by the total number of utterances produced (i.e., PS + social speech). This method allowed for social speech rates to be controlled for. Partial correlations were computed between children's coefficient of PS (CPS) scores and the two task performance measures, controlling for age and BPVS II scores. The partial correlations showed that children's CPS1 scores were positively correlated with both number of moves ($r[54] = 0.43, p < .001$, two-tailed) and time taken ($r[54] = 0.30, p < .025$, two-tailed) to complete the ToL task. Children's CPS2 scores were not related to time taken ($r[54] = 0.17, n.s.$) or number of moves ($r[54] = 0.03, n.s.$) on the ToL task. Controlling for age and BPVS II scores, children's CPS3 scores were negatively correlated with number of moves on the ToL task ($r[54] = -0.32, p < .025$, two-tailed). The partial correlations showed that CPS3 scores were also negatively correlated with the time taken to complete the task, but this relation was not statistically significant ($r[54] = -0.18, n.s.$). Thus, controlling for age and verbal ability, proportionately greater use of PS1 was associated with poorer performance (in terms of making more moves) on the ToL trials, whereas proportionately greater use of PS3 was related to superior performance.

3.6.5.6. Relations Between PS and Concurrent Task Performance at Session 1 in the Saudi children

Turning now to the Saudi children, Table 3.10 shows the correlation matrix for relations between the raw frequency scores for the PS measures, total SS, total number of moves taken and total time taken during the four ToL trials. As with British children, the Saudi children's chronological age and verbal ability are also included in the matrix.

Table 3.10: Relations between PS, Social Speech, Task Performance, Age and Verbal Ability for the Saudi children ($N = 63$).

	PS1	PS2	PS3	PS2+3	TPS	SS	NM	TT	Age	VIQ
PS1	–									
PS2	0.04	–								
PS3	0.04	0.21	–							
PS2+3	0.04	0.86††	0.67††	–						
TPS	0.23	0.85††	0.66††	0.98††	–					
SS	0.09	0.14	0.31*	0.25*	0.27*	–				
NM	0.09	0.28*	0.39††	0.40††	0.42††	0.75††	–			
TT	0.20	-0.07	0.10	-0.02	0.03	0.53††	0.26*	–		
Age	-0.13	0.08	0.18	0.16	0.13	-0.38†	-0.12	-0.39†	–	
VIQ	0.06	0.22	0.00	0.16	0.17	-0.23	-0.03	-0.32*	0.29*	–

* $p < .05$, ** $p < .01$, † $p < .005$, †† $p < .001$.

As Table 3.10 shows, the number of moves taken on the ToL task was positively correlated with Saudi children's use of PS2, PS3, self-regulatory PS (PS2 + PS3) and total PS. Children's social speech was positively correlated with both number of moves

and time taken to complete the ToL task. Social speech was correlated with the number of moves and time taken on the ToL. Age and verbal ability were both negatively correlated with time taken to complete the ToL.

Partialling out age and verbal ability, the relation between PS2 and number of moves on the ToL task remained significant ($r[59] = 0.29, p < .025$, two-tailed), as did the relation between PS3 and number of moves ($r[59] = 0.43, p < .001$, two-tailed). Thus, among the Saudi children, controlling for age and verbal ability, greater use of both types of self-regulatory PS was associated with poorer task performance on the ToL trials.

As with the British children, the relation between the Saudi children's PS and task performance was investigated using coefficient of PS (CPS) scores. Partialling out age and verbal ability, no significant associations were found between the Saudi children's CPS at any level and either of the task performance measures. Thus, after age and verbal ability had been controlled for, Saudi children's proportionate use of the different types of PS showed no associations with ToL task performance.

These findings suggest that PS may serve different functions in the British and Saudi children, or it might be that the Saudi children might not be able to benefit from its self-regulating function. Regardless of their age or verbal ability, proportionately greater use of the most sophisticated form of PS in the British children appeared to help them succeed on the ToL trials. In contrast, the proportionate use of PS among the Saudi children showed no association with task performance; indeed, using the frequency scores for PS, both types of self-regulatory PS were associated with poorer ToL performance in terms of the number of moves taken to solution.

3.6.5.7. Relations Between PS and Subsequent Task Performance at Session II

Hypothesis one (p. 73) was also investigated through potential links between PS and children's *subsequent* task performance. Some researchers have argued that PS is more highly related to children's subsequent task performance than their concurrent task performance (e.g. Behrend et al., 1989, 1992; Fraenglass & Diaz, 1985). This was tested in Study 1 by investigating links between children's use of PS at *Session I* and their task performance at *Session II*.

For the British children, controlling for age and verbal ability, number of moves taken on the ToL at *Session II* was not related to their *Session I* use of: (i) PS1 ($r[54] = -0.06$, n.s.); (ii) PS2 ($r[54] = -0.08$, n.s.); (iii) PS3 ($r[54] = -0.13$, n.s.); use of self-regulatory PS ($r[54] = -0.14$, n.s.); or total use of PS ($r[54] = -0.14$, n.s.). Neither was PS related to the time taken to complete the ToL at *Session II*: for PS1 ($r[54] = -0.10$, n.s.); for PS2 ($r[56] = -0.06$, n.s.); for PS3 ($r[56] = -0.14$, n.s.); for use of self-regulatory PS ($r[56] = -0.14$, n.s.); and for total use of PS ($r[56] = -0.15$, n.s.).

Relations between PS and subsequent task performance were also investigated using CPS scores to control for social speech. Partial correlations controlling for age and verbal ability again showed no relations between any level of PS and number of moves taken (r s between -0.01 and 0.02 , df 54), or between any level of PS and time taken to complete the ToL trials (r s between -0.08 and 0.05 , df 54). Thus, these findings give no support to the contention that PS has a greater impact on subsequent task performance than on concurrent task performance in the British children.

For the Saudi children, controlling for age and verbal ability, number of moves taken on the ToL at *Session II* was not related to their *Session I* use of: (i) PS1 ($r[59] = -0.13$,

n.s.); (ii) PS2 ($r[59] = -0.04$, n.s.); (iii) PS3 ($r[59] = -0.14$, n.s.); use of self-regulatory PS ($r[59] = -0.05$, n.s.); or total use of PS ($r[59] = -0.06$, n.s.). Controlling for age and verbal ability, time taken to complete the ToL at *Session II* was not related to: (i) PS1 ($r[61] = 0.01$, n.s.); (ii) PS2 ($r[61] = 0.08$, n.s.); (iii) PS3 ($r[61] = -0.04$, n.s.); use of self-regulatory PS ($r[61] = 0.08$, n.s.); or total use of PS ($r[61] = -0.08$, n.s.).

Using the CPS scores to control for social speech use, no relations were found between any of the levels of PS and number of moves (r s between -0.21 and 0.09 , $df = 59$), or between any of the levels of PS and time taken to complete the ToL trials (r s between -0.05 and 0.02 , $df = 59$). The pattern of findings for the Saudi children was identical to that for the British children, giving no indication that PS relates to superior subsequent task performance. The findings of Study 1 are thus in line with those of Fernyhough et al. (2002) who failed to find any support for a predictive relation between PS and later task performance, but go against Fraenglass and Diaz's (1985) argument and Behrend et al.'s (1989) findings that PS will be more greatly associated with subsequent, rather than concurrent, task performance.

3.6.5.8. *The Effects of PS Suppression on Task Performance*

The second hypothesis (p. 73) concerned the effects of suppression of PS on children's task performance, predicting that children who were more reliant on self-regulatory PS during task completion would be more adversely affected by the verbal suppression technique. In order to test this hypothesis, children in both the British and Saudi samples were divided into two groups, using a median split of their use of self-regulatory PS (i.e. PS2 and PS3) at *Session I*. Thus, children were classified as "high PS users" or "low PS users". In the British sample, 31 children were classified as high PS users: $M = 8.71$ ($SD = 3.65$), and 27 as low PS users: $M = 2.30$ ($SD = 1.46$). In the Saudi

sample, 34 children were classified as high PS users: $M = 7.62$ ($SD = 4.08$), and 29 as low PS users: $M = 1.62$ ($SD = 1.15$).

In the British sample, the high and low PS users did not differ in terms of their age or verbal ability as the results of two Independent-Samples t-tests indicated. In terms of their chronological age: ($t[56] = -1.60$, "n.s.", two-tailed), and in terms of their verbal ability: ($t[56] = -1.07$, "n.s.", two-tailed). The same results were obtained for the Saudi sample, with no differences in age: ($t[61] = -1.76$, "n.s.", two-tailed), or verbal ability: ($t[61] = 0.04$, "n.s.", two-tailed) between the two groups. This analysis treats PS as a dichotomous variable (high vs. low), whereas the earlier analysis linking PS with children's chronological age dealt with PS as a continuous variable.

If self-regulatory PS is used comparatively more by the high PS users in order to aid task performance than by the low PS users, one would predict that high PS users would be more greatly affected by the verbal suppression than the non-verbal suppression. If the low PS users are less reliant on self-regulatory PS to accomplish a cognitive task, they will be less affected by the verbal suppression. Table 3.11 shows the mean task performance scores (in terms of number of moves on the ToL) of the high and low PS users during the verbal and non-verbal suppression conditions. Rather than using both task performance measures, these analyses focused exclusively on number of moves taken on the ToL trials because it was reasoned that this was the more meaningful index of task performance. For example, it seems reasonable to assume that the performance of a child who solves all trials in the minimum number of moves but who takes a relatively long period of time to complete the task is superior to that of a child who performs the task quickly, but who makes many more moves to solution.

Table 3.11: Means and standard deviations of task performance (number of moves) at Session III for the verbal and non-verbal groups among high and low PS users (British Children).

High PS Users		Low PS Users	
Verbal (N=17)	Non-verbal (N=14)	Verbal (N=12)	Non-verbal (N=15)
23.53(6.96)	22.00(6.75)	22.83(6.35)	25.33(9.43)

(Figures in brackets are s.d.)

A 2-PS(high/low) \times 2-task suppression(verbal/nonverbal) ANCOVA, with age and verbal ability as covariates, was carried out. The ANCOVA revealed that there was no effect of the suppression condition on task performance at *Session III*, $F(1, 5) = 0.03$, n.s. The interaction between the suppression condition and the amount of PS used by the high and the low PS users was also non-significant: $F(1, 5) = 1.75$, n.s.

The data of the Saudi children were analysed in the same way as those of the British children. Table 3.12 shows the mean number of moves on the ToL for the high and low PS users under the verbal and non-verbal suppression conditions at *Session III*.

Table 3.12: Means and standard deviations of task performance at Session III of verbal and non-verbal groups among high and low PS users (Saudi children).

High PS Users		Low PS Users	
Verbal	Non-verbal	Verbal	Non-verbal
30.00(9.88)	21.67(8.19)	23.23(7.54)	18.19(4.26)

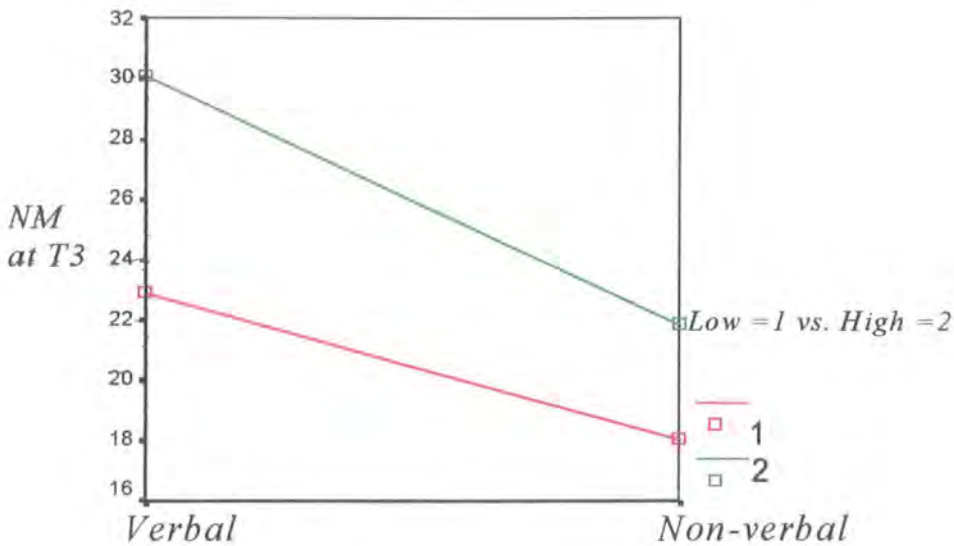
(Figures in brackets are s.d.)

These task performance scores (number of moves) in *Session III* were entered as the dependent variable in a 2-PS(high/low) \times 2-task suppression(verbal/non-verbal) ANCOVA, with age and verbal ability as covariates. The ANCOVA revealed a significant main effect of high versus low PS use: $F(1, 5) = 7.04$, $p < 0.01$, two-tailed, as well as a significant main effect of the suppression condition: $F(1, 5) = 7.44$, $p < 0.01$,



two-tailed. The interaction between PS use and suppression condition was non-significant: $F(1, 5) = 0.63$, n.s. As Figure 3.7 shows, there was no interaction between these variables in the Saudi sample of children.

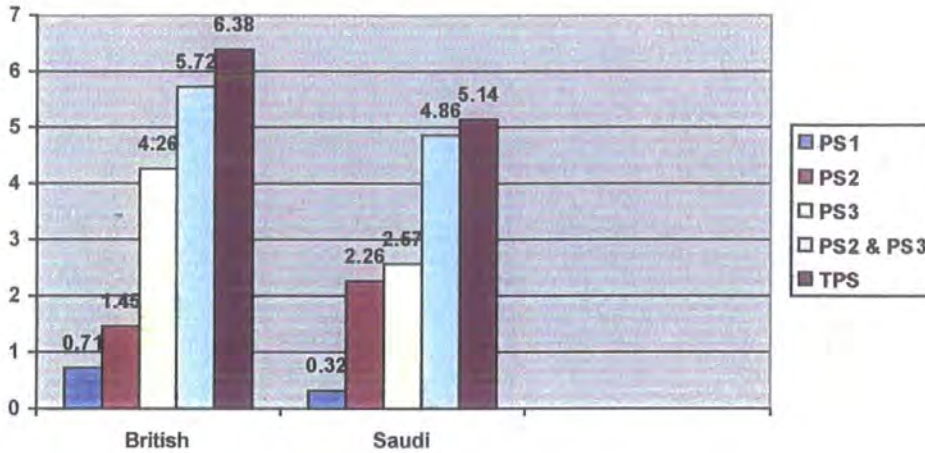
Figure 3.7: Interaction between PS and task performance under suppression conditions and among high and low PS users (the Saudi children).



3.6.5.9. Cross-Cultural Differences in Children's PS Use

The third hypothesis (pp. 73-74) stated that British children should engage in more PS, particularly the most sophisticated forms of PS, than their Saudi counterparts. Before comparing the levels of PS between the two groups of children, it was important to establish whether there were any differences between the groups that might confound any cultural effects on PS use. With respect to chronological age, the Saudi children were found to be older than their British counterparts ($t[119] = 2.02$, $p < .05$, two-tailed), but there were no differences between the British and Saudi children with respect to verbal ability ($t[119] = 0.20$, n.s.) or use of social speech ($t[119] = 0.04$, n.s.). Figure 3.8 shows the means frequency of PS scores for the British and the Saudi children at *Session I*.

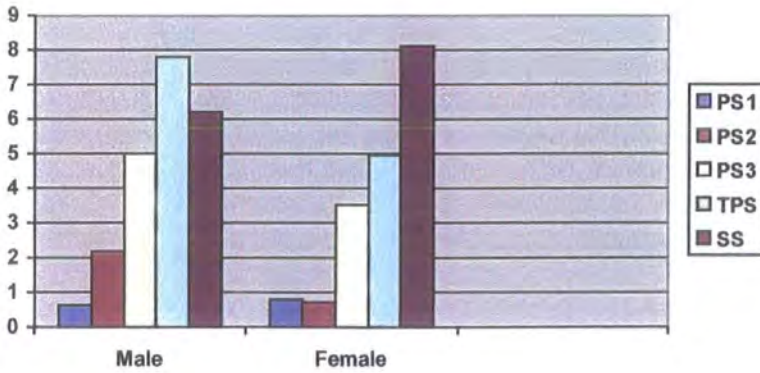
Figure 3.8: mean incidence of PS and its levels among the British and the Saudi children in Session I.



In order to examine the effect of culture on PS and its types, Independent-Samples *t*-tests were carried out aiming to compare between the two cultural groups on PS and its types. There was a non-significant trend for Saudi children to use more PS1 than their British counterparts ($t[119] = 1.76, p = 0.08$, two-tailed). There were no differences between the two groups in their use of PS2 ($t[119] = 1.53$, n.s.), but the British children used significantly more PS3 than their Saudi counterparts ($t[119] = 3.42, p < 0.001$, two-tailed). There were no differences between the groups in their total use of PS ($t[119] = 1.45$, n.s.) or in their use of self-regulatory PS (PS2 + PS3): $t(119) = 1.12$, n.s.

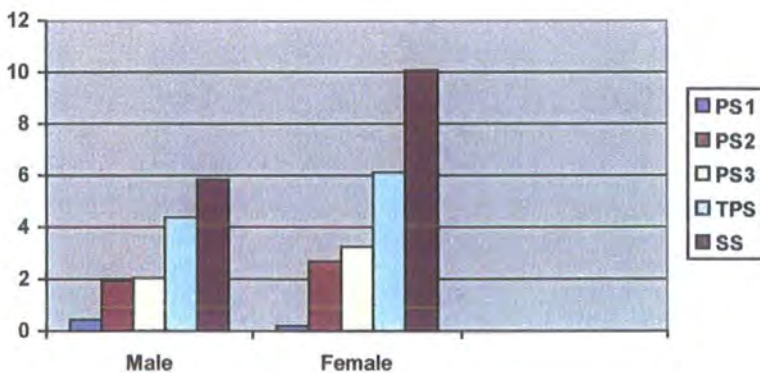
3.6.5.10. Gender Differences in Children's Use of PS

Hypothesis four (p. 74) related to gender differences in children's PS use in the British and Saudi cultures. Figure 3.9 shows mean frequency scores for social speech and PS produced in *Session I* for the British girls and boys.

Figure 3.9: Effect of gender on private and social speech for the British children.

There were no gender differences in the British sample¹ for children's use of PS1 ($t[56] = 0.42$, n.s.) or PS3 ($t[56] = 1.80$, n.s.), but British boys used significantly more PS2 than British girls: $t(56) = 2.33$, $p < 0.025$, two-tailed. The boys also had higher scores for the total incidence of PS: $t(56) = 2.22$, $p < 0.05$, two-tailed. There was no difference between the British girls and boys in their use of social speech: $t(56) = 1.02$, n.s. These results are in line with previous research indicating that boys tend to use more PS than girls (e.g. Fernyhough, 1994).

Turning now the Saudi children, Figure 3.10 shows the mean frequency scores for social speech and PS at *Session I* with respect to gender.

Figure 3.10: Effect of gender on private and social speech for the Saudi children.

¹ Note that there were no age differences ($t[56] = 0.22$, n.s.) between the British boys and girls, but British boys attained significantly higher verbal ability scores than British girls ($t[56] = 2.15$, $p < .05$, two-tailed).

Due to different socialisation practices between girls and boys in Saudi, it was predicted that Saudi girls would engage in more PS, particularly the more sophisticated types of PS, than Saudi boys². The results for gender differences in PS3 use supported this prediction: $t(61) = 2.29, p < 0.05$, two-tailed. There were, however, no differences between the Saudi boys and girls with respect to PS1, PS2 and total PS. In addition, Saudi girls were found to engage in more social speech than Saudi boys: $t(61) = 2.06, p < 0.05$, two-tailed.

3.6.5.11. Overall Predictors of Children's PS Use

In order to investigate which of the independent variables considered in Study 1 independently predicted children's use of PS and its types, a number of regression analyses were conducted. For each of PS1, PS2, PS3, self-regulatory PS (PS2 + PS3), and the total use of PS (TPS), chronological age, verbal ability, gender, concurrent task performance (number of moves), social speech and culture were entered into the regression as independent variables. Blockwise entry method was used where these variables were entered hierarchically (i.e. one by one), and the order of entry was as shown in the tables below. The results of the regression analyses are presented in Tables 3.13 through 3.17.

² Note that there were no age differences ($t[61] = 0.24$, n.s.) or differences in verbal ability ($t[61] = 0.44$, n.s.) between the Saudi boys and girls.

Table 3.13: Multiple regression results for predictors of PS1 (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	-0.17	-1.87*	0.03
Verbal ability	0.09	0.96	0.01
Gender	0.08	0.90	0.01
Task performance	0.06	0.53	0.00
Social speech	0.28	2.53**	0.05
Culture	0.14	1.59	0.02

* $p < .10$, ** $p < .025$

As Table 3.13. shows, children's use of social speech was the only significant predictor of PS1, with chronological age approaching significance ($p = .065$). Thus, the best predictor of children's use of PS1 was their use of social speech, with greater levels of social speech relating to greater levels of PS1. Social speech accounted for 5% of the variance in PS1. There was also a non-significant trend (accounting for 2% of the variance) for age to predict PS1 use, with younger children producing more PS1.

Table 3.14: Multiple regression of PS2 on age, task performance, social speech, gender and culture (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.03	0.32	0.00
Verbal ability	0.16	1.68*	0.02
Gender	0.08	0.81	0.01
Task performance	0.12	1.11	0.01
Social speech	0.14	1.20	0.01
Culture	0.13	1.42	0.02

* $p < .10$

As Table 3.14 shows, there were no significant independent predictors of PS2, although the values for verbal ability approached significance ($p = .096$), showing that there was

a non-significant trend for more verbally able children to use more PS2. Verbal ability accounted for 2% of the variance in PS2 use.

Table 3.15: Multiple regression of PS3 on age, task performance, social speech, gender and culture (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.34	3.83**	0.10
Verbal ability	0.04	0.44	0.00
Gender	0.06	0.84	0.01
Task performance	0.06	0.57	0.00
Social speech	0.31	2.94*	0.06
Culture	0.37	4.43**	0.13

*p < .005, **p < .001

Table 3.15 shows that culture was the best predictor of children's PS3 use, followed by chronological age and social speech. British children engaged in significantly more PS3 than Saudi children, with older children and children who used more social speech engaging in more PS3. Culture accounted for 13% of the variance in children's PS3 use, with age accounting for 10% of its variance and social speech 6% of its variance.

Table 3.16: Multiple regression of the total use of PS2 & PS3 on age, task performance, social speech, gender and culture (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.25	2.69**	0.05
Verbal ability	0.13	1.41	0.02
Gender	0.09	1.06	0.01
Task performance	0.12	1.16	0.01
Social speech	0.29	2.63**	0.05
Culture	0.16	1.75*	0.02

*p < .10, **p < .01

Table 3.16 shows that age is the best predictor of children's use of self-regulatory PS, followed by social speech. Thus, older children, and those who engaged in more social speech produced higher levels of self-regulatory PS. Age and social speech each accounted for 5% of the variance in self-regulatory PS use. There was a non-significant trend for culture to predict self-regulatory PS use ($p = .083$), with British children tending to engage in more than their Saudi counterparts. Culture accounted for 2% of the variance in self-regulatory PS use.

Table 3.17: Multiple regression of the total use of private speech on age, task performance, social speech, gender and culture (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.18	1.91*	0.03
Verbal ability	0.14	1.63	0.02
Gender	0.11	1.28	0.01
Task performance	0.13	1.22	0.01
Social speech	0.35	3.15**	0.07
Culture	0.17	2.00**	0.03

* $p < .10$, ** $p < .05$, $p < .005$

As shown in Table 3.17, social speech was the best predictor of children's overall use of PS, followed by culture, with children who engaged in more social speech, and those who were British, producing more PS. Social speech accounted for 7% of the variance in total use of PS, with culture accounting for 3% of its variance. There was also a non-significant trend for age to predict overall PS use, with older children tending to produce more PS. Age accounted for 3% of the variance in total PS use.

3.6.6. Discussion

Study 1 aimed to investigate the incidence and function of different types of PS within and between two cultures: British and Saudi Arabian. Study 1 is thus the first to investigate cultural differences in PS using the same tasks and obtaining measures on PS from two different cultures at the same point in time. PS measures were obtained during completion of four trials of ToL on two occasions.

PS was produced by the vast majority of British and Saudi children: only one of the British children failed to use PS during either testing session, and all but two of the Saudi children used PS in one of the two sessions. In both cultural groups, use of PS and its different levels showed significant positive correlations between the two testing sessions. Thus, these data support Vygotsky's (1934/1986) contention that PS is a universal phenomenon, and show that its use within the context of a cognitive task is highly consistent over time.

The results of Study 1 showed that age-related changes in total PS follow the same curvilinear progression in both British and Saudi children, with the incidence of PS peaking at around 6 years of age. The lowest level of PS (PS1) showed a steady decline with age in both cultures, with the oldest group of British and Saudi children on average hardly ever using PS1 during the ToL task. The developmental progressions for the more sophisticated types of PS were slightly different within each culture. British children's use of PS2 showed a curvilinear progression similar to that for the development of total PS, whereas use of the most sophisticated form of PS (PS3) showed a steady increase with age. In contrast, use of PS2 in the Saudi children was almost static across the three age groups, and PS3 showed a curvilinear function. In the British children, PS1 showed significant negative relations with age, and PS3 showed

significant positive relations with age, but in the Saudi children, there were no significant associations between any of the types of PS and age.

In both the British and Saudi children, use of PS at all levels was not related to children's general verbal ability as assessed by culture-appropriate standardised tests. In the British children, PS1 use was positively correlated with PS2 use, but there were no other significant pairwise correlations between the different levels of PS for the British children. None of the pairwise correlations between the different levels of PS were significant in the Saudi sample of children. This supports the argument that PS is best understood in terms of the ontogenesis of its different levels, rather than viewing PS as a unitary phenomenon (Berk, 1992; Berk & Garvin, 1984; Berk & Spuhl, 1995; Diaz, 1992; Kohlberg et al., 1968).

Children's social speech use was positively correlated with use of PS1 and total PS use in the British children, whereas the Saudi children's social speech was positively correlated with the higher forms of PS (PS3 and the composite measure of self-regulatory PS [PS2 + PS3]), as well as total PS. These relations between social and private speech support Vygotsky's (e.g., 1978) view that the origins of PS are social, with PS developing out of social speech.

The first hypothesis of Study 1 concerned relations between PS and task performance, predicting that self-regulatory PS would be associated with superior task performance in both the British and Saudi children. Some support for this hypothesis was obtained from relations found between the British children's proportionate use of PS and children's concurrent ToL task performance in terms of the number of moves taken to complete the ToL trials. These proportional scores, or coefficient of PS (CPS) scores, controlled

for social speech use, which was related to various types of PS in both cultural groups. Controlling for age and verbal ability, the British children's CPS1 scores were positively correlated with the number of moves on the ToL trials, but their CPS3 scores were negatively correlated with number of moves. Thus, British children's use of the least sophisticated form of PS (involving no self-regulatory component) was related to poorer concurrent task performance, whereas use of the most sophisticated form of PS (indicative of PS being internalised) related to superior concurrent task performance. However, no such relations were found between the CPS scores and task performance in the Saudi children. In addition, there were no relations between the *frequency* scores for any type of PS and task performance in the British children, and the frequency scores for both types of self-regulatory speech (PS2 and PS3) were actually associated with poorer task performance in the Saudi children. These findings suggest that PS may play a different function in British versus Saudi children. Whereas there was some evidence for sophisticated self-regulatory PS helping British children to improve their concurrent task performance, there was no evidence for Saudi children using such PS to the same end. In both cultural groups, there were no associations between any of the PS measures and children's subsequent ToL performance, going against Frauenglass and Diaz's (1985) contention that PS should be more greatly associated with later, rather than concurrent, task performance. These null findings on PS predicting subsequent cognitive performance were, however, in line with those of Fernyhough et al. (2002).

The second hypothesis of Study 1 focused on the effects of verbal versus non-verbal suppression on children's task performance, predicting that the performance of children who frequently used self-regulatory PS during the task would be more greatly affected by verbal suppression that abolished their use of PS. In order to test this possibility, children in both cultures were divided into two groups using a median split of the data

for self-regulatory PS use. In the Saudi children, the high PS users performed significantly worse than the low PS users during the verbal suppression, but there were no differences between the high and low PS groups with respect to task performance during the non-verbal suppression. An ANCOVA on the Saudi children's task performance (with age and verbal ability as covariates) showed a significant main effect of suppression type and high versus low PS use, although there was no interaction between these two variables. In the British children, there were no significant differences in task performance between the high and the low PS users under either the verbal or the non-verbal suppression conditions. The ANCOVA for the British children showed that there was no effect of suppression condition or high versus low PS use on task performance.

The third hypothesis concerned differences in PS between the British and Saudi children. It was predicted that the comparatively restricted nature of social interactions experienced by Saudi children both at home and at school would result in their using less PS, particularly the most sophisticated form of PS, than their British counterparts. Support was found for this hypothesis, since even though the Saudi children were significantly older than their British counterparts, the British children engaged in significantly more PS3. In addition, there was a non-significant trend for Saudi children to engage in more PS1 than the British children. These findings were supported by the results of regression analyses to establish the independent predictors of the different levels of PS. Culture was found to be the best predictor of children's PS3 use, accounting for 13% of its variance.

The final hypothesis predicted that Saudi girls would produce significantly more PS (especially the more sophisticated forms of PS) than Saudi boys due to the greater

opportunities for social interaction afforded to girls within the Saudi culture. The results supported this hypothesis, with Saudi girls producing significantly more PS3 than Saudi boys. Saudi girls also produced more social speech than Saudi boys. The effect of gender on PS in the British children was in the opposite direction, with British boys producing more PS2 than British girls, although there were no gender differences in the British children for any of the other language measures. This finding that boys produce more PS than girls is in line with Fernyhough's (1994) study showing that Boys have used significantly more PS than girls.

Finally, the regression analyses to investigate independent predictors of the different types of PS resulted in a number of findings that are worthy of note. First, chronological age was found to be an independent predictor of all types of PS except for PS2. Culture was an independent predictor of PS3 (with a non-significant trend for culture to predict the composite self-regulatory PS measure) and of total PS, with the British children engaging in PS more than their Saudi counterparts. As mentioned above, the relation between culture and PS3 was particularly strong. Social speech was also found to be an independent predictor of all types of PS except PS2. This finding again underlines the support for the social origins of PS (Vygotsky, 1978). Children's task performance did not independently predict use of any type of PS, suggesting that how well or badly a child is performing on a task has little effect on their use of PS. Gender was not an independent predictor of any type of PS across all children in Study 1, showing that the effects of gender on PS appear to function within each culture, rather than across cultures.

Taken together, the results of Study 1 provide good support for the social origins of PS. This support comes both from the relations found between children's use of social

speech and the different levels of PS, and from the predicted cultural effects on PS use. In the Introduction to this chapter, the specific aspects of Saudi culture that were expected to impact on the development of children's PS were outlined. To recap, Saudi culture is a "high context" culture, in which non-verbal means of communication are used to aid understanding. This contrasts with the "low context" British culture where meaning is made explicit through verbal language. In addition, Saudi society is collectivistic, with the family playing a very strong role in influencing and organising individuals' behaviour. Within this society, parenting is typically authoritarian and children are expected to obey their parents. Thus, the nature of Saudi society and the fact that parents tend not to encourage regular conversations with their children will result in children having fewer verbal social interactions than children in typical British families. The educational system in Saudi is also organised in ways that are likely to decrease social and verbal contact between children and their teachers, with its emphasis on memorisation, testing and lecturing, with play activities and free time in the classroom being limited. If PS has its origins in social interaction and social speech, one would predict that Saudi children will engage in significantly less PS than their British counterparts. The results of Study 1 supported this prediction. What is perhaps most interesting with respect to the effect of culture on PS is that it appeared to impact on its rate of development, rather than its basic incidence. For example, there was a non-significant trend for Saudi children to produce *more* PS1 than their British counterparts, whereas the British children produced significantly more PS3. This pattern is identical to that reported by Berk and Garvin (1984) and Berk (1994) in their study on PS in Appalachian children. They found that the adult-centred nature of Appalachian culture, whereby family interactions were characterised by "verbal silence, with social contacts appearing to be restricted and strained" (Berk & Garvin, 1984, p. 274-75) affected the speed with which PS developed in Appalachian children, but did not result in their

never using PS. The lag in age with respect to movement through the different levels of PS for the Saudi children in Study 1 thus mirrors the lag reported by Berk and colleagues for the Appalachian children.

Support for the social origins of PS also came from the gender differences between the Saudi girls and boys. It was predicted that Saudi girls would be more advanced in their use of PS because of their greater opportunities to take part in social gatherings with other girls and women. Saudi boys have fewer opportunities for such social interactions with peers and elders. The fact that Saudi girls engaged in more PS3 than Saudi boys supported this hypothesis. Moreover, the fact that Saudi girls also engaged in more social speech than Saudi boys is also suggestive of PS developing out of social speech.

3.6.7. Conclusion and Predictions

This chapter aimed to examine the phenomenon of private speech among samples of British and Saudi children by focusing on certain factors that are assumed to determine this verbal behaviour both within each culture and across the two cultures. The findings obtained by testing the developmental, functional, social and cultural aspects of PS among the British and the Saudi children, revealed similarities as well as differences in the production and function of PS.

In terms of similarities, practically all British and Saudi children used PS during the ToL trials, and in both cultures PS was related to social speech. The differences on PS, on the other hand, may be seen within each culture, as well as across the two cultures. Within each culture, there are certain children who relied more on PS in order to regulate their actions (the high PS users) than others.

The differences in PS between the two cultures were most obvious in the frequency with which children engaged in the most sophisticated form of PS, with British children using this type of PS significantly more than their Saudi counterparts. British children thus appeared to be more advanced in their internalisation of PS than Saudi children, despite the fact that the Saudi children were on average older than their British counterparts. Perhaps the most striking difference between the two cultures was in the potential function of PS. There was evidence for a link between British children's proportionate use of PS3 and superior task performance, whereas no such link was found in the Saudi children. Indeed, there was some suggestion of self-regulatory PS relating to poorer task performance in the Saudi children. Thus, for the Saudi children, use of PS may not play an important role in their successful completion of a cognitive task. However, if one considers the task performance of the high versus low PS users within the Saudi group, then there is evidence for PS playing a role in task performance. Recall that the high PS users in the Saudi sample of children performed significantly worse than their low PS user counterparts during the verbal suppression task, but no such differences were found between these two groups during the non-verbal suppression task. Thus, one might conclude that there is a general relationship between task performance and PS use in the British children, regardless of their status as a high versus low PS user, but within the Saudi culture, PS is only a determinant of task performance amongst those children who frequently engage in self-regulatory PS during a cognitive task. One question that arises from this finding is why certain Saudi children are high PS users and use PS to accomplish a cognitive task in a way that "goes against" the cultural norm. This question will be returned to in the General Discussion chapter.

In summary, PS is observed in both British and Saudi children and there is some support for the argument that PS plays a role in task performance in both cultures. Study

1 has thus met the objective of establishing both that PS occurs across cultures and serves similar functions across cultures. The next aim was to investigate whether such differences in PS use influence children's development beyond the specific cognitive task from which the PS measures were taken. Specifically, the studies presented in the next two chapters focus on potential relations between children's PS and their memory development. Chapter 4 deals with relations between PS and children's verbal working memory, testing the possibility that the tendency among certain children to use the more advanced types of PS (i.e., the high PS users) may explain individual differences in children's propensity to succumb to the phonological similarity effect.

Chapter 5 reports on a study that investigated whether children's use of PS related to their ability to use language to report and organise their autobiographical memories. A Vygotskian might argue that PS represents the genetic link between the interpsychological processes and the intrapsychological processes through the course of internalisation. Reporting past personal memories in an organised way has been found to relate to social interaction between children and adults. This study investigated the possibility that the frequent use of more advanced types of PS (by which the internalisation process is carried out) might account for the link between social interaction and autobiographical memory.

Private Speech and Remembering (1): Verbal Working Memory

4.1. Introduction

As discussed previously, the aim of the study reported in this chapter is to investigate the relation between PS and phonological working memory performance in early childhood. The findings of Study 1 on the incidence and function of PS in British and Saudi Arabian children appear to support the argument that PS is a universal phenomenon, derived from social interaction, which plays an important role in children's ability to regulate their behaviour. Although the predicted cross-cultural differences in the incidence of PS were found, Study 1 showed that, in both cultures, certain children appeared to rely more heavily on PS to accomplish a cognitive task¹.

Study 2 used these PS data as a starting point for investigating developmental progressions in children's working memory (WM). Specifically, Study 2 addressed the possibility that PS, and in particular PS3, may be the underlying mechanism responsible for the major developmental milestone of phonological recoding of visually presented material.

¹ The mean PS frequency scores for the British children were as follows: "high PS users" $M = 8.71$ ($SD = 3.65$), and for the "low PS users" $M = 2.30$ ($SD = 1.46$). For the Saudi children: "high PS users" $M = 7.62$ ($SD = 4.08$), and for the "low PS users" $M = 1.62$ ($SD = 1.15$).

4.2. Private Speech and the Development of Short-Term Memory

To recap, PS is considered to be of central importance in enhancing children's self-regulatory capacity (Bronson, 2000; Diaz & Berk, 1992). PS is an indication of "the child's dependence on verbal stimuli to promote thinking and to mediate or regulate behaviour" (Rubin & Dyck, 1980, p. 219). Moreover, age-related changes in the quantity and quality of PS suggest that the developmental and functional aspects of this verbal behaviour are best understood in terms of the ontogenesis of various types or levels of PS. That is, the more advanced forms of PS (external manifestations of subvocal rehearsal, such as lip movements and inaudible muttering) increase with age, whereas the less sophisticated utterances decrease as children grow up. Similarly, remembering is a mental activity that becomes increasingly dependent on verbal processes as children get older. For example, children younger than around 6 years of age (i) do not spontaneously employ subvocal rehearsal strategies to aid memory, (ii) do not phonologically recode visually presented material, and (iii) are not prone to the phonological similarity effect (see Chapter 1). These developmental changes have been attributed to children's move to conscious attempts to memorise pictorial material (Flavell et al., 1966), to the gradual decoupling of overt speech from phonological working memory (Hitch et al., 1991), and to developments in the way in which the central executive functions (Palmer, 2000).

Recall from Chapter 1 that several studies were suggestive of a link between children's use of what these researchers called "inner speech" and memory development (e.g. Flavell et al., 1966; Ford & Silber, 1994; Hitch et al., 1991). The type of speech identified in these studies would, however, be classified as Level 3 speech according to the classification scheme used in this thesis since it involved lip movements and other external, non-audible manifestations of inner speech. For example, Flavell et al. (1966)

found age-related increases in 5- to 10-year-old children's lip movements during a memory task, but also noted that within each age group, certain children moved their lips while carrying out the task. Most importantly, at all ages, lip movements were associated with better task performance, suggesting that use of this subvocal rehearsal strategy helped children memorise and recall the information. Interestingly, Flavell et al. (1966) asked the children's teacher to identify those children who would have engaged in more verbalisation during the task, and reported that she pointed out "without a moment's hesitation" (p. 297) the children who had indeed used most subvocal rehearsal. When the teacher was asked how she had known, she replied that those were the children "who perpetually talked in class" (p. 297). This study thus highlights the fact that those children who tend to rely on PS to aid memory also use PS more generally to regulate their behaviour.

Other studies that have discussed the role of subvocal speech in the context of memory development have focused on the phonological similarity effect (PSE). To recap, individuals prone to the PSE show a poorer immediate recall of sequences of words that sound alike than of phonologically dissimilar words (e.g., Baddeley, 1986). Developmentally, adults and older children show a more pronounced PSE than younger children, with children first becoming prone to the PSE at around 6 years of age (e.g., Conrad, 1971; Gathercole, 1997; Gathercole & Hitch, 1993; Longoni & Scalisi, 1994). Within Baddeley and Hitch's (1974) WM model, the PSE is attributed to the way in which the articulatory loop functions as a mechanism for verbal rehearsal and as a phonological input store (see Chapter 1). As well as processing verbally presented material, the rehearsal process in the articulatory loop is employed in order to "recode non-phonological inputs such as printed words or pictures into their phonological form so that they can be held in the phonological store" (Gathercole & Baddeley, 1993, p. 8).

Two studies have indirectly addressed the links between PS and children's susceptibility to the PSE. Hitch et al. (1991) investigated the effects of overt versus covert rehearsal on the PSE in groups of children aged 5 and 10 years. Children were randomly assigned to a silent condition or a condition in which they were allowed to label out loud the to-be-remembered items, which consisted of two sets of drawings: (i) objects whose names were phonologically similar, and (ii) objects whose names were phonologically dissimilar. Hitch et al. (1991) predicted that requiring the 5-year-olds to name out loud the objects would induce the PSE, but that children of this age would not show the PSE under the silent condition since they were too young to use "inner speech" to label the items. In contrast, they predicted that the 10-year-olds would be prone to the PSE in both the silent and overt naming conditions. The results confirmed their hypotheses, and Hitch et al. (1991) explained their results in light of the development of inner speech, and stated that labelling the to-be-remembered items in a visual presentation is "important for younger children where the ability to use inner speech is not fully developed" (p. 228).

Ford and Silber (1994) came to a similar conclusion in their study on children's susceptibility to the PSE between 3 and 11 years. They found that the youngest children in their study (aged 3- to 5-years) benefited most from being able overtly to name the visually presented to-be-remembered items, and the younger children experienced a greater PSE when they named the items than when they performed the task in silence. Ford and Silber (1994) concluded that the dependence on overt speech to facilitate verbal recoding of visual material may decrease "as the child internalises speech and becomes increasingly more able to utilise subvocalisation in cognitive tasks" (p. 173), but the mechanism that underlies this process has not been clearly identified.

All of these studies highlight the role of both vocal and subvocal speech in children's ability to encode and recall visually presented material using the auditory modality. However, all of these studies have assumed that this speech is simply the means via which children go about performing feats of memory, rather than regarding PS as a separate phenomenon that is used more generally by children to regulate their behaviour. Thus, although these previous authors have talked about the PSE with reference to "internalisation of inner speech", none of them has used these terms in the Vygotskian sense of seeing PS as a way-station in the ontogenesis of verbalised thought. On the contrary, these researchers explicitly rejected such an internalisation account of children's use of phonological recoding. For example, Hitch et al. (1991) stated that "any such internalisation process is either non-existent or extremely rapid" (p. 232), and concluded that evidence was in line with the former, that is, that internalisation did not exist. Their grounds for reaching this conclusion were that there could be no lag between children's processing of spoken language and their ability to use inner speech. Since children process language very early in development, but do not appear to use "inner speech" in the context of phonological recoding until considerably later in development, Hitch et al. (1991) maintained that such use of inner speech could not be the result of a gradual process of internalising overt speech. However, as Fernyhough et al. (2002) noted, the fact that the articulatory loop is a necessary prerequisite of language development does not exclude the possibility that children's internalisation of overt speech determines children's spontaneous *use* of the articulatory loop to aid working memory. Fernyhough et al. (2002) therefore concluded that "the Vygotskian position does not have to entail that internalisation *forms* the phonological STM system" (p. 7, original emphasis). In support of such a Vygotskian account, Fernyhough et al. reported a positive correlation between 5- and 6-year-olds' use of

self-regulatory PS and susceptibility to the PSE, although this relation was not independent of children's social speech use.

Hitch et al. (1991) cited additional evidence which they believed discounted a Vygotskian internalisation account of phonological WM development. For example, the word length effect and phonological similarity effect for visually presented materials have been observed in anarthric (Bishop & Robson, 1989, cited in Hitch et al., 1991) and deaf children (Conrad, 1971, cited in Hitch et al., 1991). Anarthric children have experienced partial or complete loss of articulate speech (Reber, 1985), and Hitch et al. (1991) argued that since they "have never been able to speak, they cannot have internalised speech in the sense that is normally understood" (p. 232). Similarly, deaf children will not be able to internalise speech "they have never been able to hear" (Hitch et al., 1991, p. 232). Recall, however, from Chapter 2 that internalisation is considered not to be the simple action of copying external practices into the internal domain; rather, it is seen as a process by which the internal (intrapyschological) plane is *formed* (Frawley, 1997; Leont'Ve, 1981; Wertsch, 1985). Moreover, in the light of Vygotsky's theory, internalisation is understood in terms of different sign systems that regulate social processes (and consequently mediate higher mental functioning), only one of which is verbal language. Thus, different non-verbal sign systems used by anarthric and deaf children could function equally well in internalising overt communication. Since both groups of these children are prone to both the word length effect and the PSE, they clearly use similar forms of articulation in WM tasks as articulate and hearing children, thus showing that they have the same verbal thought processes and mechanisms. Thus, the fact that certain children use "inner speech" during WM tasks yet cannot hear or articulate spoken language does not present a

problem for the Vygotskian internalisation account, since internalisation can proceed via any form of semiotic mediation, not merely that of spoken language.

In summary, the PSE involves the *verbal encoding* of the to-be-remembered items, which signifies the use of inner speech or advanced PS as an aid to memory. At the same time, PS, especially in its advanced form, represents the use of *verbal behaviour* to regulate one's actions in a strategic manner. If one takes a Vygotskian view of the use of subvocal articulation to aid WM performance, one would predict that children who use PS in other contexts should be those who will be most likely to recode visual information phonologically and be most prone to the PSE. This chapter tested this possibility by investigating relations between children's private speech and the phenomenon of the phonological similarity effect. Study 2 thus sought to replicate and extend the findings of Fernyhough et al. (2002) by investigating the links between PS and WM cross-culturally in British and Saudi children. Study 2 is the first cross-cultural study on children's susceptibility to the PSE to attempt to make cultural comparisons between two subtly different cultural groups, rather than comparing schooled and non-schooled, or literate and non-literate groups. Study 2 also investigated the links between PS and phonological WM development in a broader age range of children than the 5- and 6-year-olds involved in Fernyhough et al.'s (2002) study.

Study 2

4.3. Study 2: Aims and Hypotheses

By using the PS data derived from Study 1 (see Chapter 3), Study 2 aimed to achieve the following objectives:

- To determine the universality of the phenomenon of the PSE on memory for pictorial materials by examining it within both British and Saudi children.
- To investigate links between PS and children's WM performance.

- To examine the relation between PS and the PSE.
- To investigate how chronological age and general verbal ability relate to WM performance and the PSE.

The specific hypotheses of Study 2 were as follows:

1. That older children's WM performance will be better than that of younger children.
2. That older children will be more susceptible to the PSE than younger children.
3. That children who are high PS users will show better WM performance than low PS users.
4. That high PS users will be more prone to the PSE than low PS users.

Finally, Study 2 investigated the relative predictive strengths of culture, PS, chronological age and verbal ability on children's WM performance and the PSE.

4.4. Method

4.4.1. Participants

Participants were the same samples of British children ($N = 58$) and Saudi children ($N = 63$) who participated in Study 1 (see Chapter 3, p. 74).

4.4.2. Materials

For both the British and Saudi children, the test stimuli consisted of two sets of eight simple line drawings of common objects, mounted on cards of 35 cm by 25 cm in size. For the British children, the pictures were taken from a selection of early word books published by *Ladybird Books*; all object names were high-frequency concrete nouns that

were familiar to the children. One set consisted of objects with phonologically similar names (*cat, car, clown, cow, clock, cake, keys, cot*), and the other consisted of objects with phonologically dissimilar names (*house, dog, lamp, glass, tree, flag, shoes, ball*) (see Appendix 7).

Preparation of comparable sets of pictures suitable for the Saudi children involved four stages:

- a. As many Arabic words as possible that were monosyllabic², phonologically dissimilar and similar, and that were the names of different objects familiar to young children were collected. This process was conducted by referring to kindergarten and preliminary reading books³ as sources of information.
- b. Specialists in Linguistics and Arabic Phonology in Britain and in Saudi Arabia were then consulted⁴ on the linguistic structure of the words, especially those words that were phonologically similar.
- c. The selected sets of pictures were then piloted on a small group (N = 6) of children aged between 4 and 8 years in order to establish whether any of the words were poorly understood by this age group. These children were not part of the Saudi sample of children (N = 63), who participated in the study.
- d. Two sets of eight Arabic phonologically similar (*pencil, boat, monkey, cat, cage, foot, train, moon*) and dissimilar (*scissors, eye, bell, duck, box, horse, clock, apple*), pictures were, then, selected. The pictures were simple line drawings of

² The requirement that the to-be-remembered names were of one syllable was not always met because most Arabic monosyllabic words have abstract meanings, unfamiliar to children of younger ages.

³ A selection of books published by Dar Al-manhal For Publishing & Distributing, Amman, Jordan.

⁴ These were Dr. J. Dickins from the Centre for Middle Eastern and Islamic Studies at the University of Durham, and some of the Postgraduate Students at the Centre, as well as specialists in the Departments of Psychology and Arabic Language at Al-Imam Muhammad Ibn Saud University (IMISU) in Saudi Arabia.

common objects (for the literal translation of the pictures' names, see Appendix 8).

4.4.3. Procedure

The procedure used for the Saudi and British children was identical. Testing of phonological working memory took place one week after children had completed the three sessions of PS testing. Children's performance on phonological working memory was examined on two separate occasions, each approximately one week apart: one for testing phonological similarity and the other for testing phonological dissimilarity. The participating children were randomly assigned either to start with the similarity or the dissimilarity test.

The British children were tested individually in the school library, with the child sitting at a table facing the experimenter. The Saudi children were tested in the school theatre, again sitting at a table facing the experimenter. All the cards were first laid out on the table and each child was asked to name them one by one. None of the children had any difficulty in naming all of the cards.

The experimenter then explained the memory task by means of a demonstration. The experimenter told the child that the point of the game was to try to remember the objects cards and recall them in the order in which they had been presented. The experimenter also explained that children had to be silent while they conducted the task, and had to place a finger over their lips in order to ensure silence. This procedure was used to control for the facilitatory effect of overt naming on young children's use of phonological recoding during a visually presented recall task (e.g., Ford & Silber, 1994). The experimenter then silently looked at series of two pictures and repeated them

back in correct order to demonstrate what was required. Children were told that they could say “don’t know” in place of an item whose position they knew, but whose name they had forgotten. The child was then given three two-word lists as practice, emphasising silence and saying the items in the correct order. These practice trials ensured that children were able to do the task in silence and knew what kind of response was required of them; none of the children had any problems with the practice trials.

The test trials were conducted immediately after the practice trials. The task proper for each of the phonological dissimilarity and phonological similarity consisted of 10 trials, each of which involved the visual presentation of three picture cards. Each picture was held in front of the child for 2 seconds, and then placed face downwards on the table. After all three pictures had been presented, the child was asked to recall the pictures in order. The child was given 30 seconds to recall the list. The same ten three-picture combinations were used for all children, but presentation of the items within the phonologically similar and dissimilar sets was randomised. The order of presentation of the similar and dissimilar sets of items was randomised and counterbalanced. All sessions were videotaped for later scoring and analysis.

Scoring for each of the phonological dissimilarity and phonological similarity was performed by giving 6 marks for the correct answer, 2 for each remembered item, or 1 if the child remembered it but in the wrong order, or 0 for not remembering. Each child received a score out of a total of 60 for each of the similar and dissimilar sets of items.

Relations between children’s scores for the phonologically similar items (PSI) and phonologically dissimilar items (PDI) and their use of PS during *Session I* of the Tower of London task (see Chapter 3, pages 88, and 91) were then investigated. The *Session I*

PS data were used rather than doing separate analyses with *Session I* and *Session II* data due to the fact that there were positive correlations between PS and its different types between the two testing sessions, showing that use of the different indices of PS was highly consistent over time (see Chapter 3, p. 85).

4.4.4. Results

The Results section is presented in three parts. First, relations between PS and children's WM are considered in the British sample of children; second these relations are considered in the Saudi sample of children; and third, cross-cultural comparisons are made between the British and Saudi children's WM performance.

4.4.4.1. Results for the British Children

The first hypothesis concerned age-related changes in children's WM performance. Table 4.1 shows the means and standard deviations for the PDI and PSI scores for the three different age groups. A one way ANOVA showed significant differences between the three age groups on recall of the PDI: $F(2, 55) = 8.75, p < 0.01$, two-tailed, and on recall of the PSI: $F(2, 55) = 11.19, p < 0.01$, two-tailed. Post-hoc comparisons using the Tukey HSD test revealed significant mean differences in terms of recalling the PDI between the youngest group and both the middle age group ($- 6.77, p < 0.05$, two-tailed) and oldest group ($- 11.57, p < 0.01$, two-tailed), but the differences between the middle and oldest groups were non-significant. Thus, the children in the two older age groups remembered the PDI significantly better than the children in the youngest age group, but there was no significant increase in the memory performance of the oldest children compared with the middle group children. As for remembering the PSI, there were no significant differences between youngest and middle age groups ($- 5.38$). The differences between the youngest and oldest groups in terms of remembering the PSI

were significant ($-12.18, p < 0.001$, two tailed) as were the differences between the middle and oldest groups ($- 6.80, p < 0.05$, two-tailed). Thus, children's memory for the PSI did not significantly increase from the youngest to the middle age group, but the oldest children recalled the PSI significantly better than both the youngest and the middle age group children.

Table 4.1: Means and standard deviations of the recall of PDI and PSI for each age group in the British children (N = 58).

Groups	Phonological Dissimilarity	Phonological Similarity
G1 (4.5-5.5 yrs, N = 18)	42.83 (11.29)	39.67 (11.18)
G2 (5.6-6.5 yrs, N = 20)	49.60 (8.05)	45.05 (7.12)
G3 (6.6-7.8 yrs, N = 20)	54.40 (5.64)	51.85 (4.60)

(Figures in brackets are s.d.)

The second hypothesis concerned age-related changes in children's susceptibility to the PSE. In order to test this hypothesis, a $3(\text{Age-group}) \times 2(\text{PDI-PSI})$ mixed design analysis of variance (ANOVA) was conducted, where the PDI and PSI were designated as within-subject factors, and these were repeated at the three age levels. The test revealed a significant main effect of phonological similarity ($F[1, 55] = 14.13, p < 0.01$, two-tailed) as well as a significant main effect of age ($F [2, 55] = 11.90, p < 0.01$, two-tailed). The interaction between phonemic similarity and age was, however, non significant: ($F [2, 55] = 0.44, "n.s.",$ two-tailed).

In order to find out the age at which children become susceptible to the phonological properties of the to-be-remembered items, comparison between recalling of the PDI and the PSI was made within each age group by using a paired-samples t-test. For the

youngest group, there was no difference between their memory of the PDI and PSI: $t(17) = 1.66$, n.s. For the middle group, memory for the PDI was significantly better than the PSI: $t(19) = 2.62$, $p < 0.025$, and this pattern was also seen in the oldest group: $t(19) = 2.55$, $p < 0.025$. These results thus support the second hypothesis, and are also in line with those of others studies that have shown that children younger than age 6 are not poorer at recalling phonologically similar items (e.g., Conrad, 1971).

Hypothesis 3 stated that children who were high PS users would show better WM performance than low PS users, and Hypothesis 4 stated that the high PS users would be more prone to the PSE than the low PS users. In order to test these two hypotheses, children were classified into high ($N = 31$) and low ($N = 27$) PS users according to their employment of the more advanced types of private speech (see Chapter 3, pp. 99-100). Recall from Chapter 3 that there were no differences between the high and low PS users with respect to chronological age, or in terms of general verbal ability as indexed by their BPVS II scores. Table 4.2 shows the mean scores of the PDI and PSI items for the high and low PS users.

Table 4.2: Means and standard deviations of PDI and PSI recalled by the high and the low PS users (British children, N = 58).

High PS Users		Low PS Users	
Dissimilar	Similar	Dissimilar	Similar
52.58(6.78)	48.16(6.99)	45.22(10.95)	42.93(10.83)

(Figures in brackets are s.d.)

In order to determine any possible effect of the high and the low deployment of the more advanced types of PS on the phenomenon of phonological similarity, these data were entered into a 2(high-low PS) \times 2(PDI-PSI) mixed design ANOVA, where phonological similarity was designated as a within-subject factor. The test revealed a significant main effect of phonological similarity ($F[1, 56] = 13.94$, $p < 0.01$, two-

tailed), as well as a significant main effect of high versus low use of the more sophisticated types of PS: $F(1, 56) = 8.32, p < 0.01$, two-tailed. The interaction between the phonemic similarity and the high and the low usage of PS was non-significant: $F(1, 56) = 1.39$, n.s. Thus, the dissimilar items were remembered significantly better than the similar items, and high PS users recalled significantly more than low PS users. Figure 4.1 illustrates the relation between the more advanced types of PS and the phonological similarity.

Figure 4.1: Relation between the high and the low usage of PS and the phonemic similarity in the British children (N = 58).

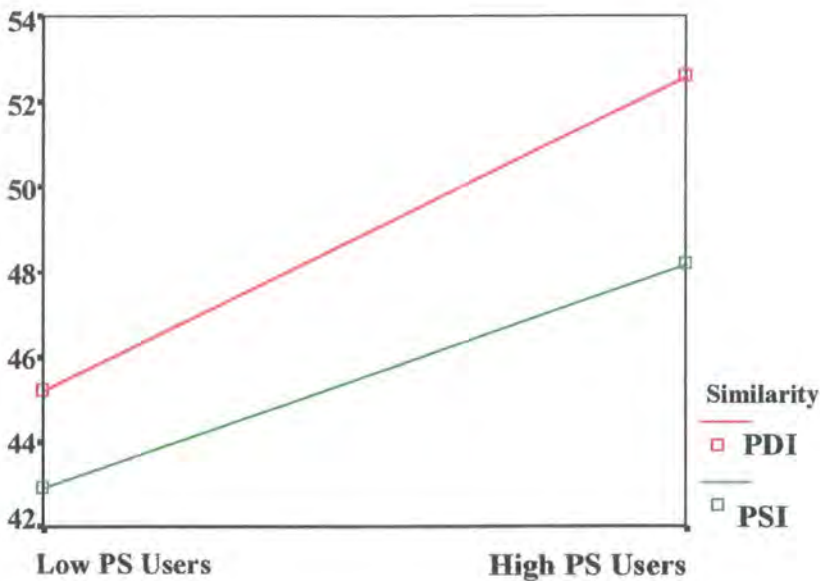


Figure 4.1 indicates that the difference between the means of phonologically similar and dissimilar words recalled tends to increase as a result of increasing the use of the more advanced types of PS. In other words, these results suggest that the effect of similarity might be seen in terms of the degree to which the more advanced types of private speech were utilised.

Relations between children's use of PS and their recall of phonologically similar and dissimilar items were also investigated with correlational analyses using PS as a continuous variable. Table 4.3 shows the correlations between the different types of speech and children's recall of the PDI and PSI.

Table 4.3: Correlations between scores of recalling PDI and PSI and frequent use of PS and its levels among the British children (N = 58).

Recall of Phonologically Dissimilar & Similar Items	Type of Speech					
	PS1	PS2	PS3	TPS	PS2&PS3	SS
Phonological Dissimilarity	- 0.24	0.04	0.35 [†]	0.17	0.29*	- 0.30**
Phonological Similarity	- 0.19	- 0.10	0.30**	0.07	0.17	- 0.27*

*p < .05, **p < .025, [†]p < .01

As Table 4.3 shows, children's use of the most sophisticated form of PS (PS3) was associated with better recall of both the PDI and the PSI. Children's use of self-regulatory PS (PS2 + PS3) was also positively correlated with recall of the PDI. In contrast, children's use of social speech (SS) was negatively correlated with recall of both the PDI and PSI. Table 4.4 shows these same relations between PS and WM performance when children's chronological age, verbal ability and use of social speech had been partialled out.

Table 4.4: Partial correlations between scores of recalling PDI and PSI and frequency of use of PS and its levels among the British children (N = 58).

Phonologically Dissimilar & Similar Items	Private speech and its levels				
	PS1	PS2	PS3	TPS	PS2&PS3
Phonological Dissimilarity	0.15	0.15	0.31*	0.26	0.31*
Phonological Similarity	0.05	- 0.02	0.22	0.13	0.14

*p < .025.

As Table 4.4 shows, after controlling for these variables, children's use of PS3 was positively correlated with their recall of the PDI, but controlling for age, verbal ability and social speech made the relation between PS3 and recall of the PSI non-significant. The relation between children's recall of the PDI and self-regulatory PS (PS2 + PS3) remained significant after age, verbal ability and social speech had been controlled for. In addition, partialling out these factors resulted in the relation between total PS and recall of the PDI approaching significance ($p = .06$). Thus, even after age, verbal ability and use of social speech had been taken into account, children who were more likely to use sophisticated PS in performing a cognitive task were better at recalling phonologically dissimilar items, but no relations were found between use of sophisticated PS and recall of similar items.

4.4.4.2. Results for the Saudi Children

Hypothesis 1 concerned age-related changes in children's WM performance. Table 4.5 shows the mean scores for the PDI and PSI for the three age groups in the Saudi sample of children. A one-way ANOVA test was carried out to examine differences between the three age groups on their recall of each of the PDI and the PSI. Significant differences were found between the three age groups on recall of the PDI: $F(2, 60) = 25.58, p < 0.001$, two-tailed, and on recall of the PSI: $F(2, 60) = 30.31, p < 0.001$, two-tailed.

Table 4.5: Means and standard deviations of the recall of PDI and PSI for each age group among the Saudi sample.

Groups	Phonological Dissimilarity	Phonological Similarity
G1 (4.5-6.0 yrs, N = 21)	44.19 (8.59)	41.76 (6.46)
G2 (6.1-7.0 yrs, N = 22)	54.59 (4.37)	51.86 (4.16)
G3 (7.1-8.1 yrs, N = 20)	56.60 (3.90)	53.65 (5.11)

(Figures in brackets are s.d.)

Post hoc comparisons using the Tukey HSD test showed that, for remembering the PDI, there were significant differences between the youngest group and both the middle age group ($-10.40, p < 0.01$, two-tailed) and oldest group ($-12.41, p < 0.05$, two-tailed), but the differences between the middle and oldest groups were non-significant. Likewise, for remembering the PSI, post hoc comparisons showed significant differences between the youngest group and both the middle ($-10.10, p < 0.01$, two-tailed) and oldest age groups ($-11.89, p < 0.01$, two-tailed), but the differences between the middle and oldest groups were non-significant. Thus, the oldest children and the middle age group of children recalled both the PDI and PSI significantly better than the youngest children, but there were no differences in recall of either PDI or PSI between the middle and oldest age groups.

The second hypothesis concerned age differences in children's susceptibility to the PSE. In order to test this hypothesis a $3(\text{Age-group}) \times 2(\text{PDI-PSI})$ mixed design ANOVA was used to investigate further the relation between age and phonological similarity. A significant main effect was found for phonological similarity ($F[1, 60] = 15.87, p < 0.01$, two tailed), as well as a highly significant main effect of age: $F(2, 60) = 35.67, p < 0.001$, two-tailed. The interaction between the phonemic similarity and age was, however, non-significant: $F(2, 60) = 0.05, "n.s."$.

In order to find out the age at which children become susceptible to the phonological properties of the to-be-remembered items in the Saudi sample, comparison between recalling of the PDI and the PSI was made within each age group by using a paired-samples t-test. For the youngest group the differences between recall of the PDI and the PSI were non-significant: $t(20) = 1.86, n.s.$ In contrast, significant differences between recall of the PDI and the PSI were found among the middle age group: $t(21) = 2.40, p <$

0.05, two-tailed, and among the older group: $t(19) = 2.79, p < 0.01$, two-tailed. Thus, although the youngest children showed no difference in the recall of the PDI and PSI, the older two age groups recalled the PDI significantly better than the PSI.

The third hypothesis stated that high PS users would show better WM performance than low PS users, and the fourth hypothesis stated that the high PS users would be more prone to the PSE. In order to test these two hypotheses, the children were classified as high ($N = 34$) and low ($N = 29$) private speech users. (see Chapter 3, pp. 99-100). Recall from Chapter 3 that there were no significant differences between the high and low PS users with respect to chronological age or general verbal ability. Table 4.6 shows the means and standard deviations for recall of the PDI and PSI for the high and the low PS users.

Table 4.6: Means and standard deviations of PDI and PSI recalled by the Saudi high and low PS users (Saudi children, N = 63).

High PS Users		Low PS Users	
Dissimilar	Similar	Dissimilar	Similar
53.89(5.35)	50.35(6.48)	49.28(9.89)	47.55(8.24)

(Figures in brackets are s.d.)

These data were then entered into a 2(high-low PS) \times 2(PDI-PSI) mixed design ANOVA. The test indicated a significant main effect of phonological similarity: $F(1, 61) = 15.61, p < 0.01$, two-tailed, as well as a significant main effect of high versus low use of the more sophisticated types of PS: $F(1, 61) = 4.28, p < 0.05$, two-tailed. The interaction between the phonological similarity and the high/low usage of PS was non significant: $F(1, 61) = 1.84$, n.s. Thus, the dissimilar items were recalled significantly better than the similar items, and the high PS users recalled significantly more than the

low PS users. Figure 4.2 below illustrates the relation between the more advanced types of PS and phonological similarity.

Figure 4.2: Relation between the high/low usage of PS and phonological similarity (Saudi children, N = 63).

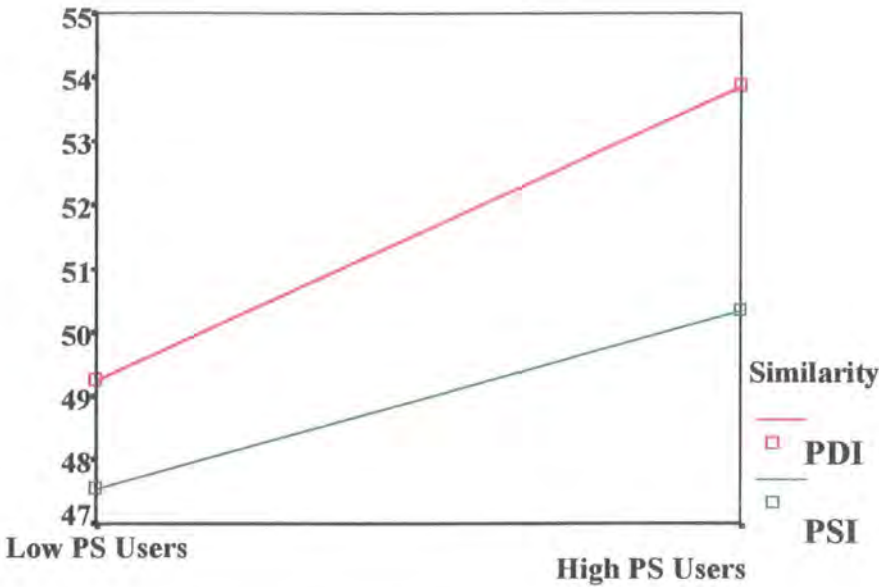


Figure 4.2 shows that the difference between the means of phonologically similar and dissimilar items recalled tends to increase as a result of the deployment of more advanced types of PS.

As with the British sample, relations between PS use and WM performance were further investigated using correlational analyses. Table 4.7 shows the correlation coefficients for the relations between recall of the PDI and PSI and the different types of speech.

Table 4.7: Correlations between scores of recalling PDI and PSI and frequent use of PS and its levels among the Saudi children (N = 63).

Recall of Phonologically Dissimilar & Similar Items	Type of Speech					
	PS1	PS2	PS3	TPS	PS2&PS3	SS
Phonological Dissimilarity	- 0.07	0.20	0.27*	0.27*	0.29*	- 0.34†
Phonological Similarity	- 0.09	0.07	0.28*	0.18	0.20	- 0.30**

*p < .05, **p < .025, †p < .01

As Table 4.7 shows, recall of both the PDI and PSI was positively associated with children's use of the most sophisticated type of PS (PS3). Recall of the PDI was positively correlated with children's total PS use and their use of self-regulatory PS (PS2 + PS3). In contrast, children's recall of the PDI and PSI was negatively correlated with social speech (SS). These correlational analyses were then recomputed partialling out chronological age, verbal ability and children's use of social speech. These partial correlation coefficients are shown in Table 4.8. As Table 4.8 shows, after age, verbal ability and use of social speech had been controlled for, children's use of PS3 was still positively correlated with their recall of both the PDI and PSI. The relations between total PS use and self-regulatory PS use and recall of the PDI also remained significant.

Table 4.8: Partial correlations between scores of recalling PDI and PSI and frequent use of PS and its levels among the Saudi children (N = 63).

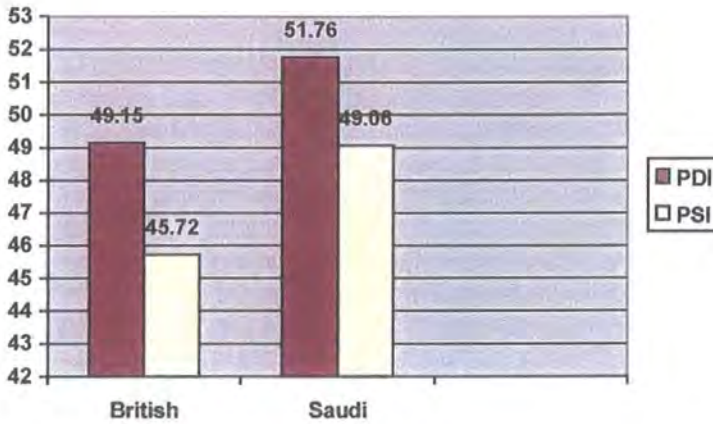
Phonologically Dissimilar & Similar Items	Type of Speech				
	PS1	PS2	PS3	TPS	PS2&PS3
Phonological Dissimilarity	0.01	0.21	0.28*	0.30**	0.30**
Phonological Similarity	- 0.03	-0.08	0.28*	0.07	0.08

*p < .05, **p < .025 two-tailed

4.4.4.3. Cross-Cultural Comparisons of Children's WM Performance

Study 2 also sought to investigate the effect of culture on children's WM performance and the PSE. Figure 4.3 shows the mean PDI and PSI scores of the British and Saudi children.

Figure 4.3: Means of recall of the PDI and the PSI among the British and the Saudi children.



There was no difference between the British and Saudi children's recall of the PDI ($t[119] = 1.62$, n.s.), but the Saudi children recalled significantly more PSI than their British counterparts: $t(119) = 2.20$, $p < .05$, two-tailed. In order to further examine the effect of culture on the PSE, a $2(\text{culture}) \times 2(\text{similarity})$ analysis of variance (ANOVA) was used. The ANOVA test showed no significant effect of culture: $F(1, 119) = 2.63$, n.s. The effect of similarity was significant: $F(1, 119) = 4.82$, $p < 0.05$. The interaction between culture and similarity was non-significant: $F(1, 119) = 0.44$, n.s.

4.4.4.4. Overall Predictors of Children's Recall of Phonologically Similar and Dissimilar Items

Regression analyses were conducted in order to investigate which factors were independent predictors of children's recall of the PDI and PSI. For each regression, five

independent variables were included in the regression equation: chronological age, verbal ability, *Session I* social speech, culture (Saudi versus British) and PS use (high versus low). Blockwise entry method was used where these variables were entered hierarchically (i.e. one by one), and the order of entry was as shown in tables 4.9 and 4.10 below. Table 4.9 summarises the results of the regression analysis using recall of the PDI as the dependent variable, and Table 4.10 summarises the results of the regression analysis using recall of the PSI as the dependent variable.

Table 4.9: Results of the Multiple Regression on Children's Recall of Phonologically Dissimilar Items (the British & the Saudi children, N = 121).

Independent Variables	β	t	R ² -change
Age	0.38	4.67**	0.11
Verbal ability	0.19	2.52*	0.03
Social Speech	-0.18	-2.30*	0.03
Culture	0.08	1.11	0.01
High vs. Low PS	0.27	3.62**	0.07

*p < .025, **p < .001

As Table 4.9 shows, the best predictor of children's recall of the PDI was chronological age, followed by high versus low PS use, verbal ability and social speech. Children who were older, more verbally able and who were high PS users recalled more PDI, but note that the direction of effect for social speech was in the opposite direction, with greater use of social speech relating to poorer PDI recall. Age accounted for 11% of the variance in PDI recall, high versus low PS use for 7% of its variance, with verbal ability and social speech use each accounting for 3% of its variance.

Table 4.10: Results of the Multiple Regression on Children's Recall of Phonologically Similar Items (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.49	6.21**	0.19
Verbal ability	0.22	3.07*	0.05
Social Speech	-0.07	-0.96	0.00
Culture	0.11	1.49	0.01
High vs. Low PS	0.13	1.77	0.02

* $p < .005$, ** $p < .001$

As Table 4.10 shows, chronological age was the best predictor of children's recall of the PSI, followed by verbal ability. The value for high versus low PS use also approached significance ($p = .08$). Thus, older and more verbally able children recalled more PSI, and there was a trend for high PS users to perform better on the PSI. Age accounted for 19% of the variance in PSI, with verbal ability accounting for 5% of its variance and PS use 2%.

Children's susceptibility to the PSE is typically investigated by comparing their performance on the PDI and PSI (e.g., Ford & Silber, 1994; Hitch et al., 1991; Palmer, 2000), as done in the analyses reported above. However, such a comparison would not allow for independent predictors of susceptibility to be investigated using a regression analysis. Consequently, a continuous measure of susceptibility to the PSE was calculated by subtracting children's mean scores for the PSI from those for the PDI. A positive value represented superior recall on the PDI compared with the PSI, thus indicating susceptibility to the PSE. These PSE scores were then used as the dependent variable in a third regression. In this regression analysis blockwise entry method was

also used where chronological age, verbal ability, social speech, culture and high vs. low PS use were entered hierarchically (i.e. one by one), and the order of entry was as shown in Table 4.11 that summarises the results of this regression.

Table 4.11: Results of the Multiple Regression on Children's Susceptibility to the Phonological Similarity Effect (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	-0.13	-1.30	0.01
Verbal ability	-0.05	-0.47	0.00
Social Speech	-0.16	-1.57	0.02
Culture	0.05	0.38	0.00
High vs. Low PS	0.21	2.17*	0.04

*p < .05

As Table 4.11 shows, PS use was the only predictor of children's susceptibility to the PSE, with high PS users attaining higher PSE scores, thus demonstrating greater susceptibility to the PSE. PS use accounted for 4% of the variance in children's PSE scores.

4.4.5. Discussion

The results of Study 2 showed the expected age-related increase in children's working memory performance and in their susceptibility to the PSE in both the British and Saudi samples. With respect to recall of the phonologically dissimilar items, in both the British and Saudi children, there was a significant increase in recall between the youngest and middle age groups, but no differences between the middle and oldest age groups. The pattern of findings for recall of the phonologically similar items differed

slightly between cultures. For the British children, there was no significant increase in recall from the youngest to the middle age group, but the oldest children recalled the PSI significantly better than both of the younger groups. For the Saudi children, the age-related pattern of recall for the PSI was identical to that for the PDI, that is, the youngest age group were significantly worse than both of the older groups, but there was no difference in recall between the middle and oldest age groups. In both cultures, only the two older age groups were affected by the phonological similarity of the to-be-remembered items, recalling the PSI significantly worse than the PDI. The youngest age group in both the British and Saudi samples were not affected by phonological similarity. This shift in children's susceptibility to the PSE at around 6 years of age is in line with the findings of other studies (e.g., Conrad, 1971). The findings of Study 2 are thus the first to show cross-cultural continuity in the age at which children become susceptible to the phonological properties of the to-be-remembered items.

Previous research has proposed that this age-related shift is due to children's developing tendency to recode visually presented material phonologically and to use subvocal rehearsal to aid recall. In Study 2, the possibility that children's general tendency to use PS while performing a cognitive task might be responsible for the shift to phonological recoding and use of subvocal rehearsal was tested. Some support was found for this suggestion in that only children who were designated as high PS users recalled the PSI significantly worse than the PDI. The low PS users showed no difference in their recall of the PDI and PSI. These differences were found in both the British and Saudi children. Further confirmation for the potential role of the most sophisticated forms of PS in children's ability to phonologically recode visual material and to use the articulatory loop for subvocal rehearsal came from the finding that overall frequency scores for PS3 were positively correlated with children's recall of the PDI in both cultures, with Saudi

children also showing a positive correlation between use of PS3 and recall of the PSI. In these correlations, children's chronological age, verbal ability and use of social speech were partialled out.

Finally, the WM performance of the British and Saudi children was compared using the whole sample of children. Although there were no cultural differences in children's recall of the PDI, the Saudi children recalled the PSI significantly better than the British children. Regression analyses were conducted to establish which factors were independent predictors of children's WM performance. With respect to recall of the PDI, chronological age was found to be the best predictor, followed by high versus low use of PS. Children's verbal ability was found to be the third best predictor of PDI recall, and use of social speech was also a significant predictor, although its effects were in the opposite direction to those of the other variables. Thus, recall of the PDI was predicted by older age, high use of PS during a cognitive task, higher verbal ability, and lower use of social speech during a cognitive task. Children's cultural group was not a significant predictor of their PDI recall.

With respect to the recall of PSI, chronological age was found to be the best predictor, followed by verbal ability. There was a non-significant trend ($p = .08$) for high versus low PS to predict recall of PSI. Thus, children recalled the PSI better if they were older and of higher verbal ability, and there was a trend for children who were high PS users to recall the PSI better. Children's cultural group, verbal ability and their use of social speech were not related to their PSI recall.

Finally, a regression analysis was conducted to establish predictors of children's susceptibility to the PSE, using scores calculated by taking individual children's PSI

scores away from their PDI scores. The regression showed that the only significant predictor of children's PSE scores was high versus low use of PS. None of the other variables (age, verbal ability, cultural group, social speech use) predicted PSE scores. Thus, children who were high PS users during a cognitive task were more prone to the PSE than those who were low PS users.

Perhaps the most striking thing about the results of Study 2 is the fact that culture had so little impact on children's WM performance. The only difference between the groups was in Saudi children's superior recall of the phonologically similar items, although the regression analysis did not identify culture as an independent predictor of PSI recall. Indeed, in none of the regression analyses was culture identified as an independent predictor of WM. Study 2 is thus the first to demonstrate cross-cultural stability and consistency in children's WM development.

In contrast to the largely null effects of culture on WM performance, children's PS use was found to be an important predictor of WM performance both within and across cultures. Positive associations in both the British and Saudi groups were found between children's use of the most sophisticated type of PS (defined as external manifestations of inner speech) and WM performance even after age, verbal ability and use of social speech had been taken into account. In both cultural groups, the high PS users were found to have better recall than the low PS users, regardless of the phonological qualities of the to-be-remembered stimuli. Moreover, the regression analyses showed that high versus low PS use was an independent predictor of children's recall of the PDI and the PSI (although this value just failed to reach statistical significance), and PS use was the only predictor of children's susceptibility to the PSE. These results show that, despite the fact that high PS users are prone to the PSE, whereas low PS users are not,

children who frequently use PS to regulate their behaviour during a cognitive task are better overall at WM tasks than their low PS use counterparts. This finding highlights the link between PS use and subvocal rehearsal using the articulatory loop.

One suggestion that arises from the results of Study 2 is that any effect of culture on WM performance may function via children's PS use. As the results of Study 1 showed, there were considerable culture variations in children's PS use, particularly use of Level 3 PS, the type of PS that is most useful during use of the articulatory loop to aid WM recall. The British children used significantly more PS3 than their Saudi counterparts. However, within both cultures, certain children were identified who relied on PS to accomplish a cognitive task (the high PS users), and there were no significant differences in the mean frequency of self-regulatory PS use between the British and Saudi high PS users. As Study 2 showed, it was these high PS users, regardless of culture, who performed better on the WM tasks. Thus, culture *per se* may not have any direct effect on WM performance; rather, its influence on children's PS development may be the route via which culture indirectly relates to WM. Even though the Saudi children's educational system focuses heavily on memorisation and recall of information for examinations, this cultural difference itself appeared to have little effect on children's WM performance.

In summary, the findings of Study 2 go against the conclusions of researchers such as Hitch et al. (1991) who argued against a Vygotskian account of phonological WM development in terms of the use of internalised inner speech. Study 2's findings are in line with those of Fernyhough et al. (2002), although the results of the present study show a considerably stronger link between PS and phonological WM than that identified by Fernyhough et al. The results are also consistent with those of Flavell et al.

(1966), who identified a link between sophisticated PS use and superior WM performance. Study 2 also formalised the link between *general* use of PS to regulate one's behaviour and WM performance that was anecdotally identified by Flavell et al. (1966). Recall that in this earlier study, the children's teacher accurately predicted those children who had relied on subvocal rehearsal to do the task on the basis of these children's use of language to regulate their behaviour during everyday classroom activities. Study 2 obtained objective measures of children's use of PS during a cognitive task, and found similar links between this speech and WM performance.

4.4.6. Conclusion

Study 2 has found evidence for a positive association between PS and WM performance, and also identified that children who were high PS users were more susceptible to the PSE. These findings thus highlight links between PS and children's use of the articulatory loop for subvocal rehearsal to aid WM recall.

As indicated in the introductory chapters, the theoretical framework for understanding links between inner speech and WM is based on describing the phonological store as if it were an inner ear containing materials recently heard or subvocalised by subvocal rehearsal. Subvocal rehearsal has been considered to be an inner voice or speech (Smith et al., 1992). Internal activity normally carried out by the subvocal rehearsal is verbal in nature and aims to refresh the contents of the phonological store (Baddeley, 1986). Vygotsky's interest in studying PS was based on an attempt to discover the verbal nature of inner speech, which led him to speculate on the dialogic character of inner speech. As indicated in Chapter 2, PS in Vygotsky's account represents a transitional stage between social speech and inner speech, whereby PS "is actually an intermediate stage leading to inner speech" (Vygotsky, 1999, p. 32). Thus, PS is seen as an active

mechanism in the internalisation of thinking from its audible (external) forms (the different types of PS) into inner speech (thinking).

If PS plays an important role in performance on executive planning and WM tasks across different cultures (as the results of Studies 1 and 2 have shown), one would imagine that PS will also play an important role in other areas of cognitive development. This suggestion was tested in the following chapter in relation to children's autobiographical memory. This is an interesting area, since researchers have already identified the influences of culture and family interaction and children's ability to recall memories from their own lives. Consequently, Vygotskian account of memory development has considerably greater currency in the autobiographical literature than in that on WM. The main aim of Study 3 was to test the possibility that these social and cultural effects on autobiographical memory might function via children's use of PS, as Study 2 suggested was the case for WM performance.

Private Speech and Remembering (2): Autobiographical Memory

5.1. Introduction

The results reported in Chapter 4 showed that PS contributed unique variance to children's short term memory for visually presented material. In particular, high versus low PS use was the only independent predictor of children's susceptibility to the PSE, with high PS users showing comparatively poorer recall of phonologically similar than of phonologically dissimilar items. In contrast, there was no significant difference between the recall of phonologically similar and dissimilar items in the low PS users. This difference was seen in both the British and Saudi children. At the same time, the overall performance of recalling the sequences of the pictures (both phonologically similar and dissimilar) was better among the high PS users than the low PS users, suggesting that the regulating capacity inherent in private speech enhances strategic remembering. One aim of Chapter 5 is to establish whether PS use has similar links with the development of another type of memory: autobiographical memory (AM).

Since PS serves a self-regulatory function, there are principled reasons to propose that individual differences in children's PS use may relate to their AM development. Moreover, the fact that PS is assumed to play a crucial role in the transformation of social processes (interpsychological functions) into intrapsychological processes (e.g., Vygotsky, 1978) provides further reason for proposing links with AM. For example, several researchers have identified the functional significance of language in AM (Pillemer & White, 1989; Hudson, 1990; Nelson, 1993a, 1993c; Nelson & Fivush,

2000). The importance of language in AM is seen through social sharing of memories, such as in parent-child conversations about the past, that are assumed to contribute to the structure and development of the child's internal (mental) representations of memory by means of internalisation. In addition to learning the appropriate cultural and social ways of reporting autobiographical memories in an organised narrative style, the child also comes to create an independent self-reminding capacity based on the development of an internal language of memory (Nelson, 1993a, 1993c; Nelson & Fivush, 2000). From a developmental point of view, both the external use of language (social sharing of memories) and the internal use of language (verbal reinstatement to oneself) are believed to contribute to the transformation of early episodic memories into a long lasting AM system (Nelson & Fivush, 2000). Before the proposed links between culture, PS use and AM can be outlined further, it is necessary to provide some background on the general area of AM research.

5.2. Autobiographical Memory: General Theoretical Background

Autobiographical memory refers to the type of long-term remembering that deals with retrieving personal experiences and events from the past. AM is considered of significant interest to memory researchers "because it constitutes a major crossroads in human cognition where considerations relating to the self, emotion, goals and personal meanings, all intersect" (Conway & Rubin, 1993, p. 103).

Although Tulving's (1972/1983) distinction between two types of memory – semantic and episodic – is the primary theoretical framework that has contributed to the understanding of the nature and structure of AM (e.g., Bauer, 1993; Cohen, 1993), there is no specific theory or model that provides a comprehensive account of AM (Conway, 1990; Anderson & Conway, 1997). This might be due to the fact that AM is such a

broad topic that can be approached from many different angles (Rubin, 1986, 1998). Tulving (1983) stated that “episodic memory is concerned with unique, concrete, personal experiences dated in the rememberer’s past; semantic memory refers to a person’s abstract, timeless knowledge of the world” (preface). Thus, semantic memory contains an individual’s general knowledge about different facts and information about the world, whereas episodic memory consists of an individual’s specific experiences recalled from the past with special emphasis on time and place. Consequently, memory researchers have normally treated AM as a special subclass of episodic memory (e.g., Brewer, 1986, Nelson, 1993c, Thompson, Skowronski, Larsen & Betz, 1996). This chapter begins with a brief review of these different approaches to the separate components of episodic and autobiographical memory, although the major focus of the chapter is AM development.

Some researchers have viewed AM as a highly structured system for representing knowledge (Anderson & Conway, 1997; Brewer, 1986; Conway & Rubin, 1993). Brewer (1986) defined AM as “memory for information related to the self” (p. 26) that was organised in terms of the conditions at acquisition: whether events were unique or repeated, whether the content was personal or depersonalised, and so on. Brewer (1986) identified four types of AM: (i) single personal memories, (ii) generic personal memories, (iii) autobiographical facts, and (iv) the self-schema. In Brewer’s account, single personal memories are distinguished from generic personal memories on the basis of the uniqueness, consequentiality, unexpectedness and emotionality of the event, factors that contribute to whether the specific event is well or poorly recalled. Personal events that score highly on these characteristics are likely to be remembered well, and constitute a single personal memory, whereas events that score less well are likely to become amalgamated into generic personal memories. Thus, “single exposures to an

event lead to personal memories, whereas multiple exposures can lead to generic personal memories” (Brewer, 1986, p. 45). Personal memories are normally accompanied by detailed mental images whereas the mental images that correspond to generic personal memories are of general nature. Autobiographical facts in Brewer’s (1986) account involve retrieving different experiences and events of real-life without any mental images attached to them. Single and generic personal memories as well as autobiographical facts are organised into a complex knowledge system that Brewer (1986) termed the self-schema.

Conway and Rubin (1993) referred to three levels of structure within the autobiographical knowledge base that have been identified by several researchers (e.g., Barsalou, 1988; Linton, 1986; Schooler & Herman, 1992). Conway and Rubin (1993) defined these three levels as *lifetime periods*, *general events* and *event specific knowledge*. Lifetime periods represent a general or abstract level of autobiographical knowledge that includes various themes relating to specific time periods. This level refers to “lengthy periods of time, typically measured in years, and represents the goals, plans, and themes of the self during particular periods” (Anderson & Conway, 1997, p. 241). Operationally, lifetime periods can be described as “extended periods in a person’s autobiography such as *when I lived with “X”*, *when I worked at “Y”*, *when I was at secondary school*, and so forth” that serve as effective cues to autobiographical retrieving (Conway & Rubin, 1993, p. 104). What is interesting about lifetime periods is that they may overlap with one another in terms of strict chronology while retaining their own unique themes and accessing distinct aspects of the autobiographical knowledge base. Thus, although “*when I worked at Y*” might cover exactly the same period as “*when I lived with X*” these different lifetime periods may cue the recall of very different autobiographical memories (Brown, Shevell, & Rips, 1986).

General events in Conway and Rubin's (1993) description of AM form the second level of AM. General events are more specific than lifetime periods, and cover shorter periods of time. General events include both things that occurred repeatedly, and unique events that extend over a considerable period of time, such as a holiday. General events have been found to be organised contextually, in terms of distinctive details of each general event, rather than in strict chronological order (Anderson & Conway, 1993). General events are specific in the sense that they can provide detailed autobiographical information relating to specific events that occurred frequently or over an extended time in a particular period. In contrast, lifetime periods typically contain general knowledge about different periods in an individual's life, such as events that happened during childhood, adolescence, one's first job, and so forth.

The most specific level of autobiographical memory discussed by Conway and Rubin (1993) is event specific knowledge. This level "tends to take the form of images, feelings, and highly specific details indicating the retention of sensory details of objects and actions in a general event" (Conway & Rubin, 1993, p. 107). Event specific knowledge is considered to be a record of sensory-perceptual information where individuals can recall details of images, sensations, smells, thoughts and so on (Anderson, 1993, cited in Anderson & Conway, 1997). As with general events, the chronological order of remembered events in event specific knowledge is considered secondary to retrieving events in terms of their distinctive features (Conway & Rubin, 1993).

In summary, these three levels of AM are organised hierarchically such that access to the most general level (lifetime periods) will cue memories from the more specific levels. Thus, "knowledge in a particular lifetime period, e.g. *when I lived in city "X"*,

provides indices to associated general events, e.g. *meeting friend at location "Y"*, which in turn contain... indices to event specific knowledge" (Conway and Rubin, 1993, p. 109).

Nelson (1993a, 1993c) distinguished between *generic event memory*, *episodic memory* and *autobiographical memory*. According to Nelson (1993a), generic event memory refers to "a schema derived from experience that sketched the general outline of a familiar event without providing details of the specific time or place when such an event happened, whether once or many times" (p. 7). Nelson (1993a, 1993b, 1993c) described the basic type of generic event memory as a *script* indicating the "spatially-temporally organised sequences of actions that specify the actions, actors, and props that are most likely to be present during any given instantiation of an event" (Fivush, 1997, p. 142)

Episodic memory in Nelson's (1993a, 1993c) account refers to memory for a specific event that happened once at a particular time. This description of episodic memory appears to be equivalent to Tulving's definition, emphasising the spatial-temporal components of remembered events in episodic memory. However, Nelson (1993a) argued that "the specific identification of time and place does not seem to be necessarily part of episodic recall" (p. 7). Nelson declared that "autobiographical memory as used here is specific, personal, long-lasting, and (usually) of significance to the self-system. Phenomenally, it forms one's personal life history" (1993a, p. 8). Thus, in Nelson's view, not all episodic memories become autobiographical memories. To illustrate this point, Nelson (1993a) contrasted her memory relating to yesterday's lunch with that of giving her first conference paper. Yesterday's lunch is a specific routine event that repeatedly happens, with no unique personal properties attached to it. Consequently, it will not be retained as an autobiographical memory. In contrast, the personal significance of first giving a conference paper forms an important aspect of Nelson's

personal life story and has therefore become part of her AM. The fact that not all episodic memories are autobiographical implies that AM is a specific type of episodic memory with its own characteristics (Nelson, 1993a, 1993c). That is, in order for any experience to be recorded in AM, it should have a personal dimension and the individual should be able to date the memory as well as recognise its importance. Thus, “episodic memory is distinguished from generic event memory, and consists of personal memory for one-time happenings that may or may not be specifically dateable, and may or may not enter into the long-lasting autobiographical system” (Nelson, 1993c, p. 358). Nelson (1993c) therefore argued that “episodic memory should be thought of as temporary, and generic memory and autobiographical memory as long-lasting systems serving different functions, both dependent on the transfer of information from episodic to the more durable systems” (p. 380). This description suggests that any experienced event is first held in episodic memory and then, depending on its characteristics, will be transferred either to generic event memory or AM. That is, if the event occurs frequently and is unremarkable, it will be held in generic event memory, where it may become part of a particular schema relating to similar events. On the other hand, if the event is unique and important, it will be recorded in AM.

5.3. Developmental accounts of autobiographical memory

Empirical research into how and when AM develops has a relatively short history, with researchers first addressing these questions in the 1980s. Of course, theoretical interest in children’s lack of early memories has a considerably longer history, going back at least to Freud’s (1905/1953) discussions of infantile amnesia. Research in the 1980s suggested that very young children had only generic personal memories and no event specific memories. Thus, contrary to Freud’s (1905/1953) contention that early memories were repressed, it appeared that early specific memories were not registered

at all. For example, while 3-year-olds could recall quite well what happened at generic events, such as going to MacDonald's, they appeared unable to recall the specifics of any one particular event, and instead assimilated specific events into a generic framework (Hudson, 1986; Nelson & Gruendel, 1981; Nelson & Ross, 1980). These early generic forms of autobiographical knowledge are referred to as *scripts* (Schank & Abelson, 1977), and the use of scripts in autobiographical memory development has been discussed at length in Nelson's (e.g., 1993a, 1993b, 1993c) work. With development, script reports become more complex and elaborated, with children of 3 years being capable of representing their routine activities in a way that was quite similar to that of older children and adults (Nelson & Gruendel, 1981; Fivush, 1997). It was therefore originally believed that AM began with an accumulation of generic event knowledge, after which children could begin to lay down more unique memories (Nelson & Gruendel, 1981).

However, other research has shown that young children can recall specific events from their past under certain circumstances (see Fivush & Hudson, 1990, for a review). For example, preschool children can recall accurate information of specific past experiences if these experiences were interesting or unusual (Fivush, Gray & Fromhoff, 1987; Fivush & Hamond, 1990; Hudson, 1990). It should be noted that recalling specific episodes of recurring events does not necessarily mean that specific episodic memories are developmentally derived from generic memory. That is because children can remember detailed information of specific events they have encountered only once (Hudson & Nelson, 1986; Hudson, 1990). Moreover, dependence on general event representations to drive memory for specific episodes may result in distorted recall of specific memories because of the similarity among repeated general events (Hudson, 1990; Fivush, 1997). Two possible explanations have been proposed to explain the

functional and developmental relations between general event representations (generic event memory) and specific event representations. The first is that generic event memory provides the child with a framework in which to understand events, which in turn gives the child a store of background memories against which new events can be compared for distinctiveness (Hudson, 1990). The second explanation is that with time, it is most likely for specific episodic memories to fade and for generalised or scripted knowledge to become more established (Fivush, 1997). As a result, "memories for specific episodes become 'normalised' to the scripts" (Fivush, 1997, p. 149). Thus, the relation between generic event memory and specific episodic memories can be thought of as reciprocal, with each of the two types of memory contributing to the other.

Not only can young children remember specific events, but they can retain these memories for a considerable period of time. Children aged between 2 and 2 1/2 years were able to remember specific episodes that happened 3 months earlier (Nelson & Ross, 1980; Fivush, Gray & Fromhoff, 1987), with 4-year-olds recalling events they had experienced 18 months previously (Hamond & Fivush, 1990). Clearly, though, the relation between time and AM is complex; as children get older, their AM improves, but the greater the time elapsed between the event and recall, the greater the chances are that the young child will have forgotten the event. What seems to be the crucial determinant of such long term retention of very early memories is whether the events have been reactivated or *reinstated* between their initial occurrence and recall. Reinstatement involves more than the mere rehearsal of previous events; rather, reinstatement involves a re-exposure to the initial event or some part of it. Fivush and Hamond (1989) tested the effect of reinstatement on retention of specific memories among preschool children on the assumption that these memories would normally be lost within a period of weeks. Initial testing took place in the laboratory, where 2-year-

old children were given a series of specific experiences, including playing with certain objects in specific ways and in particular situations. Two weeks later, half of the children were brought back to the laboratory to re-experience the events, and three months later, all the children returned to the laboratory to be tested for their memory of the initial experiences. Fivush and Hamond (1989) found that children who had experienced the reinstatement remembered significantly more than children who had not.

While reinstatement appears to have quite long lasting consequences for children's AM, rehearsal seems to be less effective in helping children retain memories. For example, in Nelson's (1989) description of Emily's crib talk, the child went over the details of events many times, and yet these rehearsed memories did not become part of her AM. Indeed, when she was interviewed at age 6 about her memories from age 2 and 3, none of the events that she recalled could be traced to things she had talked about and rehearsed in her crib talk. *Collaborative* verbal rehearsal has been found to be more effective in improving children's later recall of events. For example, discussions between parents and children that involve repeated verbal recall of specific episodes have been found to improve later recall of these specific events (Hamond & Fivush, 1990; Hudson, 1990). But rehearsal is still less effective than reinstatement in helping children recall information from their AM.

5.4. Individual Differences in AM

Research on AM development has recently appeared to turn away from trying to establish the precise reasons for infantile amnesia, with most researchers agreeing that its origins will be a complex interaction between neural, cognitive and social influences (Howe & Courage, 1993; Nadel & Zola-Morgan, 1984; Perner & Ruffman, 1995; Pillemer, 1998, Pillemer & White, 1989). The focus of research in this area is now on

factors that may be responsible for individual differences in children's AM. While the expected age-related increases both in the amount of personal memories recalled and in the complexity of autobiographical narratives have been observed (Fivush, Haden & Adam 1995; Fivush, 1997; Han, Leichtman & Wang, 1998), considerable individual differences in children's AM have been reported. Research in this area began with a consideration of the qualities necessary in the child for AM, but greater consideration is currently being given to social and cultural influences on AM.

As Fivush, Haden and Adam (1995) noted, "for memories to become truly autobiographical, they must enter into the life story that each of us creates" (p. 33). This integration of experiences into a life story is said to depend on three factors: (i) the child's attainment of metacognitive skills, (ii) the acquisition of the self-concept, and (iii) social construction of personal narratives (Fivush et al., 1995; Welch-Ross, 1995). Each of these is dealt with in turn.

Metacognitive skills concern children's understanding of mental representations. Metacognitive memory skills are often referred to as *metamemory* skills or knowledge (see Chapter 1). In the development of autobiographical remembering, children must come to understand that their AMs are mental representations of personally experienced events. Welch-Ross (1995) argued that two types of metacognitive understanding are essential for children's recognition of a memory as a personally experienced event. First, children must understand that, in order to know about an event, one must have personal experience with the particular event. Second, children must understand that memories and remembering are mental states. Unless children have acquired both of these metacognitive skills, their memories, particularly episodic memories, will not be incorporated within AM. Thus, according to Welch-Ross (1995), only episodic

memories that are accompanied by the knowledge that one personally experienced the event, coupled with the awareness of the mental state of remembering, “have the potential to enter the autobiographical memory system” (p. 340). Welch-Ross proposed that understanding the distinction between knowing about an event and having personal experience with it, and being aware of the mental state of remembering, begin at around 3 years of age.

Acquiring a self-concept is the second developmental milestone that is considered a prerequisite for AM (Fivush et al., 1995). As mentioned above, autobiographical memories are related to the self (e.g., Brewer, 1986). Therefore, one aspect of the transformation of early episodic memories into personal memories is the development of a stable physical and psychological sense of the self (Fivush et al., 1995; Welch-Ross, 1995). Cognitive awareness of the self emerges early in development, with children being able to recognise themselves in mirrors, photographs and videotapes from around 15 months (Amsterdam, 1972; Lewis & Brooks-Gunn, 1979). Children then begin to realise the physical continuity of the self over time (Howe & Courage, 1993; Welch-Ross, 1995). In addition to the cognitive understanding of the physical existence or the physical identity of the self, children between ages 2 and 3 begin to develop an organised psychological self-concept (Welch-Ross, 1995). For example, Eder (1990) found that 3-year-olds were able to choose behaviours that included certain psychological traits that indicated their own thinking about themselves. With development, children’s knowledge of the self is extended, with older preschoolers being able to give detailed descriptions of themselves including “specific behaviours performed in specific contexts, perceived abilities, and personal possessions” (Welch-Ross, 1995, p. 355). In contrast to this concrete way of thinking about the self, older children’s conceptualisation of themselves tends to be more abstract (Damon & Hart,

1982). Once an organised self-concept has been formed, children may begin to organise their personal memories around it, with self-referenced personal memories indicating the emergence of AM (Fivush et al., 1995; Welch-Ross, 1995).

Social construction of personal narratives represents the third developmental factor that has been argued to be necessary for the establishment of the AM system (Fivush et al., 1995; Nelson, 1993a, 1993b, 1993c; Welch-Ross, 1995). Some researchers regard social interaction to be the process via which children's personal memories are constructed (Hudson, 1990; Pillemer & White, 1989). During social interaction, the child gradually learns the narrative skills needed to report his/her personal memories of past experienced events in a socially and culturally appropriate way (Nelson, 1993c; Tessler & Nelson, 1994). Children normally acquire these skills through talking with adults, particularly parents, about shared past experiences and events (Nelson, 1990; Nelson, 1993c). Thus, it is argued that "the original functional significance of autobiographical memory is that of sharing memory with others, a function that language makes possible" (Nelson, 1993c, p. 376). Therefore, "only those memories which can be talked about with others will become part of the autobiographical life story" (Fivush et al., 1995, p. 34). The three developmental capacities related to AM development (metacognitive skills, self-concept, social construction of personal narratives) are therefore interrelated. Thus, "a stable sense of self emerges in the process of reminiscing about the past with others" (Fivush et al., 1995, p. 34). In addition, memory conversations and the increased self-awareness that comes with the attainment of metacognitive skills contribute to the development of the self concept by highlighting the fact that one's existence is continuous, linking past, present and future.

The assumption that social talk about memories helps children to formulate their own narrative accounts of past events is generally referred to as the *social interaction perspective*. Authors adopting this perspective, such as Nelson, have used Vygotsky's (e.g., 1978) theory to explain how the child's social environment plays a central role in AM development. The process of teaching children how to talk about the past is first started by parents providing their children with almost all of the content and structure of the narrative (Fivush & Hamond, 1990; Haden, Haine & Fivush, 1997; Nelson & Fivush, 2000). Thus, early in development, children's accounts of the past are heavily *scaffolded* by their parents, who "essentially tell what happened and children confirm or repeat parental contributions" (Nelson & Fivush, 2000, p. 286). Then, by means of internalisation, children come to perform independently (Nelson, 1993; Haden, Haine & Fivush, 1997). That is, between 2 and 3 years of age, children participate substantially more in conversations about past experiences and are able to provide information about these experiences in response to particular questions (Fivush, Gray & Fromhoff, 1987; Hudson, 1990; Fivush & Hamond, 1990; Nelson & Fivush, 2000). By 3 to 4 years, children actively contribute to discussions and conversations about the past and are able to recount shared past experiences in a sensibly coherent fashion (Hudson, 1990; Fivush & Hamond, 1990; Nelson, 1992). Further, they are able to initiate past experienced events "as topics of conversations" (Nelson & Fivush, 2000, p. 286). The period between 4 to 5 years of age is assumed to witness the full emergence of AM system "when memories become verbally accessible and socially sharable" (Fivush et al., 1995, p. 36). Indeed, the gender differences that have been observed in AM, whereby girls produce more detailed, coherent autobiographical narratives, with more emotional content than those of boys (Adams, Kuebli, Boyle, & Fivush, 1995; Buckner & Fivush, 1998; Fivush, Haden, & Adam, 1995) have been interpreted as evidence for the social

construction of narratives, on the assumption that girls participate more frequently in episodes of rich and elaborate joint reminiscing.

According to these accounts, past-related conversations between parents and their children are considered essential for the development of AM in the sense that parents explicitly and implicitly provide the developing child with the organised way of narrating past events, as well as helping the child to identify those events that are important in characterising his/her life story (Fivush, 1991; Middleton & Edwards, 1990 cited in: Fivush et al., 1995). Therefore, in the light of the social interaction perspective, research on the development of AM has concentrated on different parent-child conversational styles and their role in enhancing children's autobiographical skills (Hudson, 1990; Fivush & Hamond, 1990; Nelson, 1990). Two distinctive styles of parental reminiscing have been identified; the first style is *high-elaborative* or *topic-extending*, and the second is *low-elaborative* or *topic-switching* (Engel, 1986; Fivush & Fromhoff, 1988; Haden, Haine & Fivush, 1997; Hudson, 1990; Reese & Fivush, 1993; Reese, Haden & Fivush, 1993; Welch-Ross, 1997).

High-elaborative or topic-extending parents are reported to construct rich, complex and elaborated descriptions of past events and provide their children with a great deal of embellished detail. In addition, they tend to ask memory questions and prompt their children to provide similar narratives about the past. In contrast, low-elaborative or topic-switching parents talk less frequently about past events and provide fewer details during past recounting conversations with their children (Fivush & Fromhoff, 1988; Hudson, 1990; Reese, Haden & Fivush, 1993; Haden, Haine & Fivush, 1997). Parents' level of elaboration has been found to be consistent over time and across siblings (Reese, Haden & Fivush, 1993; Nelson & Fivush, 2000). This suggests that differences

in elaboration are a function of parents' general discourse style rather than a reflection of the child's birth order or ability (Reese, Haden & Fivush, 1993; Han, Leichtman & Wang, 1998; Nelson & Fivush, 2000; Wang, Leichtman & Davies, 2000).

In support of the argument that parent-child conversational style plays an instrumental role in children's AM development, various studies have shown that children who had experienced high-elaborative style were found able to remember more details of past happenings during parent-child conversations than children of low-elaborative parents (Fivush & Fromhoff, 1988; Hudson, 1990; Reese, Haden & Fivush, 1993). In their longitudinal study, Reese et al. (1993) investigated long-term effects of mothers' level of elaboration on their preschool children's remembering. They found that mothers who used a more highly elaborative style of talking about the past when their children were 40 months old had children who recalled more event memories at 59 and 70 months of age.

Certain authors have argued that reporting the past is more than a simple act of remembering many details; rather, it involves providing a coherently organised account of past happenings (Haden et al., 1997; Nelson & Fivush, 2000). For example, Fivush et al. (1995) maintained that "for memories to become part of the life story, they must be organised as coherent narratives" (p. 34). Parental elaborative style has also been found to influence the *organisation* of children's autobiographical narratives as well as the amount they can recall (Fivush et al., 1995; Haden et al., 1997; Nelson & Fivush, 2000).

Organisation of personal memories into a coherent and meaningful representation requires certain narrative skills (Fivush et al., 1995; Haden et al., 1997; Nelson, 1993; Nelson & Fivush, 2000). In order for a narrative to be comprehensible to other people, recounting personally experienced events from the past must begin with *orienting*

information, indicating the spatial-temporal and social contexts of the remembered events (Nelson & Fivush, 2000). Specifically, in order to orient the listener, the remembered context has to include the setting of *when* and *where* an event occurred, as well as references to people involved (Haden et al., 1997). In addition to orienting information, personal narratives must contain evaluative information to clarify the reasons behind treating particular events and experiences as important, self-defining, emotional, meaningful and so on. In terms of parent-child conversations about the past and their influential roles in children's acquisition of organised narrative skills, parents vary in their narrative focus, with some parents tending to emphasise orienting information, with others concentrating on evaluative information (Haden et al., 1997; Nelson & Fivush, 2000). Nevertheless, these differences in parental organisational style are reflected in children's narratives. For example, Haden et al. (1997) reported that mothers who emphasised orientating information by telling their children when and where events happened and who was there, had children who independently organised their narratives around these themes later in development. On the other hand, mothers who focused on the emotional aspects of remembered events and provided their children with great deal of evaluative information early in development, had children who subsequently organised their personal memories in terms of evaluative characteristics. Thus, a considerable amount of research points to parent-child memory talk having far-reaching consequences for children's subsequent reminiscing about the past and their acquisition of AM skills.

5.5. Cultural Differences in Parent-Child Conversations About the Past and Children's AM

Questions relating to the relation between parental elaboration and children's AM have recently been investigated by comparing the AM of children growing up in cultures

which show variations in parent-child conversational style. Cultural variations in the style and content of parent-child memory conversations, as well as in the degree to which children are encouraged to interfere in adults' life and to express their feelings, are considered to mirror certain cultural values that characterise any given society (Han, Leichtman & Wang, 1998; Wang, Leichtman & Davies, 2000; Ji, Schwarz & Nisbett, 2000). As discussed in previous chapters, a distinction has been drawn between individualistic and collectivistic cultures. The collectivistic nature of Saudi society has already been outlined, but other Eastern cultures are also collectivistic and discourage individuals from talking about themselves, and thus less about personally experienced events (Markus & Kitayama, 1991; Mullen, 1994).

These cultural differences have been found to impact on the way in which parents in Asian cultures talk to their children about the past. For example, Mullen and Yi (1995) investigated the extent to which Korean and American mothers talked about previously experienced events with their 40-month-olds. Mullen and Yi (1995) found cultural differences between American and Korean mothers in terms of the frequency and content of their past-related conversations with their children. Compared to Korean mothers, American mothers talked to their children more frequently over the course of a day and their conversations were more likely to centre around the personal characteristics, preferences and interests of their children. On the other hand, memory conversations held between Korean mothers and their children were more likely to focus on social discipline and morals. Mullen and Yi (1995) interpreted their results as highlighting how a cultural focus on interdependence, rather than independence, can lead to certain socialisation goals, which are reflected in how and the extent to which parents encourage their children to talk about their own past experiences. For example, children in Korean society are generally discouraged from talking about themselves,

especially in the presence of adults (Yoon, 1994, cited in Han, Leichtman, & Wang, 1998). These characteristics are also enhanced among Chinese children where they are encouraged to show obedience to authority, behave appropriately and demonstrate a sense of shame (Miller, Wiley, Fung & Liang, 1997).

Similar results were reported by Wang, Leichtman and Davies (2000) who found significant differences in the style and content of parent-child memory conversations between American and Chinese cultures. In terms of stylistic differences, American mothers were more likely than their Chinese counterparts to elaborate in memory conversations with their children and to require active participation from their children by asking them questions and eliciting their responses. In contrast, Chinese mothers tended "to repeat their questions again and again, without adjusting their responses according to whether their children were providing any new information" (Wang et al., 2000, p. 172). As for the content of parent-child memory conversations, American mothers provided more evaluative comments on the responses of their children, and the nature of evaluative comments differed between the two groups. The evaluative comments of American mothers contained personal preferences, opinions and judgements, whereas those produced by Chinese mothers were generally about moral rules and behavioural standards (Wang et al., 2000).

The next step was to investigate whether these cultural differences in parent-child conversations related to children's AM development. Han et al. (1998) assessed the AM of Korean, Chinese and American children. The children were asked about events in the recent past (e.g., what they had done the night before, or since they had woken up that morning) and from the more distant past, such as how they spent their last birthday. Han et al. (1998) reported that the Korean and Chinese children produced significantly

shorter autobiographical narratives than their American counterparts. Moreover, the American children's memories were more coherent, specific and descriptive, and included more references to themselves and their own opinions. Similarly, Wang et al. (2000) reported that Chinese children provided less information when talking about previous shared past experiences than their American counterparts. The Chinese mothers' focus on moral concerns was also reflected in their children's autobiographical narratives, with the Chinese children showing greater concern with moral correctness (Wang & Leichtman, 2000).

Cultural differences in socialisation thus have the predicted effects on children's AM recall and organisation. But although these results are impressive, and the argument that social sharing of memories plays an important causal role in developing children's AM is intuitively appealing, research so far has done little to identify the potential mechanisms via which cultural and social factors affect children's AM system. One potential mechanism that has received attention in the literature is language. This is the focus of the next section.

5.6. Language and the development of autobiographical memory

The role of language in AM has focused on two main areas: (i) children's ability to report past personal recollections within an organised narrative structure; and (ii) children's use of language to recount experiences *for themselves*. The first makes it possible for the child to accomplish the social function of AM, which is sharing memory narratives with others (Nelson, 1993c). Once this *overt* function of language is established, Nelson (1993c) argued, "covert recounting or re-experiencing to oneself may take place, and take on the function of reinstatement" (p. 378).

In order to provide a convincing argument for language playing a role in the actual *construction* of AM, one must be able to discount the possibility that language is not merely involved in the recall of information. For example, it may be that AMs are encoded and stored using non-linguistic means, but when they come to be recalled, language must be involved. Some evidence appears to argue against language playing a constructive role. Pillemer, Picariello and Pruett (1994) reported that, when 3- to 5-year-old children were provided with specific cues, their recall from AM was enhanced, suggesting that language cues may be important for retrieval of information, but not necessarily that language helps children construct their AMs. Some findings from Tessler and Nelson (1994) also suggested that language during an event affects only the subsequent verbal recall of that event, and not its memory representation. However, a growing number of studies suggest that language does play a role in constructing and organising AM representations. For example, Pipe (1996) found that children who had experienced an event accompanied by a detailed narrative about what was happening recalled more information about the event, and also produced more accurate and better organised memories than children who had not had the accompanying narrative. Other evidence comes from studies that have investigated whether the acquisition of language related to children's ability to remember events. Bauer and Wewerka (1997) investigated how the language skills of 20-month-olds related to their ability to recall novel action sequences one year later. They found that the children whose language skills had been more advanced at 20 months had superior verbal recall of the action sequences a year later, although all children could act out the sequences at follow up. This suggests that for verbal recall, memories must be verbally encoded and constructed. Similar findings were reported by Peterson and Rideout (1998) and Pillemer, Picariello and Pruett (1994). The former researchers reported that young children could only recall a hospital visit that had occurred two years previously if they

had been able to talk about and give a verbal account of the event at the time it happened. However, like Bauer and Wewerka's (1997) findings, some children could recall their injury non-verbally through action even though they were unable to recall it verbally. Pillemer et al. (1994) investigated whether children could recall a fire alarm event that had occurred in preschool when they were followed up seven years later. Only the children who had been able to give a coherent account of the event immediately after it had happened were able to recall it years later. Thus, although some of these studies point to non-verbal construction and recall of AMs, these findings are suggestive of language playing a role in the construction and organisation of children's AM.

Next, we turn to the second role of language in AM: children's covert recounting past experiences for themselves. In order to engage in independent verbal reinstatement of memories to oneself, children need "a certain level of facility with language" (Nelson, 1993c, p. 377; Ratner, 1984). This facility requires the child's perception of language "as a representational system in its own right, and not simply as either an organising tool or a communication tool" (Nelson, 1993c, p. 378). This understanding of language is assumed to be mediated by the child's perspective-taking abilities which develop during the late preschool years (Nelson, 1993c; Welch-Ross, 1995; Welch-Ross, 1997). Once "children reach this level of understanding, they can engage in verbal reinstatement through language, and the autobiographical memory system begins to emerge" (Welch-Ross, 1995, p. 352). Therefore, early in development, before children understand the representational nature of language, they will be unable to engage in verbal reinstatement to themselves (Nelson, 1993c). As a result, parent-child reminiscing about the past is at first controlled by parents who provide the developing child with almost all the content and structure of the narratives.

What is fundamental to the role played by language in AM in Nelson's account is the fact that only language that is used in a *strategic* manner will serve to promote AM. For example, Nelson (1993c) argued that very early forms of verbal recounting to self (such as Emily's crib soliloquies at age 2) were "not effective as reinstatement, but only as knowledge organising activity" (p. 378). Thus, Nelson's (1993c) description of younger children's self-recounting as non-strategic implies that such uses of language would not have any impact on AM development.

Nelson's account (e.g., 1993c, Nelson & Fivush, 2000) of the role played by language in AM owes much to Vygotsky's (e.g., 1930, 1978) view that language serves two functions in the child's intellectual development. As discussed in Chapter 2, Vygotsky argued that speech has a social function as a communicative tool, as well as playing a crucial role in mediating the development of the higher mental functions (Wertsch, 1985). According to Nelson and Fivush (2000) "reminding oneself of an experience may have the same effect as talking about it with others" (p. 291). Borrowing from Vygotsky's (1986) arguments relating to the social origins of the higher mental functions, Nelson and Fivush (2000) stated that "self-reminding is a socially learned process established during the pre-school years, a process that may account for the eventual establishment of an autobiographical memory system independent of its social origins" (p. 291).

According to Nelson (1993a, 1993c), verbal reinstatement is fundamental both for maintaining autobiographical memories and in developing the child's own memory representations of events. That is, ongoing parent-child conversations about personal memories are believed to contribute to the long-term retention of these memories, as well as enhancing the child's ability to engage in independent self-reminding talk

(Hudson, 1990; Hamond & Fivush, 1990; Nelson, 1993c; Fivush, 1997). Consequently, verbal reinstatement of personal memories is assumed to contribute to the development of an internal (mental) representation of remembering. Further, verbal reinstatement can be distinguished from verbal rehearsal, which involves deliberate repeating of the to-be-remembered stimuli in order to improve later recall (Hudson, 1990). That is because the social interaction model of AM sees overt and covert use of language as teaching the child *how* to remember, and not only *what* to remember (Hudson, 1990). Thus, shared reminiscing about the past provides the child with the general framework of how to report personal memories in an organised way; this is then internalised by the child and used in verbal reinstatement of memories to self. Once children have acquired the organised way of reporting past recollections, they will be able to use it to report any remembered event or experience and not only those memories that have been verbally rehearsed. Thus, self-reminding is seen as a memory process (Nelson and Fivush, 2000) that derives from the social sharing of memories and reflects the child's unscaffolded and independent use of verbal behaviour to maintain and report past personal narratives. Therefore, verbal reinstatement to oneself can be considered as the developmental outcome of the socialisation of AM through parent-child memory conversations that have already been internalised.

However, although Nelson cites Vygotsky's work and uses the sociocultural approach as a framework for her views on the social linguistic construction of AM, one could argue that her conceptualisation of the internalisation process is not truly Vygotskian. Recall from Chapter 2 that internalisation is not just the act of simply copying external practices into the internal domain. Rather, internalisation is the process by which the internal domain is *formed* (Leont'Ve, 1981; Wertsch, 1985). For Vygotsky, spoken language (or any other formal sign system) plays a mediating role between social

speech and inner speech, via the way station of private speech. In contrast, within Nelson's account of the link between parent-child conversations about the past and children's AM recollections, internalisation is seen as the reproduction in children's autobiographical narratives of the things that were jointly discussed with parents. For this to be true internalisation, it is necessary to identify some process in the child that mediates the link between social speech about past events and the child's later recall of these events from AM. As yet, however, researchers have not attempted to identify any uses of language in *the child* that relate to AM development, beyond the mere acquisition of language (e.g. Bauer & Wewerka, 1997). Previous research has documented social and cultural differences in parent-child conversations on the past and how they related to children's AM, but no study has yet tested the hypothesis that differences in social and cultural practices affect some aspect of children's more general intellectual development, which in turn is responsible for the observed differences in children's AM. This was the main aim of Study 3. Specifically, this study addressed the possibility that individual differences in children's use of PS to regulate their behaviour may be responsible for socio-cultural differences in the recall and organisation of children's AM. The next section therefore outlines how PS may play such a role.

5.7. Private Speech as a Determinant of AM

PS represents a functional device that enables children to use language strategically to regulate their behaviour. For example, PS was found to mediate the link between parental effective interventions and children's task success (Berk & Spuhl, 1995, see pp. 56-57). Thus, while it might be assumed that suitable parental intervention would have a direct effect on children's task performance, Berk and Spuhl's (1995) results showed that this was not the case. Rather, parental intervention related to children's use of self-regulatory PS, which in turn related to their task performance. One could therefore ask

whether the observed link between social interaction factors and children's AM is mediated by the child's use of PS. If this is the case, it may be that what has been called covert reinstatement of memories for oneself in the AM literature is PS by another name.

The proposal here is that PS is the mechanism via which parent-child conversations about the past influence children's AM. Then, based on its genetic relation with inner speech, PS might support the development of children's internal language of memory that would contribute to the ontogenesis of an independent self-reminding capacity. Some recent studies have suggested such a link using data on adult AM. For example, Larsen, Schrauf, Fromholt, and Rubin (2002) argued that the internal language of memory or internal state language (ISL) is as an example of inner speech in autobiographical memory. ISL refers to inner "feelings, goals, intentions and cognitions that occurred in the past or that are anticipated to occur in the future" (Beeghly, Bretherton & Mervis, 1986, p. 247). Indeed, ISL is included as a category within Fivush et al.'s (1995) classification system for AM. Thus, ISL in AM can be considered to be an indication of children's understanding and using of the mental representations of remembering. Meanwhile, PS as a form of verbal thinking is an expression of inner speech in its early ontogenetic phases, and with development, PS will turn into inner speech. One would therefore predict that PS, especially more advanced self-regulatory types of PS, will enhance the development of children's ISL in autobiographical remembering situations.

PS, as an indicator of children's strategic use of language, may therefore be the developmental mechanism responsible for the internalisation of parent-child memory conversations and, in turn, the child's ability to create his/her mental representation of remembering. This possibility highlights Vygotsky's contention that language plays not

only social communication role, but is also responsible for the formation of the higher mental functions, in this case, the child's construction of mental representations of remembering. Thus, PS might be expected to impact on the development of children's past personal narratives through the two interrelated roles played by language in autobiographical remembering. That is, PS will first enhance the process of internalising parent-child conversations about the past and contribute to the ontogenesis of the internal language of memory that can be considered as an indication of the development of mental representations of remembering. Second, this developmental achievement will support the emergence of an independent self-reminding capacity that would be reflected in an effective social sharing of personal memories.

Various similarities can be drawn between the development of PS and children's self-reminding skills in AM. Self-reminding develops during the pre-school years, as does PS. Self-reminding is proposed to develop from children's experience of shared parent-child conversation about the past, just as PS develops from children's social speech with others. Thus, studying possible developmental and functional relations between PS and autobiographical narrative skills during the early school years may further explain the involvement of language in AM, especially in the light of the social interaction perspective. For example, Nelson (1993c) has hypothesised that "an important development takes place when the process of sharing memories with others through language becomes available as a means of reinstating memory" (p. 377). This important developmental achievement is meant to be the transformation of episodic memories into a long-lasting autobiographical remembering system by means of sharing memory with others, as well as with the self (Nelson & Fivush, 2000).

By representing children's strategic use of language, PS is expected to support children's autobiographical narrative skills in different ways. Specifically, considering

the individual variability in children's use of PS, the high PS users who are more advanced in the use of PS (indicating a degree of internalisation and its use as a means of self-regulation) would be expected to benefit more from the social sharing of memory (such as in parent-child conversations about the past) than the low PS users. Consequently, the prediction is that the high PS users will report more past memories than low PS users. This prediction is also based on the proposal that the high PS users will reinstate their personal memories verbally more frequently than the low PS users because they rely more on speech to regulate their behaviour. Moreover, given that the high PS users were classified according to their frequent deployment of the more sophisticated forms of private speech, they are expected to be more advanced in their use of the ISL of AM than the low PS users. Thus, it is predicted that the AM of the high PS users will be quantitatively and qualitatively superior to that of the low PS users.

Study 3

5.8. Study 3: Aims and Hypotheses

The main aim of Study 3 was to investigate how culture and children's PS use relate to their AM recall and organisation in the samples of Saudi and British children who had participated in Studies 1 and 2. As discussed in Chapter 3, Saudi society is collectivistic, with the individual's behaviour tending to be group-oriented (Buragga, 2001). In contrast, British society is characterised by high individualism (Hofstede, 1984). Therefore, behaviours such as self-expression, autonomy and personal uniqueness are more likely to be emphasised in parent-child memory conversations within British culture than in Saudi culture. At the same time, behaviours such as social obligation, responsibility towards others and inseparability from the social whole are more likely to be stressed in parent-child past-related conversations between Saudi parents and their children than between British parents and children. Further, the level of children's

participation in these conversations will be higher among the British than the Saudi, since Western children are more encouraged to take part in familiar adults' discussions and conversations about joint past events and experiences (Han et al., 1998). In contrast, the parent-child relationship in Saudi society is based on diffidence and respect, and is therefore less likely to support regular involvement of children in familiar adults' memory conversations.

Given the findings discussed above on cultural differences in AM, one would therefore expect to find differences between the British and the Saudi children in the content and style of their autobiographical narratives, reflecting the collectivistic versus individualistic dimension of early socialisation processes regarding remembering across the two cultures. Hence, it is predicted that the British children will recall more AMs than their Saudi counterparts, and differences in narrative structure are also predicted. Specifically, compared with the Saudi children, the British children are expected to produce more complex and specific autobiographical narratives that include more references to self and personal opinions.

Next, the relation between PS use and AM is considered. PS is an indicator of children's tendency to use language strategically to regulate their behaviour. It is therefore predicted that children who tend to use PS will have better AM than those who rely less on PS. Specifically, considering the individual variability in children's use of PS, it is predicted that those children who showed high levels of self-regulatory PS during a cognitive task (the high PS users) will be likely also to engage in verbal reinstatement of memories to self. The high PS users are therefore predicted to have better AM than the low PS users. In addition to this predicted relation between PS and volume of narrative, high PS users are also expected to have more complex and better organised

autobiographical narratives than the low PS users. In particular, it is predicted that the autobiographical narratives of high PS users will contain more internal state language than those of the low PS users given that internal state language is considered to be an example of inner speech in AM (Larsen et al., 2002).

In summary, the hypotheses for Study 3 were as follows: (i) that high PS users will recall more AMs than low PS users, (ii) that the autobiographical narratives of high PS users will be more complex than those of low PS users, (iii) that the high PS users' narratives will contain more internal state language than those of low PS users, (iv) that British children will recall a greater number of AMs than Saudi children, (v) that the autobiographical narratives of British children will be more complex than those of Saudi children, (vi) that the British children's narratives will contain more references to self and personal opinions than those of their Saudi counterparts. In addition, Study 3 investigated the relative contribution of culture and PS use to children's AM recall and organisation. Finally, relations between AM development and verbal ability, chronological age and gender were included in the analyses.

5.9. Method

5.9.1. Participants

The same sample of British children ($N = 58$) and Saudi Arabian children ($N = 63$) who took part in Studies 1 and 2 were the participants for Study 3 (see Chapter 3, p. 74).

5.9.2. Design

Children were individually given a standardised autobiographical memory interview. AM data derived from this interview were analysed with respect to PS data obtained in

Study 1. Self-regulatory PS was treated as a dichotomous variable (high versus low PS use) and as a continuous variable in the analyses.

5.9.3. Procedure

A battery of autobiographical questions, adapted from Han, Leichtman and Wang (1998), was used in the present study to examine the children's autobiographical narratives. The battery consisted of six broad questions about both routine and specific events (see Table 5.1 below).

Table 5.1: The Battery of Questions used in Autobiographical Memory Interview.

No	Questions of Autobiographical Memory
1	Can you tell me about all the things you did at bedtime last night? Tell me everything you did after you ate dinner until right before you went to sleep.
2	Now, can you tell me everything you did when you woke up this morning?
3	Now, I'd like you to tell me just one thing you did recently that was really special and fun
4	How did you spend your last birthday?
5	Now, can you tell me about a time, these days, when your mom or dad scolded you (told you off) for something?
6	You know, some kids can remember things that happened to them when they were very little. Can you tell me the first thing that ever happened to you, that you can remember, in your whole life?

Adapted from Han, Leichtman and Wang (1998).

Only one change was made to the list of questions used with the British children for administration to the Saudi children. Since it is not common for individuals in Saudi

society to celebrate their birthdays, the Saudi children were asked about what they did on the last Eid¹, rather than their last birthday.

The testing of the children's autobiographical memory took place 10 days after the testing of the phonological working memory. The children were interviewed individually in the school library (British children) or the school theatre (Saudi children), sitting at a table facing the researcher. Since all of the children had been tested individually by the researcher on several previous occasions, the children felt able to talk and express themselves more freely. Each interview began with an explanation to the child indicating that he/she was going to be asked about different events in his/her life that had happened both recently and in the past. Children were told that their task was to try to answer the questions by remembering as much about the events as they could.

Following the procedure outlined by Han et al. (1998), the interview took the form of conversation between each child and the researcher where each child was encouraged to continue by the use of general prompts such as *"Tell me more"*, *"Try to remember"*, *"Anything else?"*, or by repeating part of what the child said, e.g. *"So, you went to grandma's house, then what happened?"*, (for some examples of children's narratives, see Appendix 9). Each interview was video-taped for transcription, coding and analysis.

5.9.3.1. Transcription of Interviews

Children's answers to the AM interview were transcribed verbatim. For the British children, teachers and parents were consulted if necessary about certain places, names and phrases that the children had mentioned with which the researcher was not familiar.

For the Saudi children, the transcriptions were translated from Arabic into English by a

¹ Eid is the day Muslims normally celebrate after fasting for the month of Ramadan. It is considered a special occasion for children, when they are given presents and sweets and are taken on outings.

bilingual Arabic-English speaker, and checked for accuracy by a second bilingual speaker. Thus, all of the transcripts were coded in English to ensure that linguistic differences between the two languages had a minimal effect on any cross-cultural differences that might be found in the analyses (see Han et al., 1998).

5.9.3. 2. Coding of Interviews

The interviews were coded for structure and cohesion using a coding scheme developed by (Fivush, Haden & Adam, 1995), which has become widely used in research on AM development (e.g., Han et al., 1998). Children's narratives were coded according to the following categories:

5.9.3.2.1. Volume of narrative

The volume of each child's narrative was measured by counting the total number of words spoken during the interview.

5.9.3.2.2. Narrative Complexity

Narrative complexity was assessed by calculating the ratio of *words per proposition*. According to Han et al. (1998) this ratio indicates "the length and complexity of each unit of thought that children expressed" (p. 703).

5.9.3.2.3. Narrative cohesion

Children's narrative cohesion was assessed by totalling the number of: (i) simple temporal markers; (ii) complex temporal markers; and (iii) descriptives. Fivush et al. (1995) defined simple temporal markers as words referring to chronological time, e.g., *then, first, second, next, last, before* and *after*. Complex temporal markers were defined as words referencing complex temporal relations, including conditional states (e.g.,

if/then, when and until), causal relations (e.g., *because, so and in order to*), and optional states (e.g., *sometimes, usually, always and probably*). Descriptives were defined as words providing descriptive texture to the children's recounts, such as adjectives, adverbs and modifiers.

5.9.3.2.4. General versus Specific Memories

This category of coding autobiographical narratives indicates the degree of specificity of the children's memory recall. Specific responses were defined as containing an explicit description of people, places, times and so on, which indicated a particular occurrence of an event (e.g., "*I went to ballet, it was good, I heard the music and there were some friends*"). Specific memories should distinguish "the event under discussion from other particular events or from repeated occurrences of similar events" (Han, et al., 1998, p. 704). Responses that did not meet this criterion, i.e. did not provide a distinguishing description, were coded as general (e.g., "*I played*").

5.9.3.2.5. Other-Self

The aim of this category was to identify the extent to which the children's narratives contained information about the self and others. It was captured by counting the total numbers of self- and other-related words, including first person and third person pronouns, titles (e.g., mum, sister and teacher), and names.

5.9.3.2.6. Internal state language

This category was a composite score, obtained by totalling the scores for children's mentions of emotion, cognition, preference, and evaluation. Emotions included negative and positive affect words and expressions (e.g., "*I liked my birthday cos I got lots of presents*"; "*a wasp stung me on the lip and it hurt all day*"). Cognition included words

indicating the thought-state related to an experienced event, such as expressions referring to the mental state of remembering (e.g., “*I had forgotten what it was like and I got it again yesterday and I liked it and I remembered what it was like*”). Preference included mentions of personal preference, attained or denied during an experienced event (e.g., “*I really wanted the red bag, but I had to get the blue one*”). Evaluation included personal judgments and opinions regarding an experienced event (e.g., “*I think it was fun*”; “*the game was boring*”).

5.9.3.3. Reliability

All of the transcripts were coded by the author, and a randomly-selected 20% of the transcripts was coded for a second time by a rater who was blind to all other measures and to the Study’s hypotheses. The average inter-rater reliability (r) was .91 (ranged from .73 to .99). Disagreements were resolved by discussion.

5.9.4. Results

5.9.4.1. PS-Related Differences in AM

The first three hypotheses predicted that children who were high PS users would have superior AM compared to low PS users. Tables 5.2 and 5.3 show the mean scores for the high and low PS users as well as for the whole group in the British and the Saudi samples with respect to the AM indices.

Table 5.2: Means and standard deviations of performance of high and low PS users and the whole group of British children on autobiographical memory.

Categories of Autobiographical Memory	High PS users (N = 31)	Low PS users (N = 27)	Whole Group (N = 58)
Words	356.39 (155.77)	269.33 (160.89)	315.86 (162.78)
Words/propositions	15.57 (4.21)	13.48 (4.42)	14.60 (4.40)
Simple markers	8.06 (6.69)	5.07 (4.91)	6.67 (6.07)
Complex markers	11.71 (8.08)	6.52 (6.77)	9.29 (7.88)
Descriptives	26.52 (13.16)	16.22 (10.04)	21.72 (12.80)
Specificity	3.87 (1.38)	3.04 (1.83)	3.48 (1.65)
Self-mentions	49.52 (21.09)	39.15 (22.19)	44.69 (22.05)
Other-mentions	18.97 (12.63)	13.07 (10.24)	16.22 (11.86)
ISL	12.87 (6.69)	9.93 (6.16)	11.50 (6.56)

(Figures in brackets are s.d.)

Table 5.3: Means and standard deviations of performance of high and low PS users and the whole group of Saudi children on autobiographical memory.

Categories of Autobiographical Memory	High PS users (N = 34)	Low PS users (N = 29)	Whole Group (N = 63)
Words	148.91 (75.27)	112.21 (57.75)	132.02 (69.73)
Words/propositions	12.76 (3.70)	12.12 (5.62)	12.47 (4.65)
Simple markers	7.38 (4.97)	5.52 (3.66)	6.52 (4.48)
Complex markers	5.41 (4.31)	4.59 (3.33)	5.03 (3.89)
Descriptives	10.12 (5.40)	7.03 (4.73)	8.7 (5.29)
Specificity	2.38 (0.99)	1.97 (1.32)	2.19 (1.16)
Self-mentions	21.29 (10.70)	15.21 (8.50)	18.49 (10.15)
Other-mentions	6.56 (4.51)	5.17 (3.98)	5.92 (4.30)
ISL	6.21(4.10)	4.93 (2.60)	5.62 (3.53)

(Figures in brackets are s.d.)

The three hypotheses were first investigated using correlational analyses with data from the whole sample of children (both British and Saudi). Correlations between children's use of self-regulatory PS (PS2 + PS3) and the separate indices of AM were calculated. Use of self-regulatory PS was positively correlated with: (i) narrative complexity ($r[119] = 0.18, p < .05$, two-tailed); (ii) number of complex temporal markers ($r[119] = 0.20, p < .05$, two-tailed); (iii) number of descriptives ($r[119] = 0.22, p < .025$, two-tailed); (iv) number of specific responses ($r[119] = 0.25, p < .01$, two-tailed); and number of references to self ($r[119] = 0.19, p < .05$, two-tailed). In addition, the correlations between self-regulatory PS and the following AM indices approached significance: (i) volume of narrative ($r[119] = 0.17, p = .07$, two-tailed); (ii) number of simple temporal markers ($r[119] = 0.15, p = .09$, two-tailed); and number of references to others ($r[119] = 0.15, p = .09$, two-tailed). There was, however, no relation between self-regulatory PS and children's use of internal state language (ISL) in their autobiographical narratives ($r[119] = 0.14$, n.s.).

Thus significant associations were found between children's use of self-regulatory PS and five out of nine indices of AM, with relations with a further three AM indices approaching significance. Children who used more self-regulatory PS during a cognitive task produced more complex autobiographical narratives, containing more complex temporal markers and descriptives, more specific memories and a greater number of references to self. There were also non-significant trends for children who used more self-regulatory PS to produce a greater volume of narrative, more simple temporal markers and more references to others in their responses to the AM interview. These results thus give partial support for hypothesis 1, which predicted that high PS users would produce a greater volume of narrative than low PS users. In support of hypothesis 2, the high PS users produced more complex narratives than the low PS users, but these

correlational analyses showed no support for the hypothesis that high PS users would produce more ISL in their autobiographical narratives than low PS users.

Next, the relations between self-regulatory PS use and AM were investigated using PS as a dichotomous variable (high vs. low, see pp. 99-100), aiming to examine its possible effect on AM within and across the two cultures. Therefore, a 2 (culture) x 2 (high vs. low PS use) ANOVA was conducted for each of the AM indices.

Volume of Narrative

With respect to volume of narrative, there was a significant main effect of culture ($F[1, 117] = 69.46, p < .001$, two-tailed), and a significant main effect of PS use ($F[1, 117] = 8.00, p < .005$, two-tailed), but no significant interaction ($F[1, 117] = 69.46, p < .001$, two-tailed), showing that the British children, and the high PS users produced significantly more words in their autobiographical narratives than the Saudi children and low PS users.

Narrative Complexity

With respect to narrative complexity, there was a significant main effect of culture ($F[1, 117] = 6.42, p < .025$, two-tailed), but no main effect of PS use ($F[1, 117] = 2.75$, n.s.) and no interaction ($F[1, 117] = 0.78$, n.s.). Thus, British children produced more complex narratives than their Saudi counterparts, but the high and low PS users did not differ in narrative complexity.

Narrative Cohesion

Narrative cohesion was measured using three separate indices: simple temporal markers, complex temporal markers, and descriptives. For simple temporal markers, there was no main effect of culture ($F[1, 117] = 0.02$, n.s.), but a significant main effect of PS use ($F[1, 117] = 6.55$, $p < .025$, two-tailed). The interaction between culture and PS use was not significant ($F[1, 117] = 0.35$, n.s.). Thus, high PS users produced significantly more simple temporal markers in the narratives than low PS users, but there were no significant differences between the British and Saudi children on this variable.

In the British children, there was a non-significant trend for PS use to relate to use of simple temporal markers ($t[56] = 1.91$, $p = .06$, two-tailed). PS use was not related to use of simple temporal markers in the Saudi children's narratives ($t[61] = 1.67$, n.s.).

For complex temporal markers, there was a significant main effect of culture ($F[1, 117] = 14.60$, $p < .001$, two-tailed), a significant main effect of PS use ($F[1, 117] = 7.80$, $p < .01$, two-tailed), and a significant interaction ($F[1, 117] = 4.11$, $p < .05$, two-tailed). Figure 5.1 plots the interactional relation between the degree of self-regulatory PS use (high vs. low), culture (British vs. Saudi) and the employ of complex temporal markers in children's autobiographical narratives.

Figure 5.1: Interaction between Self-regulatory PS, Culture and the use of Complex temporal markers in AM.

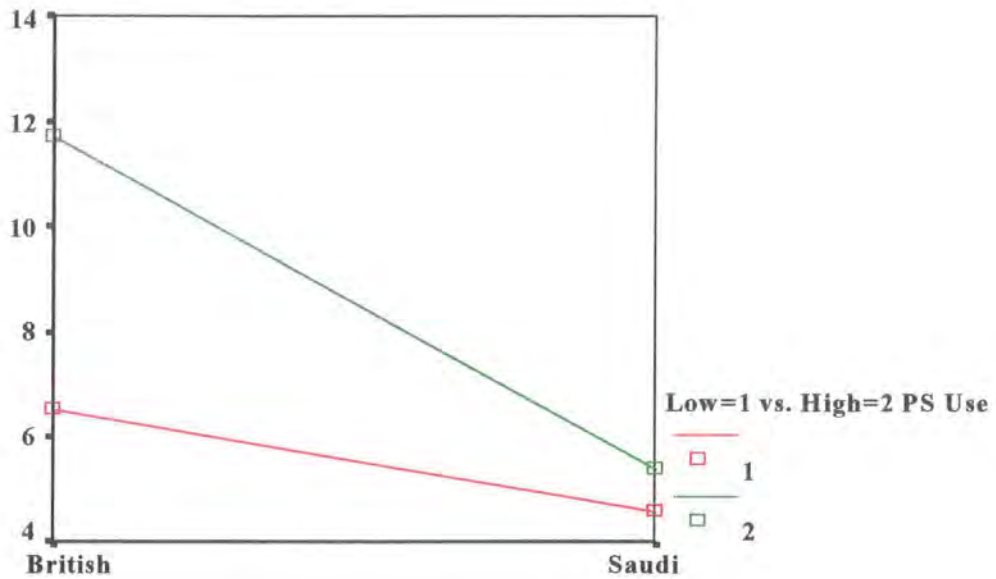
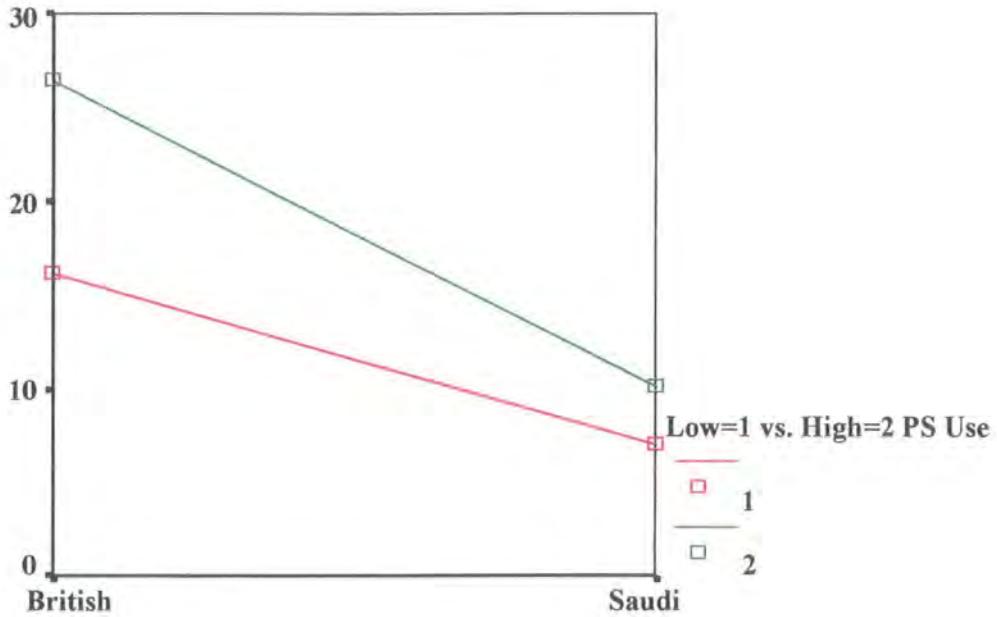


Figure 5.1 shows that difference between the means of using complex temporal markers tends to increase as a function of more employment of self-regulatory PS and the experience of more independent mode of early socialisation of children, though, the increase appears to be related more to the latter, i.e. the cultural factors. This possibility was verified by the results of independent samples t-tests indicating that the high PS users produced significantly more complex temporal markers than the low PS users in the British sample ($t[56] = 2.63, p < .01$, two-tailed), and that there were no differences between the high and low PS users in the Saudi sample ($t[61] = 0.84$, n.s.).

The same pattern was seen for descriptives, with a significant main effect of culture ($F[1, 117] = 61.17, p < .001$, two-tailed), a significant main effect of PS use ($F[1, 117] = 16.72, p < .001$, two-tailed), and a significant interaction ($F[1, 117] = 4.86, p < .05$, two-tailed). Figure 5.2 plots the interaction between the degree of self-regulatory PS use

(high vs. low), culture (British vs. Saudi) and the employ of descriptives in children's autobiographical narratives.

Figure 5.2: Interaction between Self-regulatory PS, Culture and the use of Descriptives in AM.



Similarly, there is an increase in the use of descriptives in autobiographical narratives resulted from the more use of self-regulatory PS and from the child's experience of more independent mode of early socialisation, as illustrated in Figure 5.2. An independent samples t-test showed that the high PS users in the British sample produced significantly more descriptives than the low PS users ($t[56] = 3.31, p < .005$, two-tailed). The high PS users in the Saudi sample also produced significantly more descriptives than the low PS users ($t[61] = 2.39, p < .025$, two-tailed). Thus, in both cultures, high PS use was associated with children using more descriptives in their autobiographical narratives.

Specificity of Narratives

For specific responses, there was a significant main effect of culture ($F[1, 117] = 25.54$ $p < .001$, two-tailed) and of PS use ($F[1, 117] = 6.10$ $p < .025$, two-tailed), but no interaction ($F[1, 117] = 0.68$, n.s.). Thus, British children and high PS users produced more specific memories in their autobiographical narratives.

Mentions of Self and Others

With respect to mentions of self, there was a significant main effect of culture ($F[1, 117] = 74.78$ $p < .001$, two-tailed) and of PS use ($F[1, 117] = 7.44$ $p < .01$, two-tailed), but no interaction ($F[1, 117] = 0.50$, n.s.), showing that British children and high PS users mentioned themselves more in their narratives.

With respect to mentions of other, there was a significant main effect of culture ($F[1, 117] = 42.01$ $p < .001$, two-tailed) and of PS use ($F[1, 117] = 5.40$ $p < .025$, two-tailed), but no interaction ($F[1, 117] = 2.07$, n.s.). Thus, British children and high PS users mentioned other people more in their responses to the AM interview.

Internal State Language (ISL)

Finally, for use of ISL, there was a significant main effect of culture ($F[1, 117] = 38.82$ $p < .001$, two-tailed) and of PS use ($F[1, 117] = 5.08$ $p < .025$, two-tailed), but no interaction ($F[1, 117] = 0.80$, n.s.), showing that British children and high PS users produced more ISL in their autobiographical narratives.

5.9.4.2. Independent Predictors of Children's AM

The final aims of Study 3 were to investigate (i) the relative contribution of culture and PS use, and (ii) the contribution of chronological age, general verbal ability and gender

to children's AM. In order to do this, a series of regression analyses were carried out. For each regression, chronological age, verbal ability, gender, PS use (high versus low) and culture (British versus Saudi) were entered as the independent variables. Blockwise entry method was used where these variables were entered hierarchically (i.e. one by one), and the order of entry was as shown in the tables below. The results of the regression analyses are presented in Tables 5.4 through 5.12.

Predictors of Volume of Narrative

Table 5.4: Multiple regression results for predictors of Volume of Narrative (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.05	0.65	0.00
Verbal ability	0.08	1.10	0.01
Gender	0.06	0.86	0.00
High vs. Low PS	0.18	2.53*	0.04
Culture	0.62	8.47**	0.36

* $p < .025$, ** $p < .001$

As Table 5.4 shows the best predictor of children's volume of narrative was culture followed by high versus low PS use. None of the other independent variables was a significant predictor of this category of AM. Thus, culture can be seen as a significant determinant of the volume of autobiographical knowledge, accounting for 36% of the variance. High versus low PS use was also a significant independent predictor of volume of narrative, accounting for 4% of the variance.

*Predictors of Narrative Complexity***Table 5.5: Multiple regression results for predictors of Narrative Complexity (the British & the Saudi children, N = 121).**

Independent Variables	β	T	R ² -change
Age	0.18	1.88*	0.02
Verbal ability	-0.07	-0.71	0.00
Gender	0.09	0.99	0.01
High vs. Low PS	0.11	1.21	0.01
Culture	0.26	2.86**	0.36

* $p < .10$ ** $p < .005$

Narrative complexity was indexed by the number of words per proposition. The regression analysis, as shown in Table 5.5, revealed that culture was the only significant predictor of this variable accounting for 6% of the variance. The value for children's chronological age approached statistical significance ($p = .06$) indicating that there was a trend for this factor to predict children's narrative complexity. Children's chronological age accounted for 2% of the variance in their autobiographical complexity.

*Predictors of Narrative Cohesion***Table 5.6: Multiple regression results for predictors of Simple Temporal Markers (the British & the Saudi children, N = 121).**

Independent Variables	β	T	R ² -change
Age	0.02	0.15	0.00
Verbal ability	0.02	0.22	0.00
Gender	0.10	1.04	0.01
High vs. Low PS	0.23	2.43*	0.05
Culture	0.02	0.26	0.00

* $p < .025$

With regard to the use of simple temporal markers as the first aspect measuring children's narrative cohesion, the regression analysis, as presented in Table 5.6, showed that PS use (high vs. low) was the only significant predictor of this variable accounting for 5% of the variance. None of the other independent factors was a significant predictor of children's use of simple temporal markers in their AM narratives.

Table 5.7: Multiple regression results for predictors of Complex Temporal Markers (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.04	0.40	0.00
Verbal ability	0.03	0.29	0.00
Gender	0.05	0.52	0.00
High vs. Low PS	0.23	2.67*	0.06
Culture	0.33	3.77**	0.10

*p < .01 **p < .001

As Table 5.7 shows, culture was the best predictor of children's use of complex temporal markers, followed by high versus low PS use. None of the other independent variables was a significant predictor of the number of complex markers. Culture accounted for 10% of the variance in children's use of complex temporal markers, with PS use accounting for a further 6% of the variance.

Table 5.8: Multiple regression results for predictors of Descriptives (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.08	1.11	0.00
Verbal ability	0.07	0.99	0.01
Gender	0.10	1.34	0.01
High vs. Low PS	0.26	3.60*	0.08
Culture	0.59	8.10**	0.33

*p < .005 **p < .001

As shown in Table 5.8, the regression analysis showed that culture was the best predictor of children's use of descriptives, followed by high versus low PS use. At the same time, children's chronological ages, their gender and their verbal ability were not significant predictors of the use of descriptives. Thus, culture accounted for 33% of the variance in children's use of descriptives, with PS use accounting for 8% of the variance.

Predictors of Specificity of Narratives

Table 5.9: Multiple regression results for predictors of Specificity (the British & the Saudi children, N = 121).

Independent Variables	β	t	R ² -change
Age	-0.13	-1.49	0.02
Verbal ability	0.09	1.08	0.01
Gender	0.06	0.75	0.00
High vs. Low PS	0.22	2.67*	0.05
Culture	0.40	4.83**	0.16

*p < .025 **p < .001

Table 5.9 shows that culture was the best predictor of the degree of specificity contained in children's narratives, followed by high versus low PS use. None of the other independent variables was a significant predictor of specificity. Thus, culture and PS use respectively accounted for 16% and 5% of the variance in the specificity of children's narratives.

*Predictors of Mentions of Self and Others***Table 5.10: Multiple regression results for predictors of Self-mentions (the British & the Saudi children, N = 121).**

Independent Variables	β	T	R ² -change
Age	0.03	0.40	0.00
Verbal ability	0.10	1.34	0.01
Gender	0.09	1.27	0.01
High vs. Low PS	0.18	2.52*	0.04
Culture	0.63	8.80**	0.38

* $p < .025$ ** $p < .001$

As shown in Table 5.10 culture followed by high versus low PS use were the best predictors of self-mentions. None of the other independent factors was a significant predictor of this variable. Culture and PS use respectively accounted for 38% and 4% of the variance in mentions of self in children's narratives.

Table 5.11: Multiple regression results for predictors of Other-mentions (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	-0.04	-0.49	0.00
Verbal ability	0.12	1.58	0.02
Gender	0.14	1.84	0.02
High vs. Low PS	0.18	2.28*	0.04
Culture	0.51	6.60**	0.25

* $p < .025$ ** $p < .001$

As for other-mentions, Table 5.11 shows that culture was the best predictor of this variable, followed by high versus low PS use. There was also a non-significant ($p < .07$) trend for gender to predict children's mentions of other people. At the same time, children's chronological age and their verbal ability were not significant predictors of

other-mentions. Culture accounted for 25% of the variance in mentions of other in children's narratives, with PS use accounting for a further 4% of the variance and children's gender accounted for 2% of the variance.

Predictors of ISL Use

Table 5.12: Multiple regression results for predictors of ISL (the British & the Saudi children, N = 121).

Independent Variables	β	T	R ² -change
Age	0.09	1.09	0.00
Verbal ability	0.18	2.27*	0.04
Gender	0.07	0.95	0.01
High vs. Low PS	0.15	1.88	0.03
Culture	0.52	6.66**	0.26

* $p < .025$ ** $p < .001$

With respect to children's use of ISL, the regression analysis showed that culture was the best predictor of this variable, followed by verbal ability, with high versus low PS use just approaching statistical significance ($p = .06$). At the same time, children's chronological age and gender were not significant predictors of ISL. Thus, culture accounted for 26% of the variance in children's use of ISL, with verbal ability accounting for 4% of the variance, and PS use for a further 3% of the variance.

5.9.5. Discussion

Study 3 investigated how children's cultural background and their use of self-regulatory PS relate to the quantity and quality of their autobiographical narratives. The overall predictions were that British children and those who were high PS users would have superior AM compared with their Saudi and low PS using counterparts. The results of

Study 3 showed broad support for these hypotheses. Dealing first with the relations between PS and AM, correlational analyses of the relations between children's use of self-regulatory PS and the indices of AM showed significant positive correlations between PS and five out of nine indices of AM, with positive correlations between PS and a further three indices of AM approaching significance. Thus, high use of self-regulatory PS during a cognitive task was related to narrative complexity, use of complex temporal markers and descriptives, specificity of memories, and references to self in AM. In addition, there were non-significant trends for high use of self-regulatory PS during a cognitive task to correlate positively with volume of narrative, use of simple temporal markers and references to others in AM. The predicted relation between self-regulatory PS use and use of internal state language (ISL) in autobiographical narratives was not, however, found in the correlational analyses.

The results of the ANOVAs presented a similar picture of how self-regulatory PS use related to children's autobiographical narratives. There was a significant main effect of PS use on (i) volume of narrative, (ii) use of simple temporal markers, (iii) use of complex temporal markers, (iv) use of descriptives, (v) specificity of memories, (vi) mentions of self, (vii) mentions of others, and (viii) use of ISL. Thus, on only one of the nine indices of AM (narrative complexity) was high PS use unrelated to children's autobiographical recall. In all cases, children who were high PS users outperformed the low PS users.

With respect to the predicted relations between culture and AM, the ANOVAs showed that there was a main effect of culture on (i) volume of narrative, (ii) narrative complexity, (iii) use of complex temporal markers, (iv) use of descriptives, (v) specificity of memories, (vi) mentions of self, (vii) mentions of others, and (viii) use of

ISL. Thus, as for PS use, culture was related to all but one of the AM indices (use of simple temporal markers). The British children outperformed their Saudi counterparts on all of the AM measures.

In addition, self-regulatory PS and culture interacted significantly with narrative cohesion, particularly, in terms of children's use of complex temporal markers and descriptives. This indicates that structure of children's autobiographical narratives is determined by the strategic use of language both during verbal interaction with other people within an encouraging social environment and through self-regulatory PS.

Finally, regression analyses were conducted to establish the relative contribution of PS and culture to children's AM development. Dealing first with volume of narrative, culture was found to be the best predictor, accounting for 36% of the variance. PS was the only other independent predictor of volume of narrative, accounting for a further 4% of the variance. For narrative complexity, culture was found to be the only significant predictor, accounting for 6% of the variance, with PS not acting as an independent predictor. For simple temporal markers, PS was the only independent predictor, accounting for 5% of the variance; culture did not predict children's use of simple temporal markers in their narratives. With respect to complex temporal markers, culture was the best predictor, with PS being the only other independent predictor. Culture accounted for 10% of the variance, with PS accounting for a further 6% of the variance. For descriptives, culture was the best predictor, accounting for 33% of the variance, with PS being the only other predictor, accounting for 8% of the variance. Turning now to the specificity of children's AM, culture was once again the best predictor, followed by PS. These two factors respectively accounted for 16% and 5% of the variance. With regard to mentions of self and mentions of other, the same pattern of predictors was

found. For both, culture was the best predictor, followed by PS. Culture accounted for 38% of the variance in self-mentions, and 25% of the variance in other-mentions. PS accounted for 4% of the variance in self-mentions, and 4% of the variance in other-mentions. Finally, with respect to children's use of ISL in their narratives, culture was the best predictor (26% of the variance), followed by children's general verbal ability (4% of the variance), with the level of PS as a predictor just approaching statistical significance (3% of the variance).

To summarise the results of the regression analyses, culture was found to be the best predictor of all of the AM indices apart from children's use of simple temporal markers in their narratives, where PS was the only independent predictor. For many of these indices of AM, culture accounted for a large percentage of the variance. Despite the fact that culture was such a strong predictor of children's AM, PS also made an independent contribution to all but one of the AM indices (narrative complexity). Thus, while in general culture can be said to be a better predictor of AM development than PS, PS use still makes a unique contribution to the variance in AM.

Finally, the regression analyses showed that neither children's chronological age nor their gender were predictors of any of the nine indices of AM. Children's verbal ability was an independent predictor of only one of the AM indices (children's use of ISL), with children who were more verbally able using more ISL in their autobiographical narratives.

How do the findings of Study 3 fit in with previous research on individual differences in children's AM development? First, the results of Study 3 extend previous findings of cultural difference in AM between Western and Asian children to a Middle Eastern

society: Saudi Arabia. As discussed earlier in this chapter, cultural variations in children's AM have been attributed to differences in the level of elaboration and content of parent child memory talk (Han et al., 1998; Wang et al., 2000). In individualistic cultures, such as in Britain or America, there is an emphasis on independence, self-expression, autonomy and personal uniqueness (Markus & Kitayama, 1991). For example, Markus and Kitayama (1991) argued that "achieving the cultural goal of independence requires construing oneself as an individual whose behavior is organized and made meaningful primarily by reference to one's own internal repertoire of thoughts, feelings, and action, rather than by reference to the thoughts, feelings, and actions of others" (p. 226). On the other hand, in collectivistic cultures, such as Asian, African and Arab societies, behaviour of individuals is organised and made meaningful by others in an interdependent way (Ji et al., 2000; Markus & Kitayama, 1991). Furthermore, with collectivistic societies, the focus is on "group harmony, interpersonal connectedness, social obligation, and conformity" (Wang et al., 2000, p. 160).

AM is a record of personal and self-related memories that appears to be constructed through parent-child conversations about the past (e.g., Fivush & Fromhoff, 1988; Reese et al., 1993). Parents in a given society implicitly and explicitly create different narrative environments within which children learn a particular style of reporting memories that reflects the prevailing cultural norm. In individualistic societies, a basic goal of parent-child memory conversations is for parents "to help children organise their personal histories in ways that distinguish them as individuals" (Wang et al., 2000, p. 160). In collectivistic societies, these conversations are normally used by parents to "reinforce key social values, such as moral behavior, connectedness, and responsibility towards others" (Wang et al., 2000, p. 160).

The results of Study 3 show that the collectivistic nature of Saudi society is reflected in Saudi children's autobiographical narratives. In particular, the Saudi children's AM were considerably more sparse than those of their British counterparts, and Saudi children's AMs were also less complex and coherent, less specific and contained fewer references to self and personal opinions (in the form of ISL). All of these differences make sense in terms of the way in which the different stresses of the collectivistic versus individualistic society will affect the ways in which parents in the two cultures will talk to their children about the past and its significance for them. However, one finding that was surprising was that Saudi children also mentioned other people in their autobiographical narratives significantly less than the British children. One might have predicted that the collectivistic nature of Saudi society and the way in which parents socialise their children would result in Saudi children making more references to others in their narratives than British children. However, the results of Study 3 did not support this prediction. Thus, it appears that the AMs of Saudi children involve recollections that are at a very general level, with few references to *any* individual person, not merely few references to self.

The other aim of Study 3 was to investigate the relation between children's self-regulatory PS use and AM. Earlier in this chapter, it was proposed that PS may be the mechanism via which social and cultural differences come to affect children's AM. However, the results of Study 3 do not support such a strong role for PS, with PS mediating the relation between culture and AM. For example, in all but one of the regression analyses on the predictors of the various indices of AM, culture was identified as a better predictor of AM than PS, and in several cases, culture accounted for a considerable proportion of the variance. Thus, the proposal that the link between culture and AM is indirect, and functions via PS, does not fit with the findings of Study

3. That said, PS was a significant independent predictor of eight out of nine of the AM indices, showing that PS use accounted for unique variance in these different measures of AM even after culture had been entered into the regression equation. Thus, PS does appear to play some role in children's AM development. The findings on how PS use relates to AM in the Saudi children are interesting in this regard. Saudi children who were high PS users produced autobiographical narratives that were significantly longer, and contained significantly more descriptive terms and references to self than the Saudi low PS users. Thus, even in a collectivistic society where children are not encouraged to talk about themselves or their past experiences, children who rely more on speech to regulate their behaviour have more extensive and richer personal memories.

The results of Study 3 speak to the notion that language plays two roles in enhancing children's AM: (i) through parent-child conversations about the past, and (ii) through children's use of self-reminding language about personally experienced events (Nelson, 1993c; Nelson & Fivush, 2000; Welch-Ross, 1995). No study has yet investigated the relative contribution of these two factors to children's AM development; rather, discussion of this issue has focused on the theoretical proposal that the latter develops out of the former. Indeed, apart from two case studies of individual children (Hudson, 1990; Nelson, 1989), researchers have not even attempted to assess children's use of self-reminding language or how it relates to AM. There are obvious methodological problems associated with obtaining such measures that likely explain this gap in the literature, but the PS data obtained in the studies reported in this thesis may provide an important marker of children's tendency to engage in self-reminding talk. For example, it seems reasonable to assume that children who use speech during a cognitive task to regulate their behaviour will also tend to use speech to help them understand and remember things in their everyday lives. Thus, use of self-regulatory PS in Study 3 may

be considered to be an index of children's use of self-reminding talk. Culture, on the other hand, can be considered to be an index of the type of parent-child conversations about the past that the child has experienced, given that previous research has demonstrated a link between culture and the ways in which parents talk to their children about the past (Mullen & Yi, 1995; Wang et al., 2000). Study 3 may thus be seen as testing the relative contribution of joint parent-child talk and children's own self-reminding talk to children's AM. On the basis of the data reported here, in children between 4 and 8 years, joint talk with parents appears to be the stronger predictor of the volume, complexity and content of their AMs, but self-reminding talk also makes a significant independent contribution to AM development. It is likely that the relative contribution of these two roles of language will change with development, and this issue is returned to in the final chapter. Of course, unequivocal evidence for the relative contribution of jointly constructed narratives and reminding talk for oneself will only be obtained if both of these are measured directly. However, the results of Study 3 represent an important first step towards detailing the role played by sophisticated use of language *by the child* in children's developing AM skills.

General Discussion

6.1. Introduction

The aim of the studies reported here was to investigate young children's memory development within a Vygotskian theoretical framework in an attempt to understand the mechanisms via which socio-cultural factors impact on children's ability to recall information. These studies differ from previous empirical work on cross-cultural differences in memory development in a number of ways. First, the effects of the subtle differences in culture seen between British and Saudi Arabian society were investigated with respect to children's working memory (WM) development. Previous research has tended only to deal with the impact of gross social and cultural factors (e.g. urbanisation, schooling) on memory performance. Second, the studies reported here investigated different types of memory system – phonological WM and autobiographical memory (AM) – rather than focusing on only one type of memory. Looking at how different memory systems develop in the same group of children can enable one to investigate whether certain principles or mechanisms underlie all memory systems. Third, these studies sought to investigate how individual differences in children's own general use of language to regulate their behaviour (private speech: PS) relate both to children's cultural background and their memory performance. In this way, these studies adopted a notion voiced by Mistry (1997) that a sociocultural approach to memory should be based on the assumption that the individual and the act of remembering are inseparable from their social and cultural contexts. In sum, the studies reported here enabled one to track the relations between memory development

and (i) the child's external social world (cultural background), and (ii) the child's own internalisation of the interpersonal interactions experienced in that social world (PS).

As outlined in previous chapters, the developmental course of the development and internalisation of PS bears many resemblances to children's acquisition of verbal rehearsal strategies and their ability to recode visually presented material phonologically. These advances in WM first begin around 3 years, and children have become proficient in their use by around 6 years, just as children first begin to use PS between 2 and 3 years of age, with PS being increasingly internalised by 6 or 7 years. Similarly, researchers have discussed how children's own use of self-reminding speech facilitates their AM development. In Chapter 5, it was argued that self-reminding speech is in fact PS. The studies reported here sought to address the issue of how social and cultural practices come to affect memory development, since there is at present a missing link between external factors aiding memory development (overt speech in WM tasks, parent-child conversations about the past in AM performance) and the child's internal mental activity aimed at aiding memory recall (covert rehearsal of to-be-remembered material, self-reminding speech to self).

The central hypothesis of the studies reported in this thesis was that children's use of PS might provide the genetic link between the external (interpersonal) processes and the internal (intrapersonal) processes implicated in developmental shifts in memory performance. Before discussing in greater detail the issues arising from these studies, the results are summarised.

6.2. Summary of main findings

6.2.1. Study 1

Before examining the possibility that PS might be the mechanism via which social and cultural factors facilitate or constrain memory development, it was first necessary to document how the children in Britain and Saudi Arabia used PS, and to establish whether its function was the same in both cultures. Study 1 was the first cross-culturally study on children's PS, and can be seen as a test of Vygotsky's (e.g., 1978, 1936/1986) assumptions regarding the universality of PS and its social origins. In addition, Study 1 also investigated relations between PS and children's verbal maturity, chronological age, and task performance.

Based on the cultural variations between British and Saudi children in terms of mode of communication (verbal vs. non-verbal) and degree of verbal social interaction experienced both at home and at school, it was predicted that Saudi children would be significantly delayed in their use and internalisation of PS compared with their British counterparts. Furthermore, given the greater social opportunities afforded to Saudi girls, it was predicted that they would tend to produce significantly more PS, and utilise the advanced levels of PS, more than Saudi boys. The main findings of Study 1 were as follows:

- a) The vast majority of British and Saudi children engaged in some PS while they performed the Tower of London task, providing support for Vygotsky's (1934/1986) argument that PS is a universal stage in cognitive development.
- b) There was also evidence supporting Vygotsky's (e.g., 1978) view that PS is ontogenetically derived from social speech. For example, the British children's use of social speech was significantly correlated with the lowest level of private

utterances (PS1) and with their total use of PS. The social speech produced by the Saudi children was significantly associated with the more sophisticated types of PS (PS3 and the composite measure of self-regulatory PS [PS2 + PS3]), as well as with the total use of PS.

- c) Children's general verbal ability in the two cultural groups was not related to use of any type of PS.
- d) There was a support for a curvilinear relationship between children's chronological age and their overall use of PS in both cultural groups. At the same time, the more sophisticated, self-regulatory types of PS were found to increase with development while level 1 PS declined with age.
- e) Although somewhat different results were found for the relation between PS use and task performance in the British and Saudi children, positive associations between these factors were found in both cultures. The proportionate use of the most sophisticated type of PS (PS3) was found to enhance task performance among the British children, and the Saudi children who were high PS users performed significantly worse when they were prevented from using PS during the verbal suppression task.
- f) The effect of culture on PS was found to be on the developmental progression towards internalising PS. British children engaged in significantly more PS3 than their Saudi counterparts, and culture was found to be the best predictor of children's use of this most sophisticated form of PS. Saudi girls used significantly more PS3 than Saudi boys. In contrast, the effect of gender on PS within the British group was found to be that boys produced more PS2 than girls. It should be noted that the effect of gender on PS was within each culture, but not across cultures.

The findings of Study 1 regarding the relation between age and PS development, and the relations between social speech and PS, largely supported those of previous research (e.g. Berk & Garvin, 1984; Fernyhough, 1994; Fernyhough et al., 2002; Kohlberg et al., 1968). The results of Study 1 represent a significant advance in PS research in providing the first evidence for cross-cultural differences and similarities in PS development.

The fact that all but three children in the total sample of 121 used PS supports Vygotsky's (1934/1986) contention that PS is a universal stage in children's cognitive development. The same age-related curvilinear progression of overall PS use was also seen in both cultures. However, the cultural differences identified in PS development support Vygotsky's (1978) argument that PS has its origins in social interactions, and represents a waystation in the internalisation of social speech into inner speech. The predicted cultural variations in PS use were found, with British children using significantly more sophisticated PS than their Saudi counterparts. The age-related pattern of development of the different types of PS seen in the Saudi children suggested that their comparatively restricted access to social interaction with parents and with peers and teachers at school affected the rate of development and internalisation of PS, rather than its actual occurrence. These findings mirrored those reported by Berk and Garvin (1984) in their sample of Appalachian children who had experienced similarly constrained opportunities for social interaction with parents.

Study 1's finding that Saudi girls produced more sophisticated PS than Saudi boys also highlights the social origins of PS, given that Saudi girls have considerably greater social contact. It also represents the inherent impact of social and cultural processes on mental processes that was reflected in Study 1 through the positive relations between PS and social speech. Based on the genetic relation between PS and social speech, the

ultimate goal of this thesis was to manipulate children's PS in order to explain individual differences in children's remembering behaviour within and across cultures. This has involved, as indicated earlier, viewing the impact of social and cultural processes on children's memory development via the extent to which children tended to use self-regulatory PS. Rationale of this suggestion stems from the fact that both children's use of PS and their memory performance are considered subject to differences in early socialisation of the child either within a single culture or cross-culturally. And as there were differences between the British and the Saudi children in terms of the development and function of self-regulatory PS reflecting variations in the process of children's socialisation between the British and the Saudi society, it was predicted that the British children will be advanced in their memory performance compared to the Saudi children. It was also predicted that within each cultural group those children who rely more on self-regulatory PS (high PS users) will show a superior memory performance compared to the low PS users.

6.2.2. Study 2

As discussed in Chapter 4, the PSE is considered to be an ontogenetic phenomenon indicating that adults and older children tend to encode the to-be-remembered visually presented items in phonological forms in order to use the subvocal rehearsal to improve memory. Therefore, adults and older children are expected to make errors when recalling items that sound alike (e.g. Conrad, 1971; Gathercole & Baddeley, 1993). Younger children, on the other hand, are assumed to lack the ability to use language strategically via the articulatory loop to aid recall (Gathercole & Hitch, 1993). Certain researchers (Ford & Silber, 1994; Hitch et al., 1991) have proposed that this inability is due to immaturity in the utilisation of what they termed "inner speech" (meaning subvocal rehearsal in WM). As a result, younger children have been reported not to

show the PSE (Hitch et al., 1991). Within WM developmental studies, younger children's inability to use inner speech in order to treat the to-be-remembered items verbally was inferred from their reliance on overt labelling of remembered items and how this method was resulted in improving their remembering and that they have experienced the PSE. With development, younger children will internalise speech, which will result in less dependence on overt speech (i.e. out-loud labelling of remembered items) and utilisation of inner speech (i.e. the subvocal rehearsal) (Ford & Silber, 1994). However, this developmental account does not provide an explanation regarding the ontogenetic shift from over speech to inner speech, nor does it identify the mechanism that might be responsible for such a shift.

Study 2 addressed this issue by attempting to establish the developmental and functional involvement of language in short-term remembering by investigating links between private speech and children's susceptibility to the phonological similarity effect (PSE). The relation between culture and children's phonological WM performance was also investigated by including both British and Saudi children. A key assumption in Vygotsky's argument concerning the developmental and functional relationship between language and thought is that the inner speech (verbal thought) used by adults "to plan and regulate their activity derives from their participation in social speech activity during earlier periods in ontogenesis" (Wertsch, 1980, p. 150). As indicated in Chapter 2, young children are unable to use inner speech to regulate their behaviour, since they have not yet fully internalised speech; they therefore rely more on PS, which, at their level of intellectual development, is equivalent to inner speech since "inner speech and voiced egocentric speech fulfil the same function" (Vygotsky, 1999, p. 32).

The main findings of Study 2 were as follows:

- a) In both cultures, susceptibility to the PSE in visually-presented items was a function of children's chronological age. Children did not show significantly poorer recall of phonologically similar items (PSI) compared with recall of phonologically dissimilar items (PDI) until around 6 years of age.
- b) Self-regulatory PS was found to relate to superior WM performance in both cultures, but children who relied on PS to regulate their behaviour were more susceptible to the PSE. That is, only children who were classified as high PS users recalled the PSI significantly worse than the PDI, and this was true for the high PS users in both cultures. This suggests that the high PS users are more skilful in subvocal rehearsal, but their reliance on rehearsal using the articulatory loop makes them more prone to the phonological similarity of the to-be-remembered items.
- c) Culture was found not to relate to susceptibility to the PSE or recall of PDI, although the Saudi children recalled the PSI significantly better than their British counterparts.
- d) Regression analyses provided further support for the suggestion that self-regulatory PS is an important determinant of children's susceptibility to the PSE. PS use was found to be the only predictor of whether children were prone to the PSE.

The findings of Study 2 are thus in line with previous research documenting the existence of the PSE and the age at which children become susceptible to the phonological properties of the to-be-remembered items (e.g., Conrad, 1971; Ford & Silber, 1994; Gathercole & Baddeley, 1993; Hitch et al., 1991). Study 2 provided the

first evidence for cross-cultural consistency in the age at which children become prone to the PSE. In addition, Study 2 has further extended understanding of the verbal developmental nature of the PSE by relating it to children's use of PS. By testing the relation between PS and the PSE cross-culturally, the results of Study 2 have extended those obtained by Fernyhough et al. (2002).

By using Vygotsky's account of the development of PS within WM performance, the results of Study 2 help to formalise the developmental relation between the child's use of speech and WM development, and may provide an explanation for the developmental shift from reliance on overt labelling of the to-be-remembered items to subvocal rehearsal to aid recall. PS may also explain individual differences in same age children's use of verbal rehearsal strategies in short-term memory tasks.

6.2.3. Study 3

The aim of Study 3 was to elaborate further the links between social and cultural factors and children's memory development by examining a second memory system: AM. Previous research had identified parent-child conversations about the past and children's own self-reminding talk about past events as important facilitators of AM (e.g., Nelson, 1993c; Nelson & Fivush, 2000; Welch-Ross, 1995). However, research has not yet identified the mechanism via which social interactions come to impact on AM recall, nor has research directly measured children's use of self-reminding talk. Study 3 investigated whether children's use of self-regulatory PS might be the mechanism via which social interactions and cultural practices affect children's AM. The main findings of Study 3 were as follows:

- a) There was a support for a strategic use of language via PS in the development of children's personal narratives in the sense that the more sophisticated, self-regulatory types of this verbal behaviour (PS2 + PS3) correlated positively with all of the indices of AM.
- b) Self-regulatory PS was significantly associated with (i) complexity of children's narrative, (ii) number of complex temporal markers, (iii) number of descriptives, (iv) specificity of responses, and (v) number of references to the self. The relations between self-regulatory PS and children's volume of narrative, their use of simple temporal markers and the frequency with which they mentioned other people in their narratives approached statistical significance. There was no relation between self-regulatory PS and children's use of internal state language (ISL) in their autobiographical narratives.
- c) Support for the effect of frequency of use of self-regulatory PS on children's personal narratives also came from the findings that the high PS users in each cultural group, outperformed the low PS users in all but one of the indices of AM (narrative complexity).
- d) As for cultural differences, the British children produced a greater volume of autobiographical narrative, that was better organised and contained more detailed descriptions than did the Saudi children. In addition, the narratives produced by the British children were more cohesive, containing more complex temporal markers, more specific memories and more mentions of self and other people, than those of the Saudi children. Finally, British children used more ISL in their autobiographical narratives than their Saudi counterparts. In general, culture was found to be the best predictor of AM, with PS use being the only other independent predictor.

The findings of Study 3, add to evidence from Asian cultures that the social practices adopted by collectivistic societies constrain children's AM development (e.g. Han et al., 1998; Wang et al., 2000). The consistent relations found between PS and children's AM development also support the contention that PS might be a mechanism via which joint conversations about the past come to influence children's AM. However, the fact that culture was such a strong independent predictor of several indices of AM suggests that social and cultural practices play a direct role in AM memory, and that this relation is not mediated by PS. Rather, the results of study 3 show that the types of social interaction that the child engages in, and the child's own tendency to use PS to regulate behaviour, make independent contributions to AM development.

6.3. Issues Arising from the Three Studies and Future Directions for Research

As the summary of results shows, culture had a strong effect on children's AM, but appeared to have considerably less impact on children's WM performance. Indeed, while the British children outperformed their Saudi counterparts in terms of AM recall, the only cultural difference in WM performance was Saudi children's superior recall of phonologically similar items. Why might culture have different effects on the two types of memory? The most obvious answer to this question lies in the Saudi educational system, whereby children are taught in a very formal setting, with great emphasis on memorisation of information for subsequent recall in examinations. In contrast, the British children's educational experiences are based much more on learning through play and active interaction with educational materials and with peers and teachers. Thus, the memorisation training received by the Saudi children may have helped them to recall the information in the WM tasks. However, it is unlikely that these educational experiences will be of use in children's recall of their AMs, leading to the Saudi children showing considerable deficits in the organisation and recall of personal

memories compared with the British children. In order to provide a more complete picture of the development of AM in Saudi society, future research should attempt to establish the average age for earliest memory reported by Saudi adults. Previous research has documented that people in Asian cultures date their earliest memory significantly later than American adults. For example, Mullen (1994) reported that Korean adults dated their earliest memory on average 16.7 months later than did their White American counterparts. Recall from Chapter 5 that it was in these cultures that children also demonstrated deficits in AM development compared with American children. On the basis of this previous cross-cultural research, and the results of Study 3, one would therefore predict that Saudi adults will date their earliest memory later than would adults in the West. If such a prediction were supported, this would add weight to the argument that early social experiences play an important role in the construction of AMs.

Unlike the different effects of culture on WM and AM, children's use of self-regulatory PS was found to be an important determinant of both types of memory. The relationship between PS and AM is perhaps even more striking due to the fact that culture accounted for such a high proportion of the variance in several indices of children's AM, and yet PS use still contributed independently to children's AM. For example, among the Saudi children, those who were classified as high PS users had superior AM to those who were low PS users. Thus, use of PS to regulate one's behaviour appeared to enable these children to buck their cultural norm of providing short, general narratives, lacking in descriptive detail and containing few references to self or others. Similarly, in WM performance, the high PS users among the Saudi children showed significantly worse recall of the PSI compared with the PDI, although the Saudi children as a group recalled the PSI significantly better than their British counterparts. One interesting question

arising from this is why certain Saudi children manage to use PS to regulate their behaviour, and in turn resemble the British children in terms of WM and AM performance? One reason for this may be the way in which Saudi society is gradually changing. Saudi society has undergone a rapid socio-economic change since the oil boom at the beginning of the 1970s which has resulted in some traditional values and approaches to parenting being altered in certain families (Al-Banyan, 1980; Alsudairi, 2000). For example, the economic change has contributed to more financial independence from extended families, giving rise to more nuclear families. This has resulted in parents, and especially fathers, spending more time with their children, thus providing children with more chances to discuss family matters with their parents (Alsaif, 1997, cited in Alsudairi, 2000). Within these nuclear families, which are comparatively removed from the more traditional influences of older generations, the mode of parent-child interaction and conversation is likely to be much more similar to that seen in typical British families. Thus, these differences in parenting *within* Saudi society may be responsible for some children using self-regulatory PS in a way that goes against the prevailing cultural norm. However, this explanation is as yet untested, since the studies reported here did not obtain any direct measures of parent-child interaction. The prediction would be that Saudi children who are high PS users will have been brought up in less traditional families.

Of course, another way to address this issue is to ask why certain British children also bucked their cultural norm in being *low* PS users. One could make the same arguments for individual differences in parent-child interaction within British families being responsible for differences in children's PS use. Once again, this highlights the need to include direct measures of parent-child interaction.

In the Discussion section of Chapter 5, it was claimed that self-reminding talk about past events was equivalent to self-regulatory PS. In order to test this claim, future research should make detailed naturalistic observations of children's general use of speech, as well as their strategic use of PS during tasks. One would predict that children who engage in high levels of self-reminding talk will also engage in high levels of general self-regulatory PS both in everyday activities and during more formalised tasks. Indeed, even without a focus on self-reminding speech as a determinant of AM, such a study would address a serious shortcoming in the PS literature, since studies have not investigated links between children's naturalistic use of PS and their use of PS during formal tasks.

One further contribution of the studies reported here is worthy of note. These studies are unusual because they included a measure of children's general verbal ability, a factor that is rarely taken into account in research on PS or memory development. Despite the fact that one might predict that general verbal skills would be related to children's ability to use phonological recoding and rehearsal in the articulatory loop, to tell full and coherent narratives about past events, and to use speech to regulate behaviour during a cognitive task, the studies reported here showed remarkably few positive associations between these factors and general verbal ability. Verbal ability was not related to any type of PS, it predicted only one of the nine indices of AM (children's use of ISL), and although it was an independent predictor of children's recall of PSI and PDI, it was not related to susceptibility to the PSE. However, the studies reported here measured children's receptive verbal ability, and it could be argued that a measure of children's *expressive* verbal ability would be more strongly related to PS and memory development. There are several reasons for querying this suggestion. First, it is difficult to obtain objective measures of children's expressive verbal ability using standardised

scales, since most rely on parental report, rather than extended observation of children's use of language, as the basis for the assessment. In addition, the studies reported in this thesis did take measures of children's expressive use of speech as part of the PS assessments. Recall that children's social speech during the Tower of London tasks was also measured, and social speech was found in Study 2 to have a *negative* impact on children's WM performance. For example, in both the British and Saudi children, social speech showed a significant negative correlation with recall of PDI and PSI. This contrasts starkly to the positive associations seen between self-regulatory PS and children's WM and AM performance. This suggests that it is how children use speech to regulate their behaviour, rather than their general expressive and receptive linguistic abilities, that determines memory development.

Finally, it is important to sound a note of caution, given the arguments made above for the role of PS in children's memory development. The children who did not use speech-to-self to regulate their behaviour during the Tower of London task in Study 1 were assumed not yet to have developed PS. However, an alternative suggestion is that these children have already internalised PS and are thus the most sophisticated PS users. But this suggestion seems unlikely due to the fact that only three children (one British and two Saudi) failed to use any PS during the Tower of London tasks across two testing sessions. Moreover, given the ages of the participating children, it is unlikely that PS would be completely internalised, since Berk (1992) has argued that the internalisation of PS takes place over a much longer age span than Vygotsky anticipated, with internalisation proceeding throughout the primary school years, and perhaps even continuing when the child is at secondary school. Of course, the only definitive way to prove that little or no PS use indicates an inability to use speech to regulate behaviour would be to conduct a longitudinal study beginning when children first start to become

competent users of language. Future research should therefore attempt to investigate the emergence and development of PS and how its genesis impacts on the child's memory development. Such a study, performed cross-culturally and including assessments of parent-child interaction, would considerably improve our understanding of how and why verbalisation plays a role in determining memory development.

Other interesting avenues for future research on the relation between PS and WM development include investigating whether PS shows similar relations to other aspects of short-term remembering, such as susceptibility to the word-length effect (Baddeley, Thomson & Buchanan, 1975), and non-word repetition (e.g. Gathercole, Pickering, Hall & Peaker, 2001). This possibility, which was also raised by Fernyhough et al. (2002), would further support possible roles played by PS in the development of subvocal rehearsal, identified by Study 2. The relation between PS and the PSE in visually presented material could also be investigated further by using both conditions of silence and overt labelling of the to-be-remembered items.

As for the link between children's PS and AM, the relations identified in Study 3 could be extended by investigating whether children's PS and their use of self-reminding talk relates to their story-telling abilities and memory for story narratives. It may be that children who rely on language to regulate their behaviour also tend to tell stories to aid their understanding of the world, rather than relying merely on direct questioning of other people or active exploration to establish how things work and why events happen.

To conclude, the studies reported in this thesis provide evidence for the inherent influence of social and cultural factors on memory development. In establishing links between PS and children's memory development, these studies have provided a

potential mechanism via which children begin to use speech – both overtly and covertly – to aid their recall from working memory and from long term autobiographical memory. These studies have therefore made an important first step towards providing empirical evidence for why language, social interaction and culture may affect different types of memory development, as well as outlining a meaningful theoretical framework in which individual differences in memory development can be understood.

References

Adams, S., Kuebli, J., Boyle, P. A. & Fivush, R. (1995). Gender differences in parent-child conversations about past emotions: A longitudinal investigation. *Sex Roles*, **33**, 309-323.

Al-Banyan, A. S. (1980). *Saudi Students in the United States- a study of cross cultural education and attitude change*. London: Ithaca Press.

Aldrich, R. (1982). *An introduction to the history of education*. London: Hodder and Stoughton.

Al-Farsy, F. (1986). *Saudi Arabia: A Case Study in Development*. London: KPI Limited.

Al-Garni, M. M. (2000). *The impact of family structure and family function factors on the deviant behaviors of high school students in Makkah city, Saudi Arabia*. Unpublished PhD dissertation, Ohio State University, USA.

Alotaibi, B. J. (1993). *Attitudes of teachers toward the "knowing that" and "knowing how" methods of teaching in Saudi Arabian secondary schools*. Unpublished PhD dissertation, University of Pittsburgh, USA.

Al-Shukhs, A. S. (1998). *The Scale of children's Adaptive behaviour: standardised on Egyptian and Saudi Arabian children (The Manual)*. Riyadh: Sharekat Al-Safahat Al-Zahabia Al-Mahdoda. [In Arabic]

Alsudairi, N. M. (2000). *Children's books of Saudi Arabia: Literary and cultural analysis*. Unpublished PhD dissertation, The University of Arizona, USA.

Amsterdam, B. (1972). Mirror self-image reactions before age two. *Developmental Psychobiology*, **5**, 297-305.

Anderson, L. H. (2001). *Saudi Arabia*. Minneapolis, Minnesota: Carolrhoda Books, Inc.

Anderson, S. J. & Conway, M. A. (1993). Investigating the structure of autobiographical memory. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **19**, 1178-1196.

Anderson, S. J. & Conway, M. A. (1997). Representations of autobiographical memories. In M. A. Conway (Ed.), *Cognitive Models of Memory*. Hove East Sussex: Psychology Press, Publishers.

Andy, F. (2000). *Discovering Statistics: Using SPSS for Windows*. London: SAGE Publications Ltd.

Arlin, M., & Brody, R. (1976). Effects of spatial presentation and blocking on organization and verbal recall at three grade levels. *Developmental Psychology*, **12**, 133-118.

- Atkinson, R. C. & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation*, New York: Academic Press.
- Atkinson, R. C. & Shiffrin, R. M. (1976). Human memory: A proposed system and its control processes. In J. M. Gardiner (Ed.), *Reading in human memory*, London: Methuen & Co.
- Azmitia, M. (1992). Expertise, Private Speech, and the Development of Self-Regulation. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Baddeley, A. D. (1966). Short-term memory for word sequences as a function of acoustic, semantic and formal similarity. *Quarterly Journal of Experimental Psychology*, **18**, 362-365.
- Baddeley, A. D. (1978). The trouble with levels: A reexamination of Craik and Lochhart's framework for memory research. *Psychological Review*. Vol. **85**, No. **3**, 139-152.
- Baddeley, A. D. (1982). *Your Memory: A User's Guide*. Harmondsworth: Penguin Books Ltd.
- Baddeley, A. D. (1985). *The Psychology of Memory*. London: Harper & Row, Publishers.
- Baddeley, A. D. (1986). *Working memory*. Oxford: Oxford University Press.
- Baddeley, A. D. (1990). *Working memory*. Oxford: Oxford University Press.
- Baddeley, A. D. (1993). Working Memory and Conscious Awareness. In A. F. Collins, S. E. Gathercole, M. A. Conway & P. E. Morris (Eds.) *Theories of Memory*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Baddeley, A. D. (2000). Short-Term and Working Memory. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc.
- Baddeley, A. D. & Hitch, G. J. (1974). Working Memory. In G. H. Bower (Ed.), *The Psychology of learning and Motivation* (Vol. 8). New York: Academic Press.
- Baddeley, A. D., Thomson, N., & Buchanan, M. (1975). Word length and the structure of short-term memory. *Journal of Verbal Learning and Verbal Behavior*, **14**, 575-589.
- Baker-Ward, L., Ornstein, P. A. & Holden, D. J. (1984). The expression of memorization in early childhood. *Journal of Experimental Child Psychology*, **37**, 555-575.

- Bakhtin, M. M. (1981). In M. Holquist (Ed.) *The dialogic imagination: Four essays by M. M. Bakhtin* (translated by C. Emerson and M. Holquist). Austin: University of Texas Press.
- Bakhurst, D. (1990). Social memory in Soviet thought. In D. Middleton & D. Edwards (Eds.), *Conversational Remembering*. London: Sage.
- Barsalou, L. W. (1988). The content and organization of autobiographical memories. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory*. Cambridge, England: Cambridge University Press.
- Bartlett, F. C. (1932). *Remembering*. Cambridge: Cambridge University Press.
- Bartlett, F. C. (1937). Psychological methods and anthropological problems. *Africa* 10, 401-420.
- Bartsch, K. & Wellman, H. M. (1997). *Children Talk About Mind*. Oxford: Oxford University Press, Inc.
- Bauer, P. J. (1993). Identifying subsystems of autobiographical memory: commentary on Nelson. In C. A. Nelson (Ed.), *Memory and affect in development*. Hillsdale, NJ: Erlbaum.
- Bauer, P. J. (1997). Development of memory in early childhood. In, N. Cowan (Ed) *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Bauer, P. J. & Wewerka, S. (1997). Saying is revealing: Verbal expression of event memory in the transition from infancy to early childhood. In P. van den Broek, P. J. Bauer, & T. Bourg (Eds.), *Developmental spans in event comprehension and representation: Bridging fictional and actual events*. Hillsdale, NJ: Erlbaum.
- Beeghly, M., Bretherton, I., & Mervis, C.B. (1986). Mothers' internal state language to toddlers. *British Journal of Developmental Psychology*, 4, 247-261.
- Behrend, D. A., Rosengren, K. S., & Perlmutter, M. (1989). A new look at children's private speech: The effects of age, task difficulty, and parent presence. *International Journal of Behavioural Development*, 12, 305-320.
- Behrend, D. A., Rosengren, K. S., & Perlmutter, M. (1992). The relation between private speech and parental interactive style. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Belmont, J. M. & Butterfield, E. C. (1977). The Instructional Approach to Developmental Cognitive Research. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.

- Berk, L. E. (1986). Relationship of elementary school children's private speech to behavioral accompaniment to task, attention, and task performance. *Developmental Psychology*, **22**, 671-680.
- Berk, L. E. (1992). Children's Private Speech: An Overview of Theory and the Status of Research. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Berk, L. E. (1994). Why Children Talk to Themselves. *Scientific American*, 78-83.
- Berk, L. E., & Garvin, R. A. (1984). Development of private speech among low-income Appalachian children. *Developmental Psychology*, **20**, 271-286.
- Berk, L. E., & Landau, S. (1993). Private speech of learning disabled and normally achieving children in classroom academic and laboratory contexts. *Child Development*, **64**, 556-571.
- Berk, L. E., & Potts, M. (1991). Development and functional significance of private speech among attention-deficit hyperactivity disorder and normal boys. *Journal of Abnormal Child Psychology*, **19**, 357-377.
- Berk, L. E. & Spuhl, S. T. (1995). Maternal Interaction, Private Speech, and Task Performance in Preschool Children. *Early Childhood Research Quarterly*, **10**, 145-169.
- Berry, J. W., Dasen, P. R. & Saraswathi, T. S. (1997). *Handbook of cross-cultural psychology. Vol.2: Basic processes and human development*. Needham Heights, MA: Allyn & Bacon.
- Berry, J. W., Poortinga, Y. H. & Pandey, J. (1997). *Handbook of cross-cultural psychology. Vol. 1: Theory and method*. Needham Heights, MA: Allyn & Bacon.
- Bershon, B. L. (1992). Cooperative Problem Solving: A Link to Inner Speech. In L. Hertz & N. Mille (Eds.), *Interaction in Cooperative Groups: The theoretical anatomy of group learning*. CUP.
- Best, J. B. (1999). *Cognitive psychology*. Belmont: Wadsworth Publishing Co.
- Bivens, J. A., & Berk, L. E. (1990). A longitudinal study of the development of elementary children's school private speech. *Merrill-Palmer Quarterly*, **36**, 443-463.
- Bivens, J. A., & Hagstrom, F. (1992). The representation of private speech in children's literature. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. (New Jersey: Lawrence Erlbaum Assoc.
- Bjorklund, D. F. & Harnishfeger, K. K. (1987). Developmental differences in the mental effort requirements for the use of an organizational strategy in free recall. *Journal of Experimental Child Psychology*, **44**, 109-125.

- Bjorklund, D. F. & Douglas, R. N. (1997). The development of memory strategies. In N. Cowan (Ed) *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Blackburne, L. (2002). "Education, Primary,". Microsoft® Encarta® Online Encyclopedia. <http://encarta.msn.co.uk>
- Borkowski, J. G., Milstead, M. & Hale, C. (1988). Components of Children's Metamemory: Implications for Strategy Generalization. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal Changes and Individual Differences*. New Jersey: Lawrence Erlbaum Assoc.
- Brainerd, C. J. (1981). Stages II. *Developmental Review*, 1, 63-81.
- Brainerd, C. J. (1983). Working-memory system and cognitive development. In C. J. Brainerd (Ed.), *Recent advances in cognitive-developmental theory, progress in cognitive development research*. New York: Springer-Verlag.
- Brewer, W. F. (1986). What is autobiographical memory? In D. C. Rubin (Ed.), *Autobiographical memory*. Cambridge, England: Cambridge University Press.
- Bronson, M. B. (2000). *Self-regulation in early childhood, nature and nurture*. New York: The Guilford Press.
- Brown, A. L. (1975). The development of memory: Knowing about knowing, and knowing how to know. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 10). New York: Academic Press.
- Brown, A. L. (1978). Knowing when, where and how to remember: A problem of metacognition. In R. Glaser (Ed.), *Advances in instructional psychology*. NJ: Erlbaum.
- Brown, S. C. & Craik, F. (2000). Encoding and retrieval information. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc.
- Brown, N. R., Shevell, S. K. & Rips, L. J. (1986). Public memories and their personal context. In D. C. Rubin (Ed.), *Autobiographical memory*. Cambridge, England: Cambridge University Press.
- Buckner, J. P. & Fivush, R. (1998). Gender and self in children's autobiographical narratives. *Applied Cognitive Psychology*, 12(4), 407-429
- Buragga, K. A. (2001). *An investigation of the relationship between national culture and the adoption of information technology*. Unpublished PhD dissertation, George Mason University, USA.
- Campione, J. C., & Brown, A. L. (1977). Memory and Metamemory Development in Educable Retarded Children. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.

- Case, R. (1978). Intellectual development from birth to adulthood: A neo-Piagetian interpretation. In R. S. Siegler (Ed.), *Children's thinking: What develops?* Hillsdale, NJ: Erlbaum.
- Carr, M., Kurtz, B. E., Schneider, W., Turner, L. A. & Borkowski, J. G. (1989). Strategy acquisition and transfer among American and German children: Environmental influences on metacognitive development. *Developmental Psychology*, *25*, 765-771.
- Cavanaugh, J. C., & Perlmutter, M. (1982). Metamemory: A critical examination. *Child Development*, *53*, 11-28.
- Ceci, S. J., Bronfenbrenner, U. & Baker, J. G. (1988). Memory in context: The case of prospective remembering. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal changes and individual differences*. New Jersey: Lawrence Erlbaum Assoc.
- Chi, M. T. H. (1978). Knowledge structures and memory development. In R. Siegler (Ed.), *Children's thinking: What develops?* Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chi, M. T. H. (1988). Children's Lack of Access and Knowledge Reorganization: An Example from the Concept of Animism. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal Changes and Individual Differences*. New Jersey: Lawrence Erlbaum Assoc.
- Christopher, D. (1999). *British Culture: An introduction*. London: Routledge.
- Cohen, G. (1989). *Memory in the real world*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Cohen, G. (1993). Part I, everyday memory. In G. Cohen, G. Kiss & M. Le Voi (Eds.), *Memory Current Issues*. Buckingham, Philadelphia: Open University Press.
- Cohen, G., Kiss, G. & LeVoi, M. (1993). *Memory, Current Issues*. Buckingham, Philadelphia: Open University Press.
- Cole, M. (1995). The supra-individual envelope of development: Activity and practice, situation and context. In J. J. Goodnow, P. J. Miller & F. Kessel (Eds.), *Cultural practices as contexts for development*. Los Angeles, CA: Sage.
- Cole, M., & Scribner, S. (1977). Cross-Cultural Studies of Memory and Cognition. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Cole, M. & Scribner, S. (1978). Introduction. In L. S. Vygotsky, *Mind in society: The development of higher psychological processes*. (M. Cole, V. John-Steiner, S. Scribner and E. Souberman, eds.). Cambridge, MA: The MIT Press.
- Cole, M., Gay, J., Glick, J. A. & Sharp, D. W. (1971). *The cultural context of learning and thinking*. New York: Basic Books.

- Collins, A. F., Gathercole, S. E., Conway, M. A., & Morris, P. E. (1993). (Eds.). *Theories of Memory*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Colombo, J. (1993). *Infant Cognition: Predicting Later Intellectual Functioning*. Newbury Park: Sage Publications, Inc.
- Conrad, R. (1971). The chronology of the development of covert speech in children. *Developmental Psychology* **5**, 398-405.
- Conway, M. A. (1990). Associations between autobiographical memories and concepts. *Journal of Experimental Psychology: Learning, Memory and Cognition*, **16**, 799-812.
- Conway, M. A. & Rubin, D. C. (1993). The Structure of Autobiographical Memory. In A. F. Collins, S. E. Gathercole, M. A. Conway & P. E. Morris (Eds.), *Theories of Memory*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Corsale, K. & Ornstein, P. A. (1980). Developmental changes in children's use of semantic information in recall. *Journal of Experimental Child Psychology*, **30**, 231-245.
- Cowan, N. (1997). (Eds.). *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Cowan, N. (1997). The development of working memory. In N. Cowan (Ed.), *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Cox, B. D., Ornstein, P. A., Naus, M. J., Maxfield, D., & Zimler, J. (1989). Children's concurrent use of rehearsal and organizational strategies. *Developmental Psychology*, **25**, 619-627.
- Craik, F. I. M., & Lockhart, R. S. (1972). Level of processing: A framework for memory research. *Journal of verbal learning and verbal behavior*, **11**, 671-684.
- Craik, F. I. M., & Simon, E. (1980). Age differences in memory: The roles of attention and depth of processing. In L. W. Poon, J. L. Fozard, L. S. Cermak, D. Arenberg, & L. W. Thompson (Eds.), *New directions in memory and ageing: Proceedings of the George Talland memorial conference*. Hillsdale, NJ: Erlbaum.
- Craik, F. I. M. (1984). Age Differences in Remembering. In L. R. Squire & N. Butters (Eds.), *Neuropsychology of Memory*. New York: The Guilford Press.
- Daehler, M., Bukatko, D., Benson, K. & Myers, N. (1976). The effects of size and color cues on the delayed response of very young children. *Bulletin of the Psychonomic Society*, **7**, 65-68.
- Damon, W. & Hart, D. (1982). The development of self-understanding from infancy to adolescence. *Child Development*, **53**, 841-864.
- Deregowski, J. B. (1970). Effect of cultural value of time upon recall. *The British Journal of Social and Clinical Psychology* **9**, 37-41.

- Diaz, R. M. (1992). Methodological concerns in the study of private speech. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Diaz, R. M., & Berk, L. E. (1992). (Eds.). *Private Speech, From Social Interaction to Self-Regulation*. NJ: Lawrence Erlbaum Assoc.
- Diaz, R. M., Neal, C. J., & Amaya-Williams, M. (1990). The social origins of self-regulation. In L. C. Moll (Ed.), *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. New York: Cambridge University Press.
- Diaz, R. M., Padilla, K. A., & Weathersby, E. K. (1991). The impact of bilingualism on the self-regulatory private speech of Mexican-American preschoolers. *Early Childhood Research Quarterly*, *6*, 377-393.
- Dickie, J. (1973). Private speech: The effect of presence of others, task, and intrapersonal variables. *Dissertation Abstracts International*, *34*, 1292B. (University Microfilms No. 73-20, 329).
- Donnellan, C. (1994). *Family Values: Issues for the Nineties*. Vol. 23. Cambridge: Independent, Educational Publishers.
- Dunn, L. M., Dunn, L. M., Whetton, C. & Pintilie, D. (1997). *The British Picture Vocabulary Scale*. Second Edition, NFER-Nelson. Erlbaum.
- Eder, R. A. (1990). Uncovering young children's psychological selves: Individual and developmental differences. *Child Development*, *61*, 849-863.
- Engel, S. (1986). *Learning to reminisce: A developmental study of how young children talk about the past*. Unpublished PhD Dissertation, City University of New York Graduate Center.
- Fantz, R. L., Fagan, J. F. & Miranda, S. B. (1975). Early visual selectivity. In L. B. Cohen & P. Salapatek (Eds.), *Infant perception: From sensation to cognition* (Vol. 1). New York: Academic Press.
- Feigenbaum, P. (1992). Development of the syntactic and discourse structures of private speech. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Fernyhough, C. (1994). *Social and private speech as determinants of early cognitive functioning*. Unpublished doctoral dissertation, thesis, University of Cambridge.
- Fernyhough, C. (1996). The dialogic mind: A dialogic approach to the higher mental functions. *New Ideas in Psychology*, *14*(1), 47-62.
- Fernyhough, C. & Russell, J. (1997). Distinguishing one's own voice from those of others: A function for private speech? *International Journal of Behavioral Development*, *20*, 651-665.

- Fernyhough, C., Meins, E., Fradley, E. & Ford, S. (2002). Private speech, inner speech and phonological recoding: Testing Vygotskian hypotheses. *Manuscript submitted for publication*.
- Fischer, K. W. & Farror, M. J. (1987). Generalisations about generalisation: How a theory of skill development explains both generality and specificity. *International Journal of Psychology*, *22*, 643-677.
- Fivush, R. (1991). The social construction of personal narratives. *Merrill-Palmer Quarterly*, *37*, 59-81.
- Fivush, R. (1993). Emotional content of parent-child conversations about the past. In C. Nelson (Ed.), *Minnesota Symposia on Child Psychology: Vol. 26. Memory and affect in development*. Hillsdale, NJ: Erlbaum.
- Fivush, R. (1997). Event memory in early childhood. In N. Cowan (Ed) *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Fivush, R. (1998). Gendered narratives: Elaboration, structure and emotion in parent-child reminiscing across the preschool years. In C. P. Thompson, D. J. Herrmann, D. Bruce, J. D. Read, D. G. Payne & M. P. Togli, (Eds.), *Autobiographical Memory: Theoretical and Applied Perspectives*. Mahwah, NJ: Lawrence Erlbaum Assoc.
- Fivush, R., & Fromhoff, F.A. (1988). Style and structure in mother-child conversations about the past. *Discourse Processes*, *11*, 337-355.
- Fivush, R. & Hamond, N. R. (1989). Time and again: Effects of repetition and retention interval on 2-year-olds' event recall. *Journal of Experimental Child Psychology*, *47*, 259-273.
- Fivush, R. & Hamond, N. R. (1990). Autobiographical memory across the preschool years: Towards reconceptualizing childhood amnesia. In R. Fivush & J. Hudson (Eds.), *Knowing and remembering in young children*. New York: Cambridge University Press.
- Fivush, R., & Hudson, J. A. (1990). *Knowing and remembering in young children*. New York: Cambridge University Press.
- Fivush, R. & Reese, E. (1991). *Parental styles for talking about the past*. Paper presented at the International Conference on Memory, Lancaster, England.
- Fivush, R., & Reese, E. (1992). The social construction of autobiographical memory. In M. A. Conway, D. C. Rubin, & W. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory*. Dordrecht, The Netherlands: Kluwer Academic.
- Fivush, R., Gray, J. T. & Fromhoff, F. A. (1987). Two year olds talk about the past. *Cognitive Development*, *2*, 393-410.

- Fivush, R., Haden, C., & Adam, S. (1995). Structure and coherence of preschoolers' personal narratives over time: Implications for childhood amnesia. *Journal of Experimental Child Psychology*, *60*, 32-56.
- Flavell, J. H. (1970). Developmental studies of mediated memory. In H. W. Reese & L. P. Lipsett (Eds.), *Advances in child development and behavior*, Vol. 5. New York: Academic Press.
- Flavell, J. H. (1977). *Cognitive Development*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- Flavell, J. H. (1985). *Cognitive Development*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- Flavell, J. H., & Wellman, H. M. (1977). Metamemory. In R. V. Kail, & J. W. Hagen (Eds.), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Flavell, J. H., Beach, D. R., & Chinsky, J. M. (1966). Spontaneous verbal rehearsal in a memory task as a function of age. *Child Development*, *37*, 283-299.
- Flavell, J. H., Friedrichs, A. G. & Hoyt, J. D. (1970). Developmental changes in memorization processes. *Cognitive Psychology*, *1*, 324-340.
- Ford, S., & Silber, K. P. (1994). Working memory in children: A developmental approach to the Phonological coding of pictorial material. *British Journal of Developmental Psychology*, *12*, 165-175.
- Fox, N., Kagan, J. & Weiskopf, S. (1979). The growth of memory during infancy. *Genetic Psychology Monograph*, *99*, 91-130.
- Frauenglass, M. H., & Diaz, R. M. (1985). Self-regulatory functions of children's private speech: A critical analysis of recent challenges to Vygotsky's theory. *Developmental Psychology*, *21*, 357-364.
- Frawley, W. (1997). *Vygotsky and cognitive science: Language and the unification of the social and computational mind*. Cambridge, Massachusetts: Harvard University Press.
- Freud, S. (1953). Three essays on the theory of sexuality. In J. Strachey (Ed.), *The standardized edition of the complete psychological works of Sigmund Freud*, Vol. 7. London: Hogarth Press. (Original work published 1905).
- Furrow, D. (1984). Social and private speech at two years. *Child Development*, *55*, 355-362.
- Furrow, D. (1992). Developmental trends in the differentiation of social and private speech. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.

- Fuson, K. C. (1979). The development of self-regulating aspects of speech: A review. In G. Zivin (Ed.), *The development of self-regulation through private speech*. New York: Wiley.
- Furth, H. & Milgram, N. (1973). Labeling and grouping effects in the recall of pictures by children. *Child Development*, **44**, 511-518.
- Gathercole, S. E. (1997). Models of verbal short-term memory. In M. A. Conway (Ed.), *Cognitive Models of Memory*. Hove East Sussex: Psychology Press, Publishers.
- Gathercole, S. E. & Baddeley, A. D. (1993/2001). *Working memory and language*. East Sussex: Psychology Press Ltd., Publishers.
- Gathercole, S. E. & Hitch, G. J. (1993). Developmental Changes in Short-term Memory: A Revised Working Memory Perspective. In A. F. Collins, S. E. Gathercole, M. A. Conway & P. E. Morris (Eds.), *Theories of Memory*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Gathercole, S. E., Pickering, S. J., Hall, M., & Peaker, S. M. (2001). Dissociable lexical and phonological influences on serial recognition and serial recall. *Quarterly Journal of Experimental Psychology*, **54A**, 1-30.
- Geary, D. C., Klosterman, I. H. & Adrales, K. (1989). Metamemory and academic achievement: Testing and validity of a group-administered metamemory battery. *Journal of Genetic Psychology*, **151**, 439-450.
- Glenberg, A. & Adams, F. (1978). Type 1 rehearsal and recognition. *Journal of verbal learning and verbal behavior*, **17**, 455-463.
- Goudena, P. P. (1987). The social nature of private speech of preschoolers during problem solving. *International Journal of Behavioural Development*, **10**, 187-206.
- Goudena, P. P. (1992). The problem of abbreviation and internalization of private speech. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Greene, J. (1987). *Memory, Thinking and Language: Topics in cognitive psychology*. London: Methuen & Co. Ltd.
- Gruneberg, M. (1983). Memory Processes Unique to Humans. In: A. Mayes (Ed.), *Memory in animals and humans*. UK: Van Nostrand Reinhold Co. Ltd.
- Guttentag, R. E. (1984). The mental effort requirement of cumulative rehearsal: A developmental study. *Journal of Experimental Child Psychology*, **37**, 92-106.
- Haberlandt, K. (1994). *Cognitive psychology*. Needham Heights, MA: Allyn and Bacon.
- Haden, C. A. & Fivush, R. (1996). Contextual variation in maternal conversational styles. *Merrill-Palmer Quarterly*, **42**, 24-51.

- Haden, C. A., Haine, R. A. & Fivush, R. (1997). Developing narrative structure in parent-child reminiscing across the preschool years. *Developmental Psychology*, **33**, 295-307.
- Hagen, J. W. & Stanovich, K. E. (1977). Memory: Strategies of Acquisition. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Hall, E. T. & Hall M. R. (1990). *Understanding Cultural Differences: Germans, French and American*. Yarmouth, Maine: Intercultural press, Inc.
- Halliday, M. S., Hitch, G. J., Lennon, B. & Pettipher, C. (1990). Verbal Short-term Memory in Children: The Role of the Articulatory Loop. *European Journal of Cognitive Psychology*, **2**, (1) 23-38.
- Hamond, N. R. & Fivush, R. (1990). Memories of Mickey Mouse: Young children recount their trip to Disney World. *Cognitive Development*, **6**, 433-448.
- Han, J. J., Leichtman, M.D. & Wang, Q. (1998). Autobiographical memory in Korean, Chinese and American children. *Developmental Psychology*, **34** (4), 701-713.
- Harkness, S. (1992). Cross-cultural research in child development: A sample of the state of the art. *Developmental Psychology*, **28**, (4), 622-625.
- Harris, P. (1978). Developmental aspects of children's memory. In M. M. Gruneberg & P. Morris (Eds.), *Aspects of Memory*. London: Methuen & Co.
- Hasselhorn, M. (1992). Task dependency and the role of category typicality and metamemory in the development of an organizational strategy. *Child Development*, **63**, 202-214.
- Henry, L. (1994). The relationship between speech rate and memory span in children. In A. de Ribaupierre & G. J. Hitch (Eds.), *The Development of working memory*. Hove, East Sussex: Lawrence Erlbaum Associates Ltd., Publishers.
- Hewes, D. E. & Evans, D. (1978). Three Theories of Egocentric Speech: A Contrastive Analysis. *Communication Monographs*, **45**, 18-32.
- Hilgard, E. R., Atkinson, R. C., & Atkinson, R. L. (1975). *Introduction to Psychology*. USA: Harcourt Brace Jovanovich.
- Hitch, G. J., Halliday, M. S., Schaafstal, A. M., & Heffernan, T. M. (1991). Speech, "Inner Speech," and the Development of Short-Term Memory: Effects of Picture-Labeling on Recall. *Journal of Experimental Child Psychology* **51**, 220-234.
- Hitch, G. J., Halliday, M. S., Dodd, A. & Littler, J. E. (1989). Development of rehearsal in short-term memory: Differences between pictorial and spoken stimuli. *British Journal of Developmental Psychology*, **7**, 347-362.

- Hitch, G. J., Halliday, M. S., Schaafstal, A. M., & Schraagen, J. M. (1988). Visual working memory in young children. *Memory and Cognition*, *16*, 120-132.
- Hofstede, G. (1984). *Culture's Consequences: International Differences in Work-Related Values*. Beverly Hills, CA: Abridged edition. SAGE.
- Holland Joyner, M. & Kurtz-Costes, B. (1997). Metamemory development. In N. Cowan (Ed.), *The Development of Memory In Childhood*. Hove East Sussex: Psychology Press, Publishers.
- Howe, M. L. & Courage, M. L. (1993). On resolving the enigma of infantile amnesia. *Psychological Bulletin*, *113*, 305-326.
- Hudson, J. A. (1986). Memories are made of this: General event knowledge and the development of autobiographical memory. In K. Nelson (Ed.), *Event knowledge: Structure and function in development*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.
- Hudson, J. A. (1990). The emergence of autobiographical memory in mother-child conversation. In R. Fivush & J. Hudson (Eds.), *Knowing and remembering in young children*. New York: Cambridge University Press.
- Hudson, J. A. & Fivush, R. (1990). Introduction: What young children remember and why. In R. Fivush & J. Hudson (Eds.), *Knowing and remembering in young children*. New York: Cambridge University Press.
- Hudson, J. A. & Nelson, K. (1986). Repeated encounters of a similar kind: Effects of familiarity on children's autobiographical memory: *Cognitive Development*, *1*, 253-271.
- Hudson, J. A., Fivush, R., & Kuebli, J. (1992). Scripts and episodes: The development of event memory. *Applied Cognitive Psychology*, *6*, 483-505.
- Hulme, C. & Mackenzie, S. (1992). *Working Memory and Severe Learning Difficulties*. Hove (UK): Lawrence Erlbaum Assoc.
- Hussy, W. & Eye, A. (1988). On cognitive operators in information processing and their effects on short-term memory performance in different age group. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal changes and individual differences*. New Jersey: Lawrence Erlbaum Assoc.
- Jenkins, J. (1974). Remember that old theory of memory? Well, forget it! *American Psychologist*, **November**, 785-795.
- Ji, Li-Jun., Schwarz, N & Nisbett, R. N. (2000). Culture, autobiographical memory, and behavioral frequency reports: Measurement issues in cross-cultural studies. *Personality and Social Psychology Bulletin*, *26*, (5), 585-593.
- Justice, E. M. (1986). Developmental changes in judgments of relative strategy effectiveness. *British Journal of Developmental Psychology*, *4*, 75-81.

- Kail, R. V., & Hagen, J. W. (1977). *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Kail, R. V., & Siegel, A. W. (1977). The Development of Mnemonic Encoding in Children: From perception to abstraction. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Kail, R. (1984). *The development of memory in children*. Second edition, New York, W.H. Freeman & Co.
- Kail, R. (1990). *The development of memory in children*. Third edition, New York, W.H. Freeman & Co.
- Kinnear, P. R., & Gray, C. D. (2000). *SPSS for Windows made simple, release 10*. Hove, East Sussex: Psychology Press Ltd, Publishers.
- Kobasigawa, A. (1977). Retrieval Strategies in the Development of Memory. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Kohlberg, L., Yaeger, J., & Hjertholm, E. (1968). Private speech: Four studies and a review of theories. *Child Development*, **39**, 691-736.
- Kozulin, A. (1986). The concept of activity in Soviet psychology: Vygotsky, his disciples and critics. *American Psychologist* **41**, 264-274.
- Krafft, K. C. & Berk, L. E. (1997). *Private Speech in Two Preschools: Significance of Open-Ended Activities and Make-Believe Play for Verbal Self-Regulation*. Paper presented at the biennial meeting of the Society for Research in Child Development, Washington, DC.
- Kreutzer, M. A., Leonard, C. & Flavell, J. H. (1975). An interview study of children's knowledge about memory. *Monographs of the Society for Research in Child Development*, **40**, 1-58.
- La Barba, R. C. (1981). *Foundations of Developmental Psychology*. New York: Academic Press.
- Laboratory of comparative human cognition (1979). Cross-cultural psychology's challenges to our ideas of children and development. *American Psychologist* **34**, 827-833.
- Laboratory of comparative human cognition (1983). Culture and cognitive development. In *Handbook of child psychology*, P. H. Mussen (Ed.), Vol. I of *History, theory, and methods*, W. Kessen (Ed.). New York: Wiley.
- Lange, G. (1978). Organization-Related Processes in Children's Recall. In P. A. Ornstein (Ed.), *Memory Development In Children*. Hillsdale, NJ: Lawrence Erlbaum Associates.

- Lange, G. & Pierce, S. H. (1992). Memory-strategy learning and maintenance in preschool children. *Developmental Psychology*, **28**, 453-462.
- Larsen, S. F., Schrauf, R. W., Fromholt, P., & Rubin, D. C. (2002). Inner speech and bilingual autobiographical memory: A Polish-Danish cross-cultural study. *Memory*, **10**(1), 45-54.
- Le Voi, M. (1993). Overview. In G. Cohen, G. Kiss & M. Le Voi (Eds.), *Memory Current Issues*. Buckingham, Philadelphia: Open University Press.
- Leont'ev, A. N. (1981). The problem of activity in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology*. Armonk, New York: M. E. Sharpe.
- Levina, R. E. (1981). L. S. Vygotsky's ideas about the planning function of speech in children. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology*. Armonk, New York: M. E. Sharpe.
- Lewis, M. & Brooks-Gunn, J. (1979). *Social cognition and the acquisition of the self*. New York: Plenum.
- Liben, L. S. (1977). Memory in the Context of Cognitive Development: The Piagetian Approach. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Liben, L. S. (1983). *Piaget and the Foundations of Knowledge*. Hillsdale, NJ:
- Linton, M. (1986). Ways of searching and the contents of memory. In D. C. Rubin (Ed.), *Autobiographical memory*. Cambridge, England: Cambridge University Press.
- Lipsky, G. A. (1959). Saudi Arabia: Its people, its society, its culture. In T. Fitzsimmons (Ed.), *Survey of World Cultures*. New Haven: Hraf Press.
- Lloyd, P. & Fernyhough, C. (1999). (Eds.). *Lev Vygotsky: Critical assessments, Vol. I, Vygotsky's theory*. London: Routledge.
- Lloyd, P. & Fernyhough, C. (1999). (Eds.). *Lev Vygotsky: Critical assessments, Vol. II, Thought and language*. London: Routledge.
- Lloyd, P. & Fernyhough, C. (1999). (Eds.). *Lev Vygotsky: Critical assessments, Vol. III, The zone of proximal development*. London: Routledge.
- de Loache, J. S. & Brown, A. L. (1983). Very young children's memory for the location of objects in a large scale environment. *Child Development*, **54**, 888-897.
- Longoni, A. M. & Scalisi, T. G. (1994). Developmental aspects of phonemic and visual similarity effects: Further evidence in Italian children. In A. de Ribaupierre & G. J. Hitch (Eds.), *The Development of working memory*. Hove, East Sussex: Lawrence Erlbaum Associates Ltd., Publishers.

- Lowndes, G. A. N. (1955). *The British Educational System*. London: Hutchinson & Co. (Publishers): Ltd.
- Luria, A. R. (1961). *The role of speech in the regulation of normal and abnormal behaviour*. London: Pergamon Press.
- Luria, A. R. (1971). Towards the problem of the historical nature of psychological processes. *International Journal of Psychology* 6 (4), 259-272.
- Luria, A. R. & Vygotsky, L. S. (1992). *Ape, primitive man, and child: Essays in the history of behaviour*. Hertfordshire: Harvester Wheatsheaf.
- Luria, A. R. & Yudovich, F. Ia. (1971). *Speech and the development of mental processes in the child*. Harmondsworth, Middlesex, England: Penguin Books Ltd.
- MacWhinney, B. (1995). *The Childes Project: Tools for analyzing talk*. Hillsdale, NJ: Erlbaum.
- Markus, H. R. & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98 (2), 224-253.
- Martin, R. M. (1975). Effects of familiar and complex stimuli on infant attention. *Developmental Psychology*, 11, 178-185.
- Mayer, R. E. (1983). *Thinking, Problem Solving, Cognition*. New York: W. H. Freeman.
- Mayes, A. (1983). *Memory in animals and humans*. UK: Van Nostrand Reinhold Co. Ltd.
- McGilly, K. & Siegler, R. S. (1989). How children choose among serial recall strategies. *Child Development*, 60, 172-182.
- Meacham, J. A. (1975). Patterns of memory abilities in two cultures. *Developmental Psychology* 11, 50-53.
- Meacham, J. A. (1977). Soviet Investigations of Memory Development. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Mead, G. H. (1984). *Mind, self and society from the standpoint of a social behaviourist*. Chicago: University of Chicago Press.
- Mead, R. (1990). *Cross-Cultural Management Communication*. England: John Wiley & Sons Ltd.
- Mead, R. (1998). *International Management, cross-cultural dimensions*. Oxford: Blackwell Publishers Ltd.

- Metcalfe, S. (2000). Metamemory: Theory and data. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc.
- Miller, J. G. (1997). Theoretical issues in cultural psychology. In J. W. Berry, Y. H. Poortinga and J. Pandey (Eds.), *Handbook of cross-psychology, Vol. 1, Theory and method*. Needham, Heights, MA: Allyn & Bacon.
- Miller, P. H. (1990). The development of strategies of selective attention. In D. F. Bjorklund (Ed.), *Children's strategies: Contemporary views of cognitive development*. Hillsdale, NJ: Erlbaum.
- Miller, P. H. (1994). Individual differences in children's strategic behavior: Utilization deficiencies. *Learning and Individual Differences*, *6*, 285-307.
- Miller, P. H., Seier, W. L., Probert, J. S. & Aloise, P. A. (1991). Age differences in the capacity demands of a strategy among spontaneously strategic children. *Journal of Experimental Child Psychology*, *52*, 149-165.
- Miller, P. J., Wiley, A. R., Fung, H., & Liang, C. H. (1997). Personal storytelling as a medium of socialization in Chinese and American families. *Child Development*, *68*(3), 557-568.
- Minick, N. (1999). The development of Vygotsky's thought: An introduction. In P. Lloyd & C. Fernyhough (Eds.), *Lev Vygotsky: Critical assessments*, Vol. I. London: Routledge. (Original work published 1987).
- Ministry of Education (1996). *Development of Education in the Kingdom of Saudi Arabia*. Riyadh: Ministry of Education.
- Mistry, J. (1997). The development of remembering in cultural context. In N. Cowan (Ed.), *The Development of Memory In Childhood*. Hove East Sussex. Psychology Press, Publishers.
- Miyake, A. & Shah, P. (1999). *Models of working memory, mechanism of active maintenance and executive control*. Cambridge: Cambridge University Press.
- Moely, B. E. (1977). Organisation Factors in the Development of Memory. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Moely, B. E., Hart, S. S., Santulli, K., Leal, L., Johnson, T., Rao, N. & Burney, L. (1986). How do teachers teach memory skills? *Educational Psychology*, *21*, 55-71.
- Moely, B. E., Hart, S. S., Leal, L., Santulli, K., Rao, N., Johnson, T. & Hamilton, L. B. (1992). The teacher's role in facilitating memory and study strategy development in the elementary school classroom. *Child Development*, *63*, 653-672.
- Morris, N. G. (1986). *Working Memory Constellations*. Unpublished Ph.D. Thesis, University of Durham.

- Morris, P. E., & Gruneberg, M. (1978/1994). *Theoretical aspects of memory*. London: Routledge.
- Mullen, M. K. (1994). Earliest recollections of childhood: A demographic analysis. *Cognition*, *52*(1), 55-79.
- Mullen, M. K. & Yi, S. (1995). The cultural context of talk about the past: Implications for the development of autobiographical memory. *Cognitive Development*, *10*, 407-419.
- Murray, J. D. (1979). Spontaneous private speech and performance on a delayed match-to-sample task. *Journal of Experimental Child Psychology*, *27*, 286-302.
- Myers, N. A. & Perlmutter, M. (1978). Memory in the Years from Two to Five. In P. A. Ornstein (Ed.), *Memory Development In Children*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Nadel, S. F. (1937). Experiments on culture psychology. *Africa* *10*, 421-435.
- Nadel, L. & Zola-Morgan, S. (1984). Infantile amnesia: A neurobiological perspective. In M. Moscovitch (Ed.), *Infant memory*. New York: Plenum Press.
- Neimark, E. D. (1976). The natural history of spontaneous mnemonic activities under conditions of minimal experimental constraint. In A. D. Pick (Ed.), *Minnesota symposia on child psychology*. Minneapolis: University of Minnesota Press.
- Nelson, K. (1989). Monologues in the crib. In K. Nelson (Ed.), *Narratives from the crib*. Cambridge, MA: Harvard University Press.
- Nelson, K. (1990). Remembering, forgetting and childhood amnesia. In R. Fivush & J. Hudson (Eds.), *Knowing and remembering in young children*. New York: Cambridge University Press.
- Nelson, K. (1992). Emergence of autobiographical memory at age 4. *Human Development*, *35*, 172-177.
- Nelson, K. (1993a). The psychological and social origins of autobiographical memory. *Psychological Science*, *4*, (1), 7-14.
- Nelson, K. (1993b). Events, Narratives, Memory: What Develops? *Minnesota Symposia On Child Psychology*, *26*, 1-24.
- Nelson, K. (1993c). Explaining the emergence of autobiographical memory in early childhood. In A. F. Collins, S. E. Gathercole, M. A. Conway & P. E. Morris (Eds.), *Theories of Memory*. Hove East Sussex: Lawrence Erlbaum Assoc.
- Nelson, K. & Fivush, R. (2000). Socialisation of memory. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc.

- Nelson, K. & Gruendel, J. (1981). Generalized event representations: Basic building blocks of cognitive development. In M. Lamb & A. Brown (Ed.), *Advances in developmental psychology*, Vol. 1. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.
- Nelson, K. & Hudson, J. (1988). Scripts and Memory: Functional Relationships in Development. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal Changes and Individual Differences*. NJ: Lawrence Erlbaum Assoc.
- Nelson, K. & Ross, G. (1980). The generalities and specifics of long term memory in infants and young children. In M. Perlmutter (Ed.), *Children's memory: New directions for child development*, Vol. 10. San Francisco: Jossey-Bass.
- Noll, R. & Turkington, C. (1994). *The Encyclopedia of Memory and Memory Disorders*. New York: Facts On File, Inc.
- Norman, D. A. (1970). *Models of Human Memory*. New York: Academic Press.
- Ornstein, P. A. & Naus, M. J. (1978). Rehearsal Processes in Children's Memory. In P. A. Ornstein (Ed.), *Memory development in children*. Hillsdale, NJ: Lawrence Erlbaum Assoc.
- Ornstein, P. A., Naus, M. J., & Liberty, C. (1975). Rehearsal and organization processes in children's memory. *Child Development*, *46*, 818-830.
- Ornstein, P. A., Baker-Ward, L. & Naus, M. J. (1988). The Development of Mnemonic Skills. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal changes and individual differences*. New Jersey: Lawrence Erlbaum Assoc.
- Ornstein, P. A., Naus, M. J., & Stone, B. P. (1977). Rehearsal training and developmental differences in memory. *Developmental Psychology*, *13*, 15-24.
- Palmer, S. (2000). Development of phonological recoding and literacy acquisition: A four-year cross-sequential study. *British Journal of Developmental Psychology*, *18*, 533-555.
- Paris, S. G. (1978). Coordination of Means and Goals in the Development of Mnemonic Skills. In P. A. Ornstein (Ed.), *Memory development in children*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Paris, S. G. (1988). Motivated Remembering. In F. E. Weinert & M. Perlmutter (Eds.), *Memory Development: Universal changes and individual differences*. NJ: Lawrence Erlbaum Assoc.
- Paris, S. G., & Lindauer, B. K. (1977). Constructive Aspects of Children's Comprehension and Memory. In R. V. Kail, & J. W. Hagen (Eds.), *Perspectives on the Development of memory and cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Pellegrini, A. D. (1981a). The social orientation of private speech. *Child Study Journal*, *11*, (1), 25-31.

- Pellegrini, A. D. (1981b). The development of preschoolers' private speech. *Journal of Pragmatics*, **5**, 445-458.
- Pellegrini, A. D., & DeStefano, J. S. (1979). The functions of private speech in preschool children. *International Journal of Psycholinguistics*, **15**, 27-42.
- Perlmutter, M. (1988). Research on Memory and its Development: Past, Present and Future. In F. E. Weinert & M. Perlmutter (Eds.), *Memory Development: Universal changes and individual Differences*. NJ: Lawrence Erlbaum Assoc.
- Perlmutter, M. & Lange, G. (1978). A Developmental Analysis of Recall-Recognition Distinctions. In P. A. Ornstein (Ed.), *Memory development in children*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Perlmutter, M. & Myers, N. (1979). Development of recall in 2 to 4 year old children. *Developmental Psychology*, **15**, 73-83.
- Perner, J. & Ruffman, T. (1995). Episodic memory: An autoegetic consciousness: Developmental evidence and a theory of childhood amnesia. *Experimental Child Psychology*, **59**, 516-548.
- Peterson, C. & Rideout, R. (1998). Memory for medical emergencies experienced by 1- and 2-year-olds. *Developmental Psychology*, **34**, 1059-1072.
- Piaget, J. (1932). *The Language and Thought of the Child*. London: Routledge & Kegan Paul Limited.
- Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.
- Piaget, J. & Inhelder, B. (1973). *Memory and Intelligence*. London: Routledge & Kegan Paul.
- Pillemer, D. B. (1998). *Momentous events, vivid memories*. Cambridge, MA: Harvard University Press.
- Pillemer, D. B. & White, S. H. (1989). Childhood events recalled by children and adults. *Advances in Child Development and Behavior*, **21**, 297-340.
- Pillemer, D. B., Picariello, M. L., & Pruett, J. C. (1994). Very long term memories of a salient preschool event. *Journal of Applied Cognitive Psychology*, **8**, 95-106.
- Pipe, M. E. (1996). Telling it like it is, was and will be: The influence of narrative on children's event memory. Paper presented at the Second International Conference on Memory. Abano, Italy, July.
- Pressley, M. (1982). Elaboration and memory development. *Child Development*, **53**, 296-309.

- Pressley, M. & Levin, J. R. (1977). Task parameters affecting the efficacy of a visual imagery learning strategy in younger and older children. *Journal of Experimental Child Psychology*, **24**, 53-59.
- Pressley, M., Forrest-Pressley, D. & Elliott-Faust, D. J. (1988). What is Strategy Instructional Enrichment and How to Study It: Illustrations from Research on Children's Prose Memory and Comprehension. In F. E. Weinert & M. Perlmutter (Eds.), *Memory Development: Universal Changes and Individual Differences*. New Jersey: Lawrence Erlbaum Assoc.
- Pressley, M., Schuder, T., Bergman, J. L. & El-Dinary, P. B. (1992). A researcher-educator collaborative interview study of transactional comprehension strategies instruction. *Journal of Educational Psychology*, **84**, 231-246.
- Pressley, M., Gaskins, I. W., Cunicelli, E. A., Burdick, N. J., Schaub-Matt, M., Lee, D. S. & Powell, N. (1991). Strategy instruction at Benchmark School. *Learning Disability Quarterly*, **14**, 19-48.
- Ramirez, J. D. (1992). The functional differentiation of social and private speech: A dialogic approach. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Ratner, H. H. (1984). Memory demands and the development of young children's memory. *Child Development*, **55**, 2173-2191.
- Reber, A. S. (1985). *The Penguin Dictionary of Psychology*. Harmondsworth, Middlesex, England: Penguin Books.
- Rebok, G. W. (1987). *Life span cognitive development*. New York: Holt, Rinehart & Winston.
- Reese, E. & Fivush, R. (1993). Parental styles for talking about the past. *Developmental Psychology*, **29**, 596-606.
- Reese, E., Haden, C. A. & Fivush, R. (1993). Mother-child conversations about the past: Relationships of style and memory over time. *Cognitive Development*, **8**, 403-430.
- Reese, H. W. (1962). Verbal mediation as a function of age level. *Psychological Bulletin*, **59**, 502-509.
- Reese, H. W. (1977). Imagery and associative memory. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the development of memory and cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- de Ribaupierre, A. & Hitch, G. J. (1994). (Eds.), *The Development of working memory*. Hove, East Sussex: Lawrence Erlbaum Associates Ltd., Publishers.
- Richardson, K. (1998). *Models of Cognitive Development*. Hove East Sussex: Psychology Press Ltd.

- Richman, A. L., Miller, P. M. & LeVine, R. A. (1992). Cultural and educational variations in maternal responsiveness. *Developmental Psychology*, **28**, (4), 614-621.
- Richmond, B. O. & Hicklighter, R. H. (1980). *Manual of children's Adaptive behavior Scale*. Atlanta, Georgia: Humanities Ltd.
- Rieber, R. W. & Carton, A. S. (1987). *The Collected Works of L. S. Vygotsky*, Vol. 1, Problems of General Psychology. New York and London: Plenum Press.
- Rogoff, B. (1980). Schooling and the development of cognitive skills. In S. Triand & J. W. Berry (Eds.), *Handbook of cross-cultural psychology: Methodology*. Boston: Allyn & Bacon.
- Rogoff, B. (1984). Introduction: Thinking and learning in social context. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social contexts*. Cambridge, Massachusetts: Harvard University Press.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. Oxford: Oxford University Press.
- Rogoff, B. & Chavajay, P. (1995). What's become of research on the cultural basis of cognitive development? *American Psychologist* **50**, 859-877.
- Rogoff, B. & Gardner, W. (1984). Adult guidance of cognitive development. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social contexts*. Cambridge, Massachusetts: Harvard University Press.
- Rogoff, B. & Lave, J. (1984). (Eds.). *Everyday cognition: Its development in social contexts*. Cambridge, Massachusetts: Harvard University Press.
- Rogoff, B. & Mistry, J. (1990). The social and functional context of children's memory skills. In R. Fivush, J. Hudson & U. Neisser (Eds.), *knowing and remembering in young children*. New York: Cambridge University Press.
- Rogoff, B. & Wertsch, J. V. (1984). (Eds.). *Children's learning in the "zone of proximal development"*. *New Directions for Child Development*, No. **23**. San Francisco: Jossey-Bass.
- Rogoff, B., Ellis, S., & Gardner, W. (1984). Adjustment of adult-child instruction according to the child's age and task. *Developmental Psychology*, **20**, 193-199.
- Rogoff, B., Newcombe, N. & Kagan, J. (1974). Planfulness and recognition memory. *Child Development*, **45**, 972-977.
- Rohwer, W. D., & Dempster, F. N. (1977). Memory Development and Educational Processes. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the Development of Memory and Cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Rosen, H. (1998). *Speaking from memory, a guide to autobiographical acts and practices*. Staffordshire, England: Trentham Books Limited.

- Rovee-Collier, C. K. (2000). Shifting the Focus From What to Why. In D. Muir & A. Slater (Eds.), *Infants Development, The Essential Readings*. Oxford: Blackwell Publishers Inc.
- Rovee-Collier, C. K. & Hayne, H. (2000). Memory in infancy and early childhood. In E. Tulving & F. I. M. Craik (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc.
- Rubin, D. C. (Ed.) (1986). *Autobiographical memory*. Cambridge, England: Cambridge University Press.
- Rubin, D. C. (1998). Beginnings of a theory of autobiographical remembering. C. P. Thompson, D. J. Herrmann, D. Bruce, J. D. Read, D. G. Payne & M. P. Toggia, (Eds.), *Autobiographical memory: theoretical and applied perspectives*. Mahwah, NJ: Lawrence Erlbaum Assoc.
- Rubin, K. H. (1979). Impact of the natural setting on private speech. In G. Zivin (Ed.), *The development of self-regulation through private speech*. New York: Wiley.
- Rubin, K. H. & Dyck, L. (1980). Preschooler's Private Speech In A Play Setting. *Merrill-Palmer Quarterly*, **26**, 219-229.
- Rubin, K. H., Hulstsch, D. F. & Peters, D. L. (1991). Non-social speech in four-year-old children as a function of birth order and interpersonal situation. *Merrill-Palmer Quarterly*, **17**, 41-50.
- Russell, J., Jarrold, C. & Henry, L. (1996). Working memory in children with autism and with moderate learning difficulties. *Journal of Child Psychology and Psychiatry*, **37**, 673-686.
- Salatas, H. & Flavell, J. H. (1976). Behavioral and metamnemonic indicators of strategic behaviors under remember instructions in first grade. *Child Development*, **47**, 81-89.
- Saville-Troike, M. (1988). Private speech: Evidence for second language learning strategies during the 'silent' period. *Journal of Child Language*, **15**, 567-590.
- Schank, R. C. & Abelson, R. P. (1977). *Scripts, plans, goals and understanding*. Hillsdale, NJ: Lawrence Erlbaum Assoc.
- Schneider, W. & Brun, H. (1987). The role of context in young children's memory performance: Istomina revisited. *British Journal of Developmental Psychology* **5**, 333-341.
- Schooler, J. W. & Hermann, D. J. (1992). There is more to episodic memory than just episodes. In M. A. Conway, D. C. Rubin, H. Spinnler & W. A. Wagenaar (Eds.), *Theoretical perspectives on autobiographical memory*. Dordrecht, The Netherlands: Kluwer Academic.

- Segall, M. H., Dasen, P. R., Berry, J. W., & Poortinga, Y. H. (1999). *Human behaviour in global perspective: An introduction to cross-cultural psychology*. Needham Heights, MA: Allyn & Bacon.
- Shah, P. & Miyake, A. (1999). *Models of Working Memory: Mechanisms of Active Maintenance and Executive Control*. Cambridge: Cambridge University Press.
- Shallice, T. (1982). Specific impairments in planning. *Philosophical Transactions of the Royal Society of London*. **B298**, 199-209.
- Shaughnessy, J. J. (1981). Memory monitoring accuracy and modification of rehearsal strategies. *Journal of verbal learning and verbal behavior*, **20**, 216-230.
- Siegler, R. S. (1983). Information processing approaches to development. In P. H. Mussen (Ed.), *Child psychology*, Vol. 1. New York: John Wiley & Sons.
- Siegler, R. S. (1991). *Children's Thinking*. 2nd ed. Englewood Cliffs, NJ: Prentice Hall.
- Siegmán, A. W. & Pope, B. (1972). *Studies in Dyadic Communication*. New York: Pergamon Press.
- Simon, H. A., Irwin, D.B. & Drinnin, B. A. (1987). *Psychology: The search for understanding*. New York: West Publishing Co.
- Smith, J. D., Reisberg, D., & Wilson, M. (1992). Subvocalisation and auditory imagery: Interactions between the inner ear and inner voice. In D. Reisberg (Ed.), *Auditory imagery*. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.
- Spelke, E. S (1983). Constraints on the Development of Intermodal Perception. In, L. S. Liben (Ed) *Piaget And The Foundations Of Knowledge*. Lawrence Erlbaum Assoc.
- Tessler, M. & Nelson, K. (1994). Making memories: The influence of joint encoding on later recall by young children. *Consciousness and Cognition*, **3**, 307-326.
- Thompson, C. P., Skowronski, J. J., Larsen, S. F. & Betz, A. L., (1996). *Autobiographical memory: Remembering what and remembering when*. Mahwah: Lawrence Erlbaum Assoc.
- Thompson, C. P., Herrmann, D. J., Bruce, D., Read, J. D., Payne, D. G. & Toggia, M. P. (1998). *Autobiographical memory: Theoretical and applied perspectives*. Mahwah, NJ: Lawrence Erlbaum Assoc.
- Tomasello, M., Kruger, A. C. & Ratner, H. H. (1993). Cultural learning. *Behavioural and Brain Science* **16**, 495-552.
- Trabasso, T. (1977). The Role of Memory as a System in Making Transitive Inferences. In R. V. Kail, & J. W. Hagen (Eds), *Perspectives on the development of memory and cognition*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.

- Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory*. New York: Academic Press.
- Tulving, E. (1983). *Elements of Episodic Memory*. Oxford: Clarendon Press.
- Tulving, E. & Craik, F. I. M. (2000). *The Oxford Handbook of Memory*. New York: Oxford University Press, Inc
- Valsiner, J. & Van der Veer, R. (1992). The encoding of distance: the concept of the zone of proximal development and its interpretations. In R. R. Cocking & K. A. Renninger (Eds.), *The Development and Meaning of Psychological Distance*. Hillsdale, NJ: Erlbaum.
- Van der Veer, R. (1993). The forbidden colors game: An argument in favor of intrnalization? In R. Van der Veer, M. van IJzendoorn & J. Valsiner (Eds.), *Reconstructing the mind: Replicability in research on human development*. Norwoob, NJ: Ablex Publishing Corporation.
- Van der Veer, R. & Valsiner, J. (1993). *Understanding Vygotsky: A quest for synthesis*. Oxford: Blackwell.
- Vygotsky, L. S. (1934/1986). *Thought and Language*. Cambridge, MA: The MIT Press.
- Vygotsky, L. S. (1962). *Thought and Language*. Cambridge, Massachusetts: The MIT Press.
- Vygotsky, L. S. (1999). *Thought and Language*. Eleventh printing, newly revised and edited by: A. Kozulin, Cambridge, MA: The MIT Press.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. (M. Cole, V. John-Steiner, S. Scribner and E. Souberman, eds.). Cambridge, MA: The MIT Press.
- Vygotsky, L. S. (1981a). The instrumental method in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology*. Armonk, New York: M. E. Sharpe.
- Vygotsky, L. S. (1981b). The genesis of higher mental functions. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology*. Armonk, New York: M. E. Sharpe.
- Vygotsky, L. S. (1987). Thinking and Speech. In R. W. Rieber & A. S. Carton (Eds.), *The collected works of L. S. Vygotsky. Vol. 1, Problems of general psychology*. New York: Plenum Press.
- Vygotsky, L. S., & Luria, A. R. (1993). *Studies on the history of behaviour* (edited and teanslated by V.I. Golod & J. E. Knox). Hillsdale, NJ: Erlbaum.
- Wagner, D. A. (1974). The development of short-term and incidental memory: A cross-cultural study. *Child Development* **45**, 389-396.

- Wagner, D. A. (1978). Memories of Morocco: The influence of age, schooling, and environment on memory. *Cognitive Psychology*, **10**, 1-28.
- Wagner, D. A. (1981). Culture and memory development. In H. C. Triandis & A. Harson (Eds.), *Handbook of cross cultural psychology: Developmental psychology*. London: Allyn & Bacon Inc.
- Wagner, D. A. & Spratt, J. E. (1987). Cognitive consequences of contrasting pedagogies: The effects of Quranic preschooling in Morocco. *Child Development* **58**, 1207-1219.
- Wang, Q., & Leichtman, M. (2000). Same beginnings, different stories: A comparison of American and Chinese children's narratives. *Child Development*, **71**(5), 1329-1346.
- Wang, Q., Leichtman, M. D. & Davies, K. I. (2000). Sharing memories and telling stories: American and Chinese mothers and their 3-year-olds. *Memory*, **8**(3), 159-177.
- Warren, A. R. & Tate, C. S. (1992). Egocentrism in Children's Telephone Conversations. In R. M. Diaz & L. E. Berk (Eds.), *Private Speech From Social Interaction to Self-Regulation*. New Jersey: Lawrence Erlbaum Assoc.
- Weinert, F. E. (1988). Epilogue. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal changes and individual differences*. NJ: Lawrence Erlbaum Assoc.
- Weinert, F. E., & Perlmutter, M (1988) *Memory development: Universal Changes and Individual Differences*. New Jersey: Lawrence Erlbaum Assoc.
- Welch-Ross, M. K. (1995). An integrative model of the development of autobiographical memory. *Developmental Review*, **15**, 338-365.
- Welch-Ross, M. K. (1997). Mother-child participation in conversation about the past: Relationships to preschoolers' theory of mind. *Developmental Psychology*, **33**, (4), 618-629.
- Wellman, H. M. (1988). The Early Development of Memory Strategies. In F. E. Weinert & M. Perlmutter (Eds.), *Memory development: Universal changes and individual differences*. NJ: Lawrence Erlbaum Assoc.
- Wertsch, J. V. (1980). The significance of dialogue in Vygotsky's account of social, egocentric, and inner speech. *Contemporary Educational Psychology*, **5**, 150-162.
- Wertsch, J. V. (1981). (Ed.). *The concept of activity in Soviet psychology*. Armonk, New York: M. E. Sharpe.
- Wertsch, J. V. (1985). *Vygotsky and the Social Formation of Mind*. Cambridge, MA: Harvard University Press.
- Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

- Wertsch, J. V. (1997). *Vygotsky and the social formation of mind*. Sixth printing. Cambridge, MA: Harvard University Press.
- Wertsch, J. V. & Hickmann, M. (1987). A microgenetic analysis of problem-solving in social interaction. In M. Hickmann (Ed.), *Social and functional approaches to language and thought*. New York: Academic Press.
- Wertsch, J. V. & Kanner, B. G. (1992). A sociocultural approach to intellectual development. In R. J. Sternberg and C. A. Berg (Eds.), *Intellectual development*. Cambridge: Cambridge University Press.
- Wertsch, J. V. & Stone, C. A. (1985). The concept of internalization in Vygotsky's account of the genesis of higher mental functions. In J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives*. Cambridge: Cambridge University Press.
- Wertsch, J. V. & Stone, C. A. (1999). The concept of internalisation in Vygotsky's account of the genesis of higher mental functions. In P. Lloyd & C. Fernyhough (Eds.), *Lev Vygotsky: Critical assessments*, Vol. I. London: Routledge.
- Wertsch, J. V. & Tulviste, P. (1992). L. S. Vygotsky and contemporary developmental psychology. *Developmental Psychology* **28**, 584-557.
- Wertsch, J. V., McNamee, G. D., McLane, J. B. & Budwig, N. A. (1980). The adult-child dyad as a problem-solving system. *Child Development*, **51**, 1215-1221.
- William, F. (1997). *Vygotsky and Cognitive Science: Language and the Unification of the Social and Computational Mind*. Cambridge, Massachusetts: Harvard University Press.
- Wingfield, A. & Byrnes, D. (1981) *The psychology of human memory*. New York, Academic Press.
- Winsler, A., Diaz, R. M., McCarthy, E. M., Atencio, D. J., & Chabay, L. A. (1999). Mother-child interaction, private speech, and task performance in preschool children with behaviour problems. *Journal of Child Psychology and Psychiatry*, **40**, No, 6, 891-904.
- Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, **17**, 89-100.
- Yussen, S. R. & Levy, V. M. (1975). Developmental changes in predicting one's own span of short term memory. *Journal of Experimental Child Psychology*, **19**, 502-508.
- Yussen, S. R. & Bird, J. E. (1979). The development of metacognitive awareness in memory, communication and attention. *Journal of Experimental Child Psychology*, **28**, 300-313.

Zivin, G. (1972). Functions of private speech during problem-solving in preschool children. *Dissertation Abstracts international*, 33 (2-B), 1834. (University Microfilms No. 72-26, 224).

Zivin, G. (1979). Removing common confusions about egocentric speech, private speech, and self-regulation. In G. Zivin, (Ed.), *The development of self-regulation through private speech*. New York: Wiley.

Appendices

Appendix 1

A Request for the Fieldwork in Saudi Arabia:

بسم الله الرحمن الرحيم

سلمه الله

سعادة المحلل الثقافي

السلام عليكم ورحمة الله وبركاته ،،، وبعد

أقدم طلي هذا لسعادتكم وفيه أهدى رغبتي في السفر إلى المملكة في رحلة علمية لمدة أربعة أشهر تبدأ في الأول من شوال هذا العام ١٤٢٠هـ، الموافق لثمان من يناير للعام ٢٠٠٠م ، وتنتهي في الثاني من شهر صفر للعام ١٤٢١هـ الموافق للثامن من مايو للعام ٢٠٠٠م . ذلك أن طبيعة بحثي تتطلب جمع المعلومات وإجراء بعض التحارب مع مجموعات من الأصغر سعوديين بعرض النقارفة مع مجموعات الأطفال البريطانيين الذين أجريت معهم بعض التحارب.

وختيار هذا التوقيت يناسب وبدء لدرسة أخصف شي في مسكة ومدة لأربعة أشهر لأن أحتاج إلى بناء بعض المفاهيم وتقييمه على بيئة سعودية فخرس نث شي حري تطبيقه مع أعباءات البريطانية.

أرجو من سعادتكم توفقة غس ضني هذ وأرفق كح حصـ من مترفة لأكاديمية حوز هذ لأمر .
وتففسو بقبول خالص لتحيات . والسلام عليكم ورحمة الله وبركاته.

المبصت/عبدالرحمن سنيماان الصلعة



رقمه المنقب B087

لسمه عمه النفس جامعة دره

١٤٢٠هـ الموافق ٩/٤ ١٩٩٩م

Appendix 2

A Supporting Letter from the Supervisor Regarding the Fieldwork in Saudi Arabia:



University
of Durham

Saudi Arabian Cultural Bureau
29 Belgrave Square
London

Department of Psychology

Science Laboratories
South Road
Durham DH1 1LE
England

Main Switchboard: 0191 374 2000

Direct Line: 0191 374

Fax: 0191 374 7474

@durham.ac.uk

E-mail:

September 3rd 1999

Dear Sir/Madam,

Re: Abdulrahman Al-Namlah

As Abdulrahman's PhD supervisor, I am writing in support of his request to return to Saudi Arabia between January 8th and May 8th 2000. This visit is necessary in order for him to carry out the data collection for the second phase of his PhD testing. One of the questions his research is addressing is potential differences between British and Saudi children in memory development and how they use language to guide their behaviour. He has already completed the studies on a group of British children, and now needs to repeat these studies with Saudi children. I understand that the usual period of stay requested is three months, but due to the fact that Abdulrahman will need to recruit his sample of children, as well as standardise some of his measures in a new country, he is therefore asking to return for four months.

Please feel free to contact me via email (elizabeth.meins@durham.ac.uk) if you require any clarification or additional information in order to proceed.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'E Meins'.

Dr. Elizabeth Meins

Appendix 3**A Letter from the Saudi Arabian Cultural Bureau Regarding the Fieldwork in Saudi Arabia:**

Kingdom of Saudi Arabia
Ministry Of Higher Education
Cultural Bureau - London/UK



المملكة العربية السعودية
وزارة التعليم العالي
مكتب الملحق الثقافي في بريطانيا

الأكاديمية

رقم الملف : 87 B

إفادة

يقدم المكتب الثقافي السعودي في بريطانيا بأن السيد / عبدالرحمن سليمان النملة هو أحد الطلبة المبتعثين من جامعة الإمام محمد بن سعود الإسلامية لدراسة الدكتوراه في تخصص علم النفس بجامعة درم. وسوف يقوم برحلة علمية إلى المملكة العربية السعودية لمدة ثلاثة أشهر لجمع للمعلومات الاستيعابية الخاصة بدراسته وإجراء القياسات والاختبارات على عينة من الأطفال كجزء من بحثه. وقد أعطيت له هذه الإفادة بناء على طلبه لتقديمها إلى الجهات المختصة.

والله وني التوفيق ...

الملحق الثقافي في بريطانيا

عبدالله بن محمد الناصر

١٠/ح ج

Appendix 4

The Supervisor's Letter Regarding the Fieldwork in Saudi Arabia:



Department of Psychology

Science Laboratories

South Road

Durham DH1 1TA

England

Main Switchboard: 0191 374 2000

Direct Line: 0191 374

Fax: 0191 374 7474

E-mail: psych@durham.ac.uk

December 9th 1999

To whom it may concern:

Re: Abdulrahman Al-Namlah

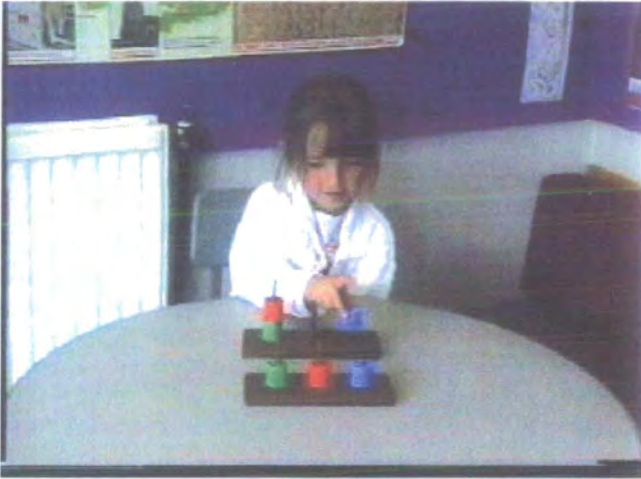
The above student is currently reading for a PhD degree under my supervision at the Department of Psychology at the University of Durham. As part of his PhD project, he will be undertaking some research on school children between the ages of 5 and 7 years, which he will need to video-tape for future coding and analysis to be carried out on his return to the United Kingdom.

A handwritten signature in black ink, appearing to read "Elizabeth Meins".

Dr. Elizabeth Meins
Lecturer in Psychology

Appendix 5

Settings of Private Speech Testing:



Appendix 6(a)

Private Speech Testing Score Sheet (front):

Private Speech Score Sheet

Child _____ Tape _____ Date _____ Start time _____

00:00 to 01:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

04:00 to 05:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

08:00 to 09:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

01:00 to 02:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

05:00 to 06:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

09:00 to 10:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

02:00 to 03:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

06:00 to 07:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

10:00 to 11:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

03:00 to 04:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

07:00 to 08:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

11:00 to 12:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

Appendix 6(b)
Private Speech Testing Score Sheet (back):

Private Speech Score Sheet

Child _____ Tape _____ Date _____ Start time _____

12:00 to 13:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

16:00 to 17:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

20:00 to 21:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

13:00 to 14:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

17:00 to 18:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

21:00 to 22:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

14:00 to 15:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

18:00 to 19:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

22:00 to 23:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

15:00 to 16:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

19:00 to 20:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

23:00 to 24:00				
:01-:10				
SS	PS1	PS2	PS3	
:11-:20				
SS	PS1	PS2	PS3	
:21-:30				
SS	PS1	PS2	PS3	
:31-:40				
SS	PS1	PS2	PS3	
:41-:50				
SS	PS1	PS2	PS3	
:51-:00				
SS	PS1	PS2	PS3	

Appendix 7

Materials used in the Testing of Verbal Working Memory (British Sample)

Set 1: 8 Drawings with Phonologically Dissimilar names:



Lamp



Tree



Dog



Shoes



Ball



Glass



Flag



House

Set 2: 8 Drawings with Phonologically Similar names:



Cake



Caw



Cot



Keys



Clown



Car



Cat



Clock

Appendix 8

Materials used in the Testing of Verbal Working Memory (Saudi Sample)

Set 1: 8 Drawings with Phonologically Dissimilar names (Literal Translation):



Maqus



Aain



Jaras



Butta



Sandoog



Hessan



Sa'ah



Toffaha

Set 2: 8 Drawings with Phonologically Similar names (Literal Translation):



Qalam



Qareb



Qerred



Qet



Qafas



Qadam



Qetar



Qamar

Appendix 9**Examples of the Children's Autobiographical Narratives:****An English girl****Age: 5.8**

1- Can you tell me about all the things you did at bedtime last night? Tell me everything you did after you ate dinner until right before you went to sleep.

I had a story then I had, you see, I got my pyjamas on then I had a story and then I had my supper, went to bed and then I went to sleep.() I forgotten what I did after dinner, I played with some toys and then when it was time for bed I read a book that could help me go to sleep.() It was about Aladdin, it was my sisters' own book and was reading it to me and when she turned back the second page there was this picture of Aladdin but when she kept turning the pages lots of characters came round and it told you what happened to Aladdin.

2- Now, can you tell me everything you did when you woke up this morning?

After I woke up I got tired (tricky), you see, my brother Billy woke me up so I had to go- so I went back to sleep again (tricky). After a while I woke up so I went down stairs to eat breakfast and I got ready for school, got my coat and my shoes and sandals and I went to school.

3- Now, I'd like you to tell me just one thing you did recently that was really special and fun.

Once, when I tried eating chocolate, I didn't know what it would be like and when I had a bite I finished it, my mouth started to crack and that was a big surprise. () Well, you see, I had forgotten what it was like and I got it again yesterday and I liked it and I remembered what it was like. () I had Rice Crisps and the first time I tried it I could see little bits of yellow and I thought that's what make it crackle of yellow, you could really feel it.

4- How did you spend your last birthday?

I've quite forgotten () in September, I think I went to the Sea Life Centre, I liked it, and I liked my birthday cos I got lots of presents () I can't remember. () It was just a family party, none of my friends came, () I think it was fun and I think my granddad came.

() This means that there was a response from the Experimenter to urge the Child to remember and talk.

5- Now, can you tell me about a time, these days, when your mom or dad scolded you (told you off) for something?

I can't quite remember, () once when I got, it was sometimes I got sent to bed because I've been naughty a lot and forgot what I was going to say.

6- You know, some kids can remember things that happened to them when they were very little. Can you tell me the first thing that ever happened to you, that you can remember, in your whole life?

I think I remember when I first started to walk when I was a baby, () you see I can't quite remember. I can remember when I was out with my Mum and Dad when with my "trummy", they kept telling me my name was "Fanll" and it was.

A Saudi boy

Age: 6.8

1- Can you tell me about all the things you did at bedtime last night? Tell me everything you did after you ate dinner until right before you went to sleep.

First, I was playing with the computer for one full hour. Then, I had dinner and slept () a triangle like this flying and it is firing on it and another one comes and fires on it. After, I finished with the computer I had dinner and slept. () I stay late everyday late, late () because I like playing. This is what remembered and I forgot, this is what I remembered the rest I forgot the rest I forgot.

2- Now, can you tell me everything you did when you woke up this morning?

I basically once I woke up early, my dad woke me up early and I did not want to get up early. After I woke up I washed my face and this... after that I dressed up and went to school () after breakfast.

3- Now, I'd like you to tell me just one thing you did recently that was really special and fun.

Today.... the day before yesterday I went to Janadiriyah. Yesterday, yesterday, twice long ago I had been to Janadiriyah it was very nice. I bought a sward there and I bought a stick and then the day before yesterday we bought a lute and a stick and we took from them pens and that is it. () we saw dances, I did not like them.

4- How did you spend last Eid?

As soon as I arrived with my dad we sat there until dawn and I went to pray the Eid prayer. Then we played fireworks () there were friends, I had a lighter and that was all. Then I stayed up late then I slept, they did not give me presents.

5- Now, can you tell me about a time, these days, when your mom or dad scolded you (told you off) for something?

Many times I do not remember them all.() Only one thing I can remember because I was watching this er cartoon, my dad was watching football match I told him I want to watch the cartoon but he did not do anything, he just said go away.

6- You know, some kids can remember things that happened to them when they were very little. Can you tell me the first thing that ever happened to you, that you can remember, in your whole life?

My sister was crawling and smashing objects.() I was crawling and pushing milk bottle into the back of the bed () I do not know maybe two years. I do not remember anything I only remember the day when I was quiet and doing nothing and did not mass up with anything.

