# Cross-cultural Variations in Naïve Psychology: A Longitudinal Comparison of Preschool Children in the United Kingdom and Singapore

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## 2011

# DECLARATION

I declare that this thesis has been written by me. The work recoded in this thesis is entirely my own. This work has not been submitted for any other degree or professional qualification. The baseline results from the present longitudinal study reported in Chapter 5 of this thesis have been published in a peer-reviewed journal in co-authorship with my supervisors.

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25th May 2011

# ACKNOWLEDGEMENTS

# ABSTRACT OF THESIS

This thesis presents a three-phase longitudinal study of naïve psychology and pretend play behaviour development between preschool children in the United Kingdom (UK) and Singapore. Research conducted in the Western contexts has shown that children develop an understanding of pretence and desires at 18 months of age (e.g. Nielsen & Dissanayake, 2004; Repacholi & Gopnik, 1997), before level-1 visual perspective-taking at 2½ years of age (e.g. Flavell, Everett, Croft, & Flavell, 1981) and followed by level-2 visual perspective-taking, appearance-reality distinction and false-belief understanding at 4 years of age (e.g. Flavell et al., 1981; Flavell, Flavell, & Green, 1983; Wellman, Cross, & Watson, 2001). A major issue that has dominated the field for many years concerns whether naïve psychology follows a universal developmental pattern. The majority of the studies to date have tended to rely heavily on false-belief understanding as an index of children's understanding of mental representation. Some cross-cultural results have shown that the onset of false-belief understanding coincides with Western norms (e.g. Callaghan et al., 2005) whereas several non-Western studies have demonstrated a time lag in development across cultural groups (e.g. Vinden, 1999). To date no longitudinal study comparing the development of other naïve psychology concepts from 2 to 4 years of age between diverse cultures has been published.

The present study aims to address the gap in the literature by tracking longitudinally and comparing the developmental patterns of children's understanding of a range of naïve psychology concepts in the UK and Singapore at 2½, 3 and 3½ years of age (phases I, II and III respectively). Singapore with its mixed blend of Eastern and Western values represents a unique case for comparative study. This study employed a repeated-measures design, incorporating a large battery of established tasks that tapped children's understanding of pretence, desires, visual perceptions and beliefs. In addition, a semi-structured observational approach was employed to study children's naturally occurring pretend play behaviour. A total of 87 children were recruited in the UK ($M = 28.60$ months, $SD = 1.90$) and Singapore ($M = 29.89$, $SD = 2.76$) in the first phase of study. Of the initial sample, 36 children ($M = 42.75$, $SD = 1.84$) in the UK cohort and 38 children ($M = 43.68$, $SD = 2.79$) in the Singapore cohort participated in all three phases of the study. This thesis has five research questions.

The first question relates to the extent to which acquisition of naïve psychology concepts differ between the two cultures at 2½ years of age. The baseline results reported in Chapter 5 indicate that 2½-year-old children in both cohorts acquired a rudimentary understanding of some aspects of pretence, discrepant desires, action prediction, emotion

prediction and level-1 visual perspective-taking. The results showed no gross cross-cultural differences. However, subtle cross-cultural differences in children's understanding of discrepant desires and action prediction were found.

The second question addresses longitudinal cross-cultural differences in naïve psychology development between 2½, 3 and 3½ years of age. The results presented in Chapter 6 reveal cultural similarities in children's performance on several pretence understanding, the level-2 visual perspective-taking, the appearance-reality distinction and the false-belief explanation tasks. Nonetheless, cultural differences were observed in some aspects of naïve psychology. The UK cohort performed significantly better than the Singapore cohort in the unexpected transfer false-belief prediction task at 3½ years of age, after verbal mental age (VMA) and gender were treated as covariates. Additionally, the UK cohort achieved significantly higher total mean for the level-1 visual perspective-taking task across the three phases and the mental representation in pretence task across phases II and III. In contrast, the Singapore cohort scored significantly higher in total mean for the discrepant desires task across the three phases.

The third question considers longitudinal differences in children's understanding of knowledge-ignorance and beliefs from 3 to 3½ years of age. The analysis in Chapter 7 indicates that the Singapore cohort performed significantly more poorly than the UK cohort in understanding knowledge-ignorance attribution (for the false-belief prediction and false-belief explanation tasks) and true-belief ascription (for the false-belief explanation task) across phases II and III, after VMA and gender were considered as covariates. Comparison of children's false-belief prediction and justification scores revealed that the cross-cultural difference in false-belief prediction related to an explicit ability to predict false-belief without concurrent ability to justify a naïve character's behaviour based on false-beliefs. Twenty-four (66.7%) and 11 (28.9%) children in the UK and Singapore cohorts respectively were able to make correct false-belief prediction at 3½ years of age. Among these children, only six and five children from the UK and Singapore cohorts respectively provided correct justifications on the basis of false-beliefs. These findings therefore indicated cultural similarities in that the same number of children in both cohorts was able to predict and justify other's behaviour in terms of false-beliefs.

The fourth question explores the degree to which presence of sibling(s), birth order, language (VMA) and bilingualism contribute to individual differences in naïve psychology development. The results in Chapter 8 show no evidence that presence of sibling(s) and birth order facilitated understanding of action prediction, discrepant desires, level-1 visual perspective-taking, mental representation in pretence and false-belief prediction in either

cohort. With respect to the role of language in children's naïve psychology development, there were concurrent (within phase) associations between VMA and false-belief prediction at 3½ years of age and longitudinal associations between VMA at 2½ years of age and false-belief prediction at 3½ years of age for both cohorts. These findings suggest that language ability contributes to individual differences in false-belief understanding. It is worth highlighting that not all aspects of naïve psychology and VMA were related.

The fifth and final question focuses on longitudinal cross-cultural similarities and differences in pretend play behaviour and examines the links between pretend play behaviour and naïve psychology development. The observational data in Chapter 9 reveal that the Singaporean children spent significantly more time engaged in non-pretend play and non-social pretend play at 2½ years of age whereas the UK children spent significantly more time engaged in social pretend play. This finding contrasted with the marked cultural differences in naïve psychology development found at 3 and 3½ years of age. It is important to note that the UK and Singaporean children showed similar developmental sequences from non-pretend to non-social pretend and finally to social pretend play behaviour and from simple to complex forms of social pretend play behaviour. With respect to other pretend play behaviour, the UK children spent significantly more time engaged in positive complementary bids, negative conflict, other forms of pretence, metacommunication and in the pretend theme of outings, holiday and weather across all phases than the Singaporean children. The associations between some early pretend play behaviour and later acquisition of some naïve psychology concepts for both cultures provide partial support for the proposition that pretend play behaviour is an early marker of understanding mental representation. The reciprocal relationships between some pretend play behaviour and some naïve psychology concepts for the Singapore children alone provide partial support for the premise that pretend play behaviour and naïve psychology are closely related and intertwined.

Taken together, the findings presented in this thesis extend our understanding of the gradual development of various naïve psychology concepts and pretend play behaviour between a Western and a hybrid culture. There were, however, substantial cross-cultural differences in the onset of some aspects of naïve psychology and pretend play behaviour. The roles of language, siblings and social pretend play behaviour in children's naïve psychology development cannot be fully understood without considering culture as a frame of reference. The results of this study have a number of important implications for policy and practice including how pretend play should form an integral part of early childhood curriculum. Recommendations for further research are discussed.

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# CHAPTER 1
# THE DEVELOPMENT OF NAÏVE PSYCHOLOGY CONCEPTS
# IN WESTERN CULTURES

## 1.1    Introduction

Naïve psychology, also known as Theory of Mind (ToM), refers to one's "ability to reason and make inferences about another's mental states, and presupposes the ability to hold beliefs about another's beliefs, or to mentally represent another's mental representation" (Jarrold, Carruthers, Smith, & Boucher, 1994, p. 446). This thesis will investigate the development of naïve psychology at 2½, 3 and 3½ years of age and explore the connections with pretend play behaviour.

A central concern of the thesis is the current debate about whether naïve psychology development is cross-culturally universal or whether cultural differences lead to variations in both naïve psychology and pretend play behaviour. Some research has highlighted important cultural differences (e.g. Naito & Koyama, 2006) whereas other studies have shown remarkable cross-cultural similarity in the development of naïve psychology (e.g. Wellman, Cross, & Watson, 2001). Much of this research has centred on the key naïve psychology concept of belief (and false-belief). This thesis will examine the issue of cultural similarities and variations in a broad range of naïve psychology concepts in a three-phase longitudinal study of children in two different cultural contexts: the United Kingdom (UK) and Singapore. The study will use a large battery of experimental mental-state measures to chart developmental changes in naïve psychology in cohorts in two cultures. Detailed observations of children's pretend play behaviour will also be made to examine cultural similarities and differences in pretend play behaviour and how these relate to naïve psychology development. The large data set will be used to examine the following five main research questions and secondary questions within these themes (more specific subsidiary questions are considered in each results chapter). The subsequent review chapters will discuss the secondary questions in relation to existing evidence.

1. **Are there differences between the UK and Singapore cohorts in naïve psychology concepts at 2½ years of age?**
2. **Are there longitudinal differences between the UK and Singapore cohorts in naïve psychology development between 2½, 3, and 3½ years of age?**
3. **Are there longitudinal differences between the UK and Singapore cohorts in the development of knowledge-ignorance and beliefs from 3 to 3½ years of age?**

4. **Does the presence of sibling(s), birth order, verbal mental age, or bilingualism contribute to individual differences in naïve psychology development?**

5. **Are there longitudinal differences between the UK and Singaporean children in terms of engagement in different categories of pretend play behaviour (peer play scale, social bids, types of pretend role-play, pretend themes, transformation skills and Test of Pretend Play) between 2½, 3, and 3½ years of age?**

    a. **What is the relationship between pretend play behaviour and naïve psychology development for children from the UK and Singapore?**

This thesis comprises ten chapters, made up of three literature review chapters (inclusive of this chapter), a methods chapter, five results chapters and a final discussion chapter. Chapter 1 reviews research evidence on the development of naïve psychology in Western contexts. Chapter 2 focuses on research exploring cultural and social variations in the development of naïve psychology concepts. Chapter 3 synthesises evidence on the development of pretend play behaviour and how it relates to the development of naïve psychology concepts. These three literature review chapters provide the background for the large longitudinal cross-cultural study presented in this thesis. Chapter 4 then gives a comprehensive description of the methodology and data analysis procedures employed in this study. The results of the analyses are presented in five chapters. Comparative data of the baseline naïve psychology tasks are reported in Chapter 5 to explore Research Question 1. Chapter 6 then examines Research Question 2 by presenting the longitudinal analysis of children's naïve psychology development in the two cultures. Chapter 7 focuses on Research Question 3 by providing a detailed longitudinal analysis of cross-cultural variations in the developmental onset of knowledge and belief concepts. Chapter 8 explores Research Question 4 by considering the roles of a range of specific individual and social variables in the development of naïve psychology concepts in an attempt to identify the locus of any cultural differences. The final results chapter, Chapter 9, investigates Research Question 5 by examining cross-cultural similarities and differences in pretend play behaviour and evaluating the relationship between pretend play behaviour and naïve psychology concepts. The final chapter of this thesis, Chapter 10, concludes the thesis with a discussion examining the implications of the findings, limitations of the study and recommendations for future research.

For the remainder of this chapter, the focus is on reviewing evidence on the emergence and development of various naïve psychology concepts in Western cultures. This chapter then discusses four dominant theoretical approaches to the study of children's naïve psychology. The chapter concludes with a summary of the key issues and their implications for the thesis.

**1.2     Emergence of Naïve Psychology Concepts in Western Cultures**

Early in life infants begin to acquire several interconnected abilities which form the foundations of naïve psychology including: synchronic imitation, deferred imitation, self-recognition, pretend play, joint attention and symbolic gestures (e.g. Asendorpf, Warkentin, & Baudonniere, 1996; Charman et al., 2000; Leslie, 1987; Liszkowski, Carpenter, Henning, Striano, & Tomasello, 2004; Meltzoff, 1995; Nielsen & Dissanayake, 2000, 2004; Tomasello & Haberl, 2003). Between infancy and the age of 2 years, children acquire a rudimentary understanding of some main aspects of naïve psychology. A distinction can be drawn between 'non-representational' and 'representational' concepts. For children younger than 2 years of age, their naïve psychology remains largely non-representational (e.g. Gopnik & Meltzoff, 1997; Gopnik, Slaughter, & Meltzoff, 1994; Gopnik & Wellman, 1992; Perner, 1991; Wellman, 1990). Non-representational naïve psychology concepts are ones that the child can understand without having to comprehend the relationship between mental-state and reality (Gopnik & Slaugher, 1991; Woolley, 1995). Hence, younger children find it easy to engage in pretend play and comprehend discrepant desires, emotions and level-1 visual perspective-taking. While understanding of rudimentary naïve psychology concepts becomes gradually representational from 2 years of age, more sophisticated representational concepts (e.g. level-2 visual perspective-taking, appearance-reality distinction and belief understanding) are acquired at around 4 years of age. Children are considered to have a representational understanding when they demonstrate knowledge of the distinction between mental-state and reality, or knowledge of their own mental representations and the fact that another person can hold a mental representation different from their own (e.g. Flavell, Green, & Flavell, 1990b; Forguson & Gopnik, 1989).

The gradual acquisition of naïve psychology concepts from infancy to 4 years has been suggested by a number of researchers and theorists as developing from implicit to explicit understanding. Karmiloff-Smith's (1986, 1992) three-phase representational redescription (RR) theory of cognitive development postulates that children's knowledge is represented implicitly initially and becomes gradually explicit with development. For example, Bretherton (1991) contends that 9-month-old infants have an implicit

understanding of others' intentionality. (See also Dienes and Perner's (1999) four-level hierarchy theory of implicit and explicit knowledge. In their discussion about developmental data, Dienes and Perner (1999) highlight the parallel between Karmiloff-Smith's (1992) RR model and their theory).

A considerable literature has documented the age of Western children's acquisition of various mental-states. Children develop an understanding of some rudimentary aspects of pretence, desires and level-1 visual perspective-taking, followed by more sophisticated pretence understanding and finally knowledge of level-2 perspective-taking, appearance-reality distinction, true-beliefs and false-beliefs. The current study will compare the developmental onset of a wide range of naïve psychology concepts between 2½ and 3½ years of age in two cultural contexts. In light of this, the subsequent review will present the development of naïve psychology concepts as each unfolds in a chronological order. A few studies are described in detail to highlight some methodological issues in relation to the methods adopted in the present study (see Chapter 4).

### 1.2.1  Pretence understanding

Before reviewing the literature on children's pretence understanding in Western cultures, the distinction between pretence understanding and pretend play behaviour is discussed. Lillard (1993a, 2002a) suggests six defining features of pretence: a pretender, a reality, a mental representation, projection of mental representation onto reality, awareness of the difference between reality and the imagined situation, and an intention to project mental representation onto reality. While external manifestation such as actions and costume is a common and important feature of pretence, Lillard argues that this is not an obligatory attribute (*cf.* Nichols & Stich, 2000). Lillard's (2002a) definition indicates that there are two dimensions that should be considered when looking at children's pretence. One is the child's naturalistic pretend play behaviour which may merely involve physical behavioural acts without the child necessarily having much explicit understanding of the mental representation involved. The second is the child's understanding of pretence and the mental representation involved in pretence. The former can be observed naturalistically, and the latter can be assessed through experimental task performance. Henceforth in this thesis, the term "pretend play behaviour" will refer to children's pretend play in naturalistic settings. The term "pretence understanding" will refer to children's understanding of pretence, going beyond action-based behaviour to being able to demonstrate the ability to comprehend pretend transformation, distinguish pretend-reality and appreciate the mind's involvement in pretence. Pretence understanding is a naïve psychology concept. The two abilities are inter-

linked. Early pretend play behaviour may enhance children's later understanding of pretence. Understanding the representational nature of pretence may support children's ability to engage in sophisticated forms of pretend play (e.g. role-play).

Children develop a fairly good grasp of several aspects of pretence understanding between 2 and 8 years of age. Most Western cross-sectional studies have only focused on a single or few concepts of pretence understanding. Little is known about children's pretence understanding in non-Western contexts. Children's developing understanding of pretence may be aided by cultural and social environmental factors (e.g. encouragement of pretend play). The present research will explore cultural differences in children's changing competence from rudimentary to complex understanding of pretence to address developmental issues and investigate the relationship between pretence understanding and other naïve psychology concepts. For this reason a range of linked aspects of pretence understanding are outlined below.

*Understanding and production of pretence action*

The second year is an important period for the development of pretence understanding. Children become competent in: comprehending and following simple pretence stipulations and transformations; understanding the causal outcomes associated with a pretend transformation; describing successive sequences and consequences in pretence episodes by providing non-literal descriptions; and producing appropriate pretend acts (e.g. Harris & Kavanaugh, 1993; Harris, Kavanaugh, & Meredith, 1994; Walker-Andrews & Harris, 1993). For instance, after observing an adult pretending to pour imaginary tea over a puppet monkey's head, 2-year-old children can describe that the monkey has become "wet" (Harris & Kavanaugh, 1993). Slightly older children can understand pretend themes. For example, when 3-year-old children were asked to engage in appropriate pretend actions to complete a doll-play pretend episode and describe the imaginary outcomes, they were able to make a mother doll fed a baby doll, and used novel non-literal words and actions that did not imitate the adult's expressions, demonstrating an independent understanding of pretence expression (Kavanaugh, Eizenman, & Harris, 1997). Given that data on such developmental changes in children's comprehension and production of pretence action in different cultural contexts is relatively sparse, further empirical verification is needed (see Chapters 5 and 6).

Prior studies have also demonstrated that children's understanding of pretence is enhanced through observing and imitating adults' actions. Walker-Andrews and Kahana-Kalman's (1999) cross-sectional study showed that children learnt to imitate an adult's actions at 15 months of age and moved to being able to tailor their pretend actions to those of

another child at 24 months of age, using this latter ability to enter into collaborative pretend play. In a series of studies on tools and toys, Rakoczy, Tomasello and Striano (2005b) demonstrated that when presented with novel objects, 18 and 24-month-old infants learnt both pretend and instrumental actions via imitation. Similar findings that 2-year-old children's understanding of pretend actions could be enhanced through imitation of adults' acts were reported in several studies (e.g. Nielsen & Christie, 2008; Rakoczy, 2003; Rakoczy, Tomasello, & Striano, 2004; Randell & Nielsen, 2006; Striano, Tomasello, & Rochat, 2001; Watson & Fischer, 1977). These findings support the notion that pretence is a naturally social and intersubjective activity. Hence, it is important to consider the relationship between children's pretence understanding in an experimental paradigm and their naturalistic social pretend play behaviour in an observational paradigm (see Chapter 9).

*Pretend-reality distinction*

Children's emerging ability to differentiate pretend from reality may facilitate their understanding of conflicting mental representations. The literature presents somewhat mixed results regarding whether children are able to differentiate pretence and reality between 16 months of age and 5 years. Bosco, Friedman and Leslie (2006) demonstrated that children from 16 months of age could differentiate between pretend and real actions. Some researchers have proposed that 3 to 4-year-old children tend not to confuse the real and pretence states of affairs when pretend play is in progress (Flavell, Flavell, & Green, 1987a; Lillard & Flavell, 1992). Others, though, suggest that there is reason to doubt that 2½ to 7-year-old children understand the difference because they are more likely to exhibit confusion after the episode has ended (e.g. DiLalla & Watson, 1998; Foley, Harris, & Hermann, 1984; Johnson & Harris, 1994; *cf.* Woolley & Phelps, 1994).

A number of studies have found that 3-year-old children are able to distinguish fantastical events from real ones (e.g. DiLalla & Watson, 1988; Golomb & Galasso, 1995; Samuels & Taylor, 1994, Sharon & Woolley, 2004). Children's pretend-reality distinction ability has been assessed using different experimental tasks. Employing a property attribution card-sorting task, Sharon and Woolley (2004) asked children and adults to categorise a range of real and fantastical entities according to different properties (physical, social, biological and mental). Their results revealed a developmental progression with 5-year-old children performing similarly to adults, whereas 4-year-old children were only able to differentiate between real and fantastical entities in their attribution of physical and social properties, and 3-year-old children showed no systemic differentiation by property type. For a systematic review of the theoretical arguments and empirical evidence of children's

understanding of the pretence-reality distinction, see Bourchier and Davis (2002). Given that existing literature provides little information about the age of onset of pretend-reality distinction in non-Western children, an examination of diverse cultures is required (see Chapter 6).

*Imaginary-reality distinction*

While research on the pretend-reality distinction assesses children's ability to distinguish between pretend and real *acts*, studies that explore imaginary-reality distinction require children to differentiate between imagined and real *entities*. Woolley and Wellman (1990, Study 2) demonstrated that 3-year-old children are able to explicitly grasp the difference between reality and nonrealities for pictures, toys and pretence. Wellman and Estes (1986) showed that 3-year-old children understand that people can only act physically on real objects but not imagined objects. Children were told that one boy had a cookie while another was thinking about a cookie. When they were asked which boy could eat, touch or see the cookie, they could reason that only the boy with the real cookie could do so. Harris, Brown, Marriott, Whittall and Harmer (1991, Experiment 4) asked 4 and 6-year-old children to imagine either a friendly animal (a bunny) or a frightening creature (a monster) in one of the two empty boxes. Children were asked about the visibility and reality of the items. The findings showed that even though some 6-year-old children understood that their imagination was not visible or real, they tended to believe that imagined entities really existed. When left alone with the pretend box (either pretend rabbit or monster condition) and a neutral box, children approached the pretend box more quickly and touched and opened it more often than the neutral box.

Woolley and Wellman (1993) argued that emotionally charged contents would have explained why children have approached the pretend box more quickly than the neutral box in Harris et al. (1991). Therefore, in a study of 3-year-old children's understanding of the representational relations between imagination and fictional mental-state, Woolley and Wellman (1993, Study 2) presented children with an empty box and asked them whether they and another person could imagine that an emotionally neutral everyday object (e.g. crayon) was inside (hypothetical imagination trial). In the actual imagination trial, children also looked into an empty box but were told to imagine an object in the box. In the knowledge trial, children looked inside a bag containing a real object (e.g. pencil) and were asked if they and another person knew that there was something inside. The results revealed that 3-year-old children often claimed that imagination corresponded to reality even though they understood that representations of knowledge rather than representations of imagination

corresponded to reality more accurately. The present study employed Woolley and Wellman's (1993) task to enhance our understanding of children's comprehension of imaginary mental representations in different cross-cultural contexts.

Research by Woolley (1995) revealed that children's ability to appreciate multiple mental representations when one of these representations lacks real content (imagine an empty box contains a spoon) emerge earlier than children's ability to reason about conflicting representations (think that a box contains chocolate when it really contains pencils). The task performance sequence between understanding of imaginary-reality distinction and understanding of other mental-states has not been compared cross-culturally (see Chapter 6).

*Mental representation of pretence*

There has been a debate on whether children understand pretence in terms of actions (acing-as-if or behaving-as-if) or mental-states. Leslie (1987) claims that the emergence of pretence marks the onset of children's understanding of their own and others' pretence. He claims that since pretence and other mental-states share similar mental structure, one cannot engage in pretend play without simultaneous understanding of the mentalistic nature of pretence (Friedman & Leslie, 2007; Leslie, 1987). A recent study by Friedman, Neary, Brunstein and Leslie (2010) investigated if 2 and 3-year-old children have a representational concept of pretence. The results revealed that children understood the intended meaning of the experimenter's behaviour by inferring the underlying mental-state (i.e. children could represent normal requests as the experimenter's and pretend requests as the bear's). However, Perner, Baker and Hutton (1994a, p. 262) argue that children before the age of 4 years have a concept of "prelief". That is, they cannot distinguish whether acting-as-if is a case of pretence or a mistake (belief) (see Scholl & Leslie, 1999, for discussion on prelief-belief distinction).

The discourse surrounding children's understanding of the mind's involvement in pretence was triggered by a task developed by Lillard (1993b). Four and 5-year-old children were presented with a series of stories about a troll character (Moe) from a different planet, who was hopping like a rabbit (behaving-as-if) but Moe did not know what rabbits were and that they hopped. Children were asked whether Moe was pretending to be a rabbit or not. The majority of the 4-year-old children (63%) and even many 5-year-old children (32%) claimed that Moe was pretending to be a rabbit. Even 8-year-old children did not perform at ceiling levels (Lillard, 1998b, Study 4). In another study, Lillard (1996) further demonstrated that children under 6 years of age regarded that one could pretend without using a brain or

needing a mind. Furthermore, when pretence was divided into planning and executive stages, even 8-year-old children asserted that the latter stage did not require the mind even though they claimed that former stage involved the mind (Experiment 5). Based on these series of experimental results, Lillard (1996, 1998b) concluded that children below 5 years of age do not seem to appreciate the role of intention in pretence. Nor do they understand the mental representational nature of pretence. Lillard's results showed clear developmental trends with children acquiring an adult-like understanding that pretence involved the mind by 8 years of age. This developmental account suggests that knowledge of mental representation nature of pretence develops many years later after children have acquired false-belief understanding. This raises the question of why children are characterised as having acquired a representational understanding of mental-states when they understand false-beliefs (e.g. Perner, 1991) rather than pretence understanding.

Critics of Lillard's Moe the Troll task attributed children's poor performance to the task's demands and methodological shortcomings including the forced choice test question and greater emphasis placed on the salience of action rather than mental-state (e.g. Bruell & Woolley, 1998; Davis, Woolley, & Bruell, 2002; Golomb & Galasso, 1995; Joseph, 1998). Studies have found that children perform better when they are actively involved in pretending. For example, Mitchell (2000) failed to replicate Lillard's results. When 3½ to 6½-year-old children were asked whether they could pretend to be an unknown creature, the majority of them replied that they could not pretend to be animals that they did not know.

A recent set of studies has produced evidence indicating that 3-year-old children demonstrate an understanding of pretending as specific intentional activity (Rakoczy & Tomasello, 2006; Rakoczy et al., 2004). A host of other studies have shown that 3 and 4-year-old children have substantial understanding of the mental representational features of pretence (e.g. Custer, 1996; Flavell et al. 1987a; Gopnik & Slaughter, 1991; Gottfried, Hickling, Totten, Mkroyan, & Reisz, 2003). Other research has also found that 4-year-old children show an early appreciation of the mentalistic nature of pretence when pretending to be a fantasy character such as superheroes and movie characters, suggesting that certain categories of pretence might highlight for children that pretending involves the mind (e.g. Lillard & Sobel, 1999; Richert & Lillard, 2002; Sobel, 2006; Sobel & Lillard, 2001). Given the methodological concerns related to Lillard's (1996, 1998b) studies, the current study adopted Davis et al.'s (2002) task that has sought to address some of these issues (see Chapter 4).

The comparison of the developmental progression of children's knowledge of the mind's involvement in pretence with their transition from solitary to social pretend play has

generated a considerable amount of theoretical arguments (see theoretical review in Chapter 3, Section 3.6.3). Further work is needed to investigate the relationship between children's progressing understanding of mental aspects of pretence and development of pretend play behaviour (see Chapter 9).

Overall, an extensive body of literature has documented the developmental change of children's gradual mastery of rudimentary to sophisticated knowledge of pretence in Western cultures. From around 2 years of age, children can comprehend pretend transformation, imitate other people's pretence actions on toys and objects, and produce novel pretend actions. At around 3 years of age, children begin to differentiate between pretend and real acts and between imagined and real objects. A number of studies have found that 3-year-old children possess mental representations of pretence. Other studies, however, suggest that it is not until the age of 6 years that children understand the mind's involvement in pretence. The literature reflects on the whole a lack of evidence of children's pretence understanding in different cultural contexts. From a socio-cultural perspective, the studies reviewed so far highlight that scaffolding provided by adults might support children's understanding of pretence (e.g. Randell & Nielsen, 2006). If children's naïve psychology development is embedded in the context of social interactions, the influence of children's language ability and family factors should not be ignored (see review in Chapter 2).

Pretence understanding can be viewed as a rudimentary foundation of naïve psychology. Children's pretence understanding can be considered as comprising of a range of conceptual abilities, from early non-representational to later, more complex, representational understanding (Jarrold et al., 1994). Previous research has reported that while 3-year-old children fail standard appearance-reality distinction tasks, they pass comparable pretence-reality tasks (Flavell et al., 1987a). This demonstrates that understanding of pretence emerges before understanding of all other complex mental-states (see also Hickling, Wellman, & Gottfried, 1997; Wright Cassidy, 1998). Relatively few Western studies have specifically examined the associations between pretence understanding and acquisition of other naïve psychology concepts. Significant relationships between pretence understanding and performance on false-belief and appearance-reality distinction tasks have been reported (e.g. Jarrold, Mansergh, & Whiting, 2010; Rosen, Schwebel, & Singer, 1997). Little attempt has been made to examine the relationship between early acquisition of other naïve psychology concepts and sophisticated pretence understanding. Additionally, scant attention has been given to cultural variations in children's pretence understanding. Further cross-cultural studies are needed to examine the associations between children's pretence understanding and other naïve psychology concepts (see Chapter 6).

### 1.2.2 Desires and emotions

Understanding of desires, like pretence, appears early in development (Bartsch & Wellman, 1989; Wellman & Woolley, 1990). At around 18 months of age, children develop a psychological understanding of subjective desires (Repacholi & Gopnik, 1997). They begin to realise that they and other people understand desires as internal states directed towards objects and know that desired objects give happiness and that undesired objects may cause negative feelings. This demonstrates an understanding that different people may have different desires directed toward the same object. In contrast to understanding discrepant desires which may require inferring desires from emotional expressions, predicting emotion necessitates deduction of another person's emotions from knowledge of their desires (Repacholi & Gopnik, 1997). From 18 months, children use simple desire and emotional terms such as *like*, *not like*, *happy* and *sad* in their everyday conversations with their mother and siblings (e.g. Dunn, Bretherton, & Munn, 1987). Research has shown that by 2 years of age, children know that people will feel good if they get what they want and feel sad if they do not (Wellman & Woolley, 1990).

Children understand the links between desires, actions and emotions by around 2 to 3 years of age. Wellman and Woolley (1990, Experiment 1) reported that 2-year-old children can predict actions and reactions related to simple desires. They recognise that people will continue searching if they do not find a desired object and cease searching if they find it. This finding supports the proposition that 2 to 3-year-old children utilise a desire-belief theory to predict that the character will search in the location to satisfy their desire (Bartsch, 1996; see further discussion in Section 1.3). While 2-year-old children fail discrepant belief reasoning tasks, they pass comparable desire reasoning tasks, demonstrating an understanding of desires before beliefs (Wellman & Woolley, 1990, Experiment 2). At 2½ years of age, children can infer others' perceptions on the basis of others' emotions about desirable and undesirable object (Wellman, Phillips, & Rodriguez, 2000, Study 2). By 3 years of age, children appreciate the link between situations and emotions (Harris, 1989). For example, they understand that children feel happy when they receive a present and sad when they lose a toy.

During enculturation, children learn appropriate and inappropriate displays of emotional expressions to different situations (Harris, 1989). A few cross-cultural studies have demonstrated that cultures differ in the extent to which they perceive universal facial expression of emotions (happiness, anger, disgust, shame/guilt) (e.g. Matsumoto, 1989; Matsumoto & Ekman, 1989). For example, Matsumoto (1992) reported that Japanese people performed more poorly in perceiving negative emotions than Americans. This finding

captured the differences noted between collectivist and individualist cultures (see definitions of individualist and collectivist cultures in Chapter 2, Section 2.3). The display of negative emotions is discouraged in collectivist cultures but generally encouraged in individualistic cultures. Furthermore, parental support for children's understanding of desires and emotions through everyday discourse about mental-states may vary from culture to culture. More research is needed to elaborate on the degree to which the age of onset of children's understanding of desires, actions and emotions varies between different cultures (see Chapters 5 and 6).

### 1.2.3    Visual perspective-taking and appearance-reality distinction

Western children begin to use perception words like *see*, *look* and *watch* by 20 months of age (Bretherton & Beeghly, 1982). By 2½ years of age, children come to understand that someone else may see something that they themselves do not (level-1 perspective-taking; Flavell, Everett, Croft, & Flavell, 1981; Masangkay et al., 1974; Salatas & Flavell, 1976; see also Moll & Tomasello, 2006). While 2 and 3-year-old children can solve level-1 perspective-taking problems, they have difficulty solving level-2 perspective-taking problems: children do not show an understanding that another person could see something in a different way than they do until 4 years of age (Flavell et al., 1981; Masangkay et al., 1974; *cf.* Moll & Meltzoff, 2011). For example, a turtle in a picture may appear standing on its feet to them but may appear to be lying on its back to someone sitting on the opposite side of the table. Level-1 perspective-taking is non-representational since it only requires a child to understand that other people perceive a different object from themselves. On the other hand, level-2 perspective-taking is representational because it requires a child to demonstrate an understanding that other people can represent a single object differently from them (Flavell, 1989).

Before the age of 4 years, children have difficulty distinguishing between the appearance and reality of an object's identity (Flavell, 1986, 1993; Flavell, Flavell, & Green, 1983a; Flavell, Green, & Flavell, 1986). When given a deceptive object such as a sponge that looks like a rock, they are likely to say that the object looks like a sponge and really is a sponge or it looks like a rock and really is a rock. Empirical evidence has also shown that younger children have difficulties differentiating the appearance and reality of an object's properties (e.g. Flavell, Green, Wahl, & Flavell, 1987b). When shown a glass of milk wrapped in a piece of orange plastic, younger children tended to report that the milk was orange when asked about its real colour (e.g. Taylor & Flavell, 1984). Children's difficulty in understanding simultaneous, multiple representations of a single object and different

representations of the same object by different people account for their poor performance on level-2 visual perspective-taking and appearance-reality tasks (Flavell, 1986).

Existing non-Western studies tend to overlook the fact that differences in self-orientation and other-orientation between Western individualistic and Eastern collectivistic cultures respectively may influence how children interpret others' perception of an object or situation. Are children who are exposed to a culture that values other-orientation more attuned to others' thoughts and feelings and skilled in perspective-taking than children living in societies that promote individualistic values? Furthermore, Western research has shown that level-2 visual perspective-taking, appearance-reality distinction and false-belief prediction develop concurrently between 3 to 5 years of age. Is this pattern of development similar across cultures? Chapter 6 addresses these issues in detail.

### 1.2.4 Belief understanding and knowledge-ignorance attribution

Children gradually realise that belief guides people's behaviours based on people's acceptance of the validity and truth of a situation. Understanding true-belief in an experimental paradigm requires children to make predictions based on their understanding of a character's past true-belief. In contrast, understanding false-belief requires children to predict behaviour based on the character's false-belief rather than their own knowledge of the current state of reality. While understanding of epistemic-states comprises of belief and knowledge, the literature on children's naïve psychology focused primarily on false-belief understanding. Passing the false-belief task is often taken as a gold standard for determining whether a child has acquired a representational naïve psychology. In view of the importance of the concept of belief in assessing children's representational understanding, a more elaborate discussion is given here, and Chapter 7 is devoted to comparing the development of children's understanding of beliefs and knowledge-ignorance between two cultures (Research Question 3).

In a true-belief task (Wellman & Bartsch, 1988), children were told a story in which magic markers were placed on a shelf and in a desk and the character saw them on the shelf. When asked to predict where the character would look for the magic markers, 3-year-old children made correct predictions. There are two types of first-order false-belief tasks. In the classic unexpected transfer 'Maxi' task (Wimmer & Perner, 1983), Maxi leaves some chocolate in a blue cupboard. While he is away, his mother removes it and puts it in a green cupboard. Children are then asked where Maxi looks for the chocolate. Children below 3 years 5 months tend to make the classic error by predicting Maxi's actions based on the true state of reality, whereas children at 4 years and above are able to predict Maxi's behaviour

based on his false-belief (e.g. Wellman et al., 2001). In the unexpected content task, children are shown a Smarties tube and asked to state what they think is inside (Perner, Leekam, & Wimmer, 1987). The experimenter then opens the tube to reveal that it contains a pencil. The lid is closed and when asked to say what they first thought and what a naïve friend would think is inside the tube, children younger than 3½ years tended to give incorrect answers whereas children older than 4 years tended to make correct false-belief attribution. Three-year-old children's difficulty with false-belief tasks indicates that they do not have a representational understanding of belief (e.g. Wellman, 1990). Both the 'Sally-Anne' and the 'Plasters' tasks are modifications (by Baron-Cohen, Leslie and Firth (1985) and Williams and Happé (2009) respectively) of the standard 'Maxi' and 'Smarties' tasks respectively.

There is evidence to suggest that infants attribute false-belief in a modified non-verbal spontaneous-response task (e.g. Baillargeon, Scott, & He, 2010; Onishi & Baillergeon, 2005; Surian, Caldi, & Sperber, 2007). However, there is controversy over whether infants can truly represent false-belief, either implicitly or explicitly (see discussion in Leslie, 2005; Ruffman & Perner, 2005; Stack & Lewis, 2008). The majority of the findings suggest that the ability to attribute false-belief develops between the ages of 3 years 5 months and 5 years (e.g. Wellman et al., 2001; Wimmer & Perner, 1983). Wellman et al. (2001, p. 678) identified the period between 3 years 5 months and 4 years of age as a transitional stage of "confused, random performance". Analysis of individual children's performance further indicates that some show change before and some after this age range (Flynn, 2006). Test-retest reliability and microgenetic studies of 3 to 6-year-old children demonstrated consistent performance across multiple measures over time but a small percentage of children showed regressions in scores (e.g. Amsterlaw & Wellman, 2006; Flynn, 2006; Flynn, O'Malley, & Wood, 2004; Hughes et al., 2000; Mayes, Klin, Tercyak, Cicchetti, & Cohen, 1996). The present study investigated the transition in development at 3 and 3½ years of age.

It is worth noting that a host of researchers has addressed some methodological shortcomings of the standard tasks in order to examine whether the representational concept of false-belief is present at 3 years of age. Some researchers argued that the 'think' question in the standard unexpected transfer task underestimated young children's true competence in false-belief reasoning (e.g. Surian & Leslie, 1999). When a temporal reference ('look first') was inserted, 83% of 3-year-old children passed the test question compared to only 30% when no temporal reference was inserted (Surian & Leslie, 1999; see also Lewis & Osborne, 1990; Siegal & Beattie, 1991; Joseph 1998, Experiments 1 & 2). Even non-Western data showed that the 'look first' question could improve the performance of 3-year-old children in

Iran (Yazdi, German, Defeyter, & Siegal, 2006). A study in Greek found that children performed below-chance on false-belief tasks when a version of the term 'to look for' was used but scored better when its synonym was used (Maridaki-Kassotaki, Lewis, & Freeman, 2003). Better performance was also observed when the false-belief question was phrased with the word 'say' rather than the word 'think' (Nelson et al., 2003). In contrast, other studies provided no consistent evidence that including temporal markers (Clements & Perner, 1994) or asking children to report their past representation of an object (Gopnik & Astington, 1988) results in improved performance. Moses (1993) explains that linguistic or temporal confusion may be a factor but not a major cause of children's difficulties on false-belief tasks. These findings have important implications for how language competence and task demands may influence performance in the present study. Attention should then be given to the issue of whether reducing the perceptual salience by including the temporal marker 'first' would aid children's performance in the present study (see Chapter 4, Section 4.7.1) and reveal their true competence on the prediction task in the present cross-cultural study (see Chapter 6).

A range of studies has explored the use of cues in children's false-belief understanding (e.g. Mitchell & Lacohee, 1991; Flavell, Flavell, Green, & Moses, 1990a). For example, 3-year-old children performed well in false mental-state comprehension, if they were actively involved and motivated in deceiving another person, because deception and trickery focused on children's ability to lead others into false-belief (e.g. Carlson, Moses, & Hix, 1998; Chandler, Fritz, & Hala, 1989; Chandler & Hala, 1994; Hala, Chandler, & Fritz, 1991; Sullivan & Winner, 1993). The findings reported here could be attributed to a range of methodological issues but also raise the possibility of important within-culture variations in naïve psychology. It also highlights the wide range of methodological issues which must be taken into consideration when adapting belief tasks for use in different cultures. Before reviewing the literature on the developmental sequence of true-belief ascription, knowledge-ignorance attribution, false-belief prediction and false-belief explanation as each chronologically unfold, children's understanding of the concept of knowledge is briefly discussed.

It has been suggested that younger children's difficulty with false-belief prediction is due to their failure to take into consideration how the naïve character's action is premised on the character's access to information (e.g. Perner, 1991; Perner & Wimmer, 1988; Wimmer, Hogrefe, & Sodian, 1988b). The ability to appreciate another person's perspective or access to verbal information is an essential condition for correct assessment of someone's knowledge (Wimmer, Hogrefe, & Perner, 1988a; Wimmer et al., 1988b). Prior studies have

shown that it is not until age 3 years, that children can correctly attribute ignorance to someone who lacks direct perceptual access to a situation (i.e. they realise that 'not seeing' leads to 'not knowing') (e.g. Pillow, 1989; Pratt & Bryant, 1990). By around 4 or 5 years of age, understanding of the 'Seeing = Knowing Rule' (Ruffman, 1996; see also Perner, 1991; Wimmer et al., 1988b) becomes more sophisticated and children appreciate that certain types of knowledge depends on different types of sensory experiences (e.g. a puppet that feels but does not see a soft, spongy, yellow ball will not know the colour of the ball: O'Neill, Astington, & Flavell, 1992). Evidence suggests there is no developmental lag between children's ability to report the object that another person who had a clear line of sight can see (level-1 visual perspective-taking) and to attribute ignorance to someone who lacks this perceptual experience (Pillow, 1989). Hence, the ability to attribute knowledge-ignorance may develop earlier than understanding of belief (but see conflicting results below). In the false-belief unexpected transfer task, children who use the Seeing = Knowing Rule will reply that the character who has not seen and does not know about the transfer would subsequently search in the wrong location (Ruffman, 1996; however, see Friedman, Griffins, Brownell, & Winner, 2003 for exception). In the standard unexpected transfer false-belief prediction and explanation tasks in the present study, children were asked to state whether the character knew and saw the object being moved (see Chapter 4, Section 4.7.1). The aim is to determine whether children would attribute ignorance to the character that has not seen the transfer.

Numerous Western studies have investigated the sequence of children's developing understanding of belief and knowledge-ignorance. Several studies have reported good true-belief performance among 3 to 5-year-old children (e.g. Garnham & Ruffman, 2001; Ruffman, Granham, Import, & Connolly, 2001; Wellman & Bartsch, 1988). On the other hand, Riggs and Simpson (2005), who employed a format of the standard unexpected false-belief transfer task (Wimmer & Perner, 1983), showed that children between 3 and 4 years of age have difficulty attributing past true-belief. Riggs and Simpson (2005) suggested information processing or executive demands as possible factors affecting children's performance. To date, no published cross-cultural studies have examined children's true-belief understanding and this study will begin to fill this gap (see Chapter 7).

As noted earlier, a conflicting picture regarding the age of onset of the ability to attribute knowledge-ignorance and predict false-belief has emerged. Some studies indicate that children are able to attribute knowledge-ignorance before false-belief (e.g. Hogrefe, Wimmer, & Perner, 1986) whereas other studies have reported no difference between the onset of the two abilities (e.g. Sullivan & Winner, 1991, 1993). There is evidence to suggest

that different cultural emphases on knowledge acquisition and belief understanding might be linked to variation in performance sequence in knowledge-ignorance and various belief tasks between Western and Chinese cultures (see Chapter 2, Section 2.3). Children's conceptualisation of the link between information access (knowledge) and mental representation (belief) may be attributed to cultural (e.g. parental talk about knowing and thinking in early years) and social (e.g. interactive activities like hide-and-seek games) factors (Wimmer et al., 1988b). A comparison of children's emerging understanding of knowledge-ignorance and belief in different cultures is required.

Characterising children as having acquired a complete understanding of false-belief means that they can pass the false-belief prediction question as well as provide a false-belief based explanation of the character's behaviour in the false-belief paradigm (e.g. Atance & O'Neill, 2004). Contradictory findings have been reported on whether false-belief explanations develop earlier than prediction. Some studies have reported an explanation-over-prediction advantage among 3-year-old children (e.g. Bartsch & Wellman, 1989; Robinson & Mitchell, 1995). On the contrary, Clements and Perner (1994) argue that children progress from correctly predicting the character's action implicitly, then they become able to answer explicitly and finally they are able to justify their responses. Wimmer and colleagues reported that 3 and 4-year-old children exhibited difficulty in explaining and predicting false-beliefs (Wimmer & Mayringer, 1998; Wimmer & Weichbold, 1994). Hence, children's false-belief prediction and explanation abilities may be differentiated along the implicit-explicit continuum.

Atance and O'Neill's (2004) results showed that even children who passed the false-belief prediction did not always make explicit reference to epistemic-state but instead referred to the goal of the character. Wimmer and Mayringer (1998) demonstrated that one-third of children's incorrect responses to the explanation question could be explained in terms of the character's desire. According to Flynn (2006), the types of explanation provided by children indicate that they tend to give situational answers by describing the current state (e.g. "The chocolate is in the blue cupboard"). They then progress through a period of confusion, in which they are unable to provide explicit explanations of a character's behaviour because they are unable to convey their understanding verbally. As the tendency to rely on situational cues begins to diminish and references made to current situation declines, they are able to explain behaviour by referring to an individual's false-belief. Children do not return to using situation-based reasoning once they begin to provide mental-state explanations. Taken together, the results to date paint a confusing picture. Does explanation develop before, after or on par with prediction? Are there any similarities and

differences between different cultural groups in children's explanation of false-belief based behaviours? Cross-cultural evidence of children's false-belief explanation ability is discussed in Chapter 2 (Section 2.3). Chapter 7 will explore these questions in greater detail.

In sum, Western results show a somewhat conflicting picture with regard to the developmental sequence in which knowledge-ignorance attribution and belief understanding emerge. Which pattern applies in another culture? The false-belief prediction and false-belief explanation tasks employed in the present study investigate whether knowledge-ignorance attribution, true-belief ascription, false-belief prediction and false-belief explanation emerged simultaneously or if there was a time-lag (Research Question 3).

### 1.2.5 Summary of naïve psychology research in Western cultures

Children in Western countries have been shown to acquire a range of naïve psychology concepts, which develop in a gradual sequence during the early childhood years, and which some suggest are coherent and form a naïve theory. Children acquire knowledge of rudimentary aspects of pretence and discrepant desires by 18 months of age and level-1 visual perspective-taking by 2½ years of age. Three-year-old children develop a mentalistic understanding of pretence. By 4 years of age, children exhibit understanding of level-2 visual perspective-taking, appearance-reality distinction, true-belief ascription and false-belief prediction. However, do children growing up in other cultures follow a similar sequence of development in naïve psychology? The gradual change from a rudimentary understanding by 2 years of age to more sophisticated understanding at around 4 years of age is of interest to both theorists and education practitioners but there is no cross-cultural work that compares the developmental changes across this age range. The present study will attempt to fill this gap by comparing naïve psychology development and examining developmental sequences in naïve psychology concepts between two cultures. Children's acquisition of an understanding of mind is often indexed by an understanding of false-belief. Extensive research in both Western and Eastern cultures has focused on comparing the difference between 3 and 4-year-old children's ability to make false-belief predictions. However, children's understanding of beliefs should be studied as a more gradual process and constitute a range of abilities including true-belief ascription, false-belief prediction, false-belief explanation and knowledge-ignorance attribution (see Chapter 7).

## 1.3    Theories of the Development of Naïve Psychology

The empirical evidence reviewed thus far of how children's naïve psychology develops has been a topic of intense theoretical debate. There are four dominant theoretical accounts of the development of naïve psychology: modularity theories, theory theory approaches, representational change accounts, and simulation theory. A number of authors have classified 'theory theory' (e.g. Gopnik & Wellman, 1992) and 'representational theory of mind' (Perner, 1991) as one theoretical account (e.g. Flavell, 1999, 2000; Harris, 1992, 1996; Lillard, 1998b; Ruffman, 1996; Sodian & Kristen, 2010). Other authors have highlighted differences between the two accounts (e.g. Carpendale & Lewis, 2010; Lewis & Carpendale, 2011). As Astington and Gopnik (1991) and Carpendale and Lewis (2006) have pointed out, Wellman (1990) and Perner (1991) have critiqued each other's explanations of how children's theories change. Moreover, Perner (1991) "might well object to being called a theory theorist" (Doherty, 2008, p. 210). This thesis considers both accounts as different theoretical approaches when discussing the developmental data of children's naïve psychology.

Modularity theorists (e.g. Fodor, 1992; Leslie, 1994) propose that children's naïve psychology has innate foundations and comprises of a series of domain-specific modules that come 'on line' at some point in the course of development as a result of brain maturation. Metarepresentation and pretend play are two central concerns in Leslie's (1987, 1989, 1994) modular theory. Leslie defines metarepresentational ability as the capability to decouple a primary representation into a metarepresentational context. According to Leslie, metarepresentation and pretend play emerge from a Theory of Mind Mechanism (ToMM), which is a specialised neurocognitive mechanism that develops at about 18 to 24 months of age. As the ToMM matures, children develop an early understanding of pretend and desire representation in the second year of life and an understanding of belief representation in their third year (Leslie, 2005; Scholl & Leslie, 1999). Leslie (1994) argues that 'pretend' and 'believe' belong to the same representational systems. An additional piece of processing component, the 'selection processor' (SP), is included in the ToMM model to explain the time-lag between understanding pretence and belief (Leslie & Thaiss, 1992). Minimal input is required from the SP when understanding pretence whereas more input is required when understanding false-belief. Three-year-old children's difficulty with false-belief tasks is due to limitations in this component. The SP matures at around 4 years of age and is responsible for appropriate selection of input for specific inference processes.

Fodor (1992, pp. 286-287), on the other hand, proposes that 3-year-old children have a 'Very Simple Theory of Mind' (VSTM) that includes only belief and desire understanding

and comprises of two principles: "*H1*: predict that the agent will act in a way that will satisfy his desires. *H2*: predict that the agent will act in a way that would satisfy his desires if his beliefs were true". In solving false-belief problems, Fodor (1992) suggests that 3-year-old children employ H1 whenever the task permits them to predict actions on the basis of the agent's desires alone and disregard the agent's belief. They use H2 only when prompted to do so. Four-year-old children and adults make correct predictions because they routinely employ H2. In the present study, it is interesting to consider children's answers to the justification and explanation questions in the false-belief prediction and explanation tasks respectively to determine whether the results favour Fodor's (1992) account of a desire-based reasoning in predicting a character's action.

By contrast, 'theory' theorists propose that children's understanding of mind is characterised in terms of theory formation (e.g. Gopnik, 1988; Gopnik & Meltzoff, 1997; Wellman & Gelman, 1992). According to proponents of 'theory theory', infants are born with initial innate abilities that undergo revision as children are confronted with new evidence leading to the acquisition of new theories and elaboration of existing theories (Gopnik, 1988, 1996, 2003; Gopnik & Meltzoff, 1997; Gopnik & Wellman, 1992, 1994). Understanding of own and others' mental-states emerge at the same time as a result of children's theory development. Wellman (1990) suggests two distinct theoretical shifts in early naïve psychology development. At the age of 2, children acquire a simple desire psychology comprising an understanding of simple desires, emotions and perceptions that is mentalistic and non-representational. The first theory shift occurs at 3 years of age when children change from a simple desire psychology to a desire-belief psychology. Three-year-old children understand both fictional representation (e.g. imagination) and reality-oriented representation (e.g. belief). However, they conceptualise beliefs as direct 'copies' of reality that represent the true state of the world. They do not understand that belief may not always be consistent with reality. The second theory shift occurs at 4 years of age when children acquire a belief-desire psychology. At this age, children understand that people's actions and behaviour are guided by their desires, thoughts and beliefs.

One of the key features of the theory theory view of young children's naïve psychology concerns the extent to which naïve psychology concepts can be described as coherent and theoretical (Astington & Gopnik, 1991; Gopnik, 1988, 1996, 2003; Gopnik & Meltzoff, 1997; Gopnik, Meltzoff, & Kuhl, 2001; Gopnik & Wellman, 1992, 1994). A host of studies have found correlations among performance of false-belief, appearance-reality distinction, representational change and visual perspective-taking tasks (e.g. Astington & Gopnik, 1991; Call & Tomasello, 1999; Flavell et al., 1986; Flavell, Mumme, Green, &

Flavell, 1992; Gopnik & Astington, 1988; Moore, Pure, & Furrow, 1990; Slaughter & Gopnik, 1996; Taylor & Carlson, 1997). Findings from training studies showing the transference of benefits between mental-states also provide support in favour of the interdependence of various concepts (e.g. Melot & Angeard, 2003; Slaughter & Gopnik, 1996, Study 2). The coherence of children's conceptual development has been put forward by theorists as support for the proposition of "why the child's theory of mind really is a theory" (Gopnik & Wellman, 1992, p. 145). Within this line of research there has not yet been an exploration of the cohesive nature of conceptual development across different ages and cultural groups (see Chapters 5 and 6).

Perner (1991), although not a theory theorist, shares the view that children construct their understanding of mind in a theory-like manner due to developmental changes in representational ability. Perner (1991) proposes two distinct stages of theory development. He identifies 2 and 3-year-old children as having a 'situation theory' of behaviour. Children of these ages understand mental-states such as pretence and desires as situations in the world but they do not have a representational understanding of mind. Rather than a radical change of the situation theory, Perner (1991, p. 252) suggests that the change involves "theory extension", which is a relatively minor change to the early situation theory. At around 4 years of age, when children acquire a 'representation theory of mind', they recognise mental-states as representational and not simply as true state of affairs. Taking a domain-general view, Perner (1991) explains that children's false-belief understanding depends on their knowledge of representation as representation (i.e. metarepresention). Support for the domain-general view comes from a recent study showing that 3 and 4-year-old children encountered equal difficulties with false-sign (object is moved but the signpost misrepresents current reality) and false-belief tasks (Leekam, Perner, Healey & Sewell, 2008). This suggests that children have a general difficulty understanding representation rather than mental-states specifically (see also discussion in Perner & Leekam, 2008).

A fourth theoretical account is offered by Simulation Theory. Simulation theorists propose that children are aware of their own mental-states and they make use of this awareness to deduce the mental-states of another person through a simulation process (e.g. Gordon, 1986; Harris, 1992, 1994). In other words, they put themselves in the mental shoes of another when predicting the other's behaviour. Simulation theory places much emphasis on the role of pretend play and imagination in naïve psychology development. Between 2 and 3 years of age, children can set aside their own mental-states and mentally simulate the mental-states of another person (Harris, 1992, 1994). For example, children begin to attribute mental-states such as desires, perceptions and emotions to dolls at an early age. Between 3

and 4 years of age, the simulation process offers children the flexibility to gain insight into the psychological process (mental-states, actions, speech) of another person or character during their role-play, thus helping them to enact what another person or character might do in a given situation (Harris, 2000). The improvement in the accuracy of their simulation enables children to imagine a situation that is in conflict with the current state of reality. With greater imaginative flexibility, 4 and 5-year-old children can solve false-belief problems by setting aside their own mental-states and the reality of a situation while imagining the mental-states of another person.

In support of the simulation account, Harris (2000) highlights that pretend role-play and not pretend play in general supports children's understanding of mental representation. Harris (2000) explains that the difference between how the simulation process works in role-play and in false-belief prediction is in terms of output. Through an online simulation process in pretend role-play, children imagine themselves to be in the same situation faced by another person and act according to what that person might do. The output is the non-literal action. Similarly, in an offline simulation, children are able to solve false-belief problems by imagining another person's mental-states while setting aside their own mental-states and the current state of reality. The output is a prediction of the behaviour and thoughts of another person. Since both role-play and prediction use the simulation process, Harris (2000, 2005) argues that children who engage in frequent role-play tend to show a greater understanding of mental-states. The relationships between pretend role-play and other naïve psychology concepts merit further attention (see Chapter 9).

It is worthwhile to keep in mind that the four theoretical approaches are not mutually exclusive and they do not provide an inclusive account of social and contextual influences on children's naïve psychology development. A similarity can be found between theory theory and modularity theory. Both modularity and theory theorists hold that infants are born with innate theories which undergo revisions in the early years. While modularity theorists argue that children acquire the mental abilities as their brains mature, theory theorists, representation change theorists and simulation theorists consider social experience to play a role in children's naïve psychology development. In contrast to theory theorists, simulation theorists argue that since children understand others' mental-states through a simulation process, their ability to understand their own mental-states should develop before the ability to understand others' equivalent mental-states. That is, they understand their own desires before understanding others' desires and their own beliefs before others' belief. In addition, pretence is a defining feature in Leslie's (1987) modularity and Harris' (1994) simulation

accounts of naïve psychology development, but is less prominent in theory theory and representational change theory.

The four frameworks have been written by Western psychologists on the basis of research conducted largely in the West. Critics of the four approaches argue that they focus too heavily on within-individual development, with social experience playing no more than a triggering role (e.g. Astington, 1996; Hughes & Leekam, 2004). All four theoretical accounts have given insufficient attention to the process of how children acquire their naïve psychology within the cultural and social milieu (e.g. Astington, 1996; Carpendale & Lewis, 2004; Garfield, Peterson, & Perry, 2001; Lillard, 1998a). Chapter 2 will consequently consider a range of cultural and social influences on naïve psychology development.

## 1.4    Summary and Implications for Thesis

Development of children's naïve psychology between 2 and 4 years of age is well-documented in Western literature. Between 2 to 3 years of age, children possess an understanding of rudimentary non-representational mental-states that develop into sophisticated representational understanding from 3 to 4 years of age. During the period of 3 to 4 years of age, children are in a state of transition. Older 3-year-old children show an initial understanding of false-belief (Wellman, 1990) and 4 to 5-year-old children are able to make false-belief predictions and explanations.

This thesis will investigate the development of naïve psychology between 2½ and 3½ years of age comprehensively by exploring a range of concepts including: understanding of pretence, desires, visual perceptions, and beliefs. Furthermore, much of the research outlined in this chapter relies on cross-sectional methods. To compliment this established literature, the research undertaken for this thesis will take a longitudinal approach. Figure 1 below provides a schematic overview of the key naïve psychology concepts investigated in this thesis. Other variables that may affect naïve psychology development are discussed in detail in later chapters.
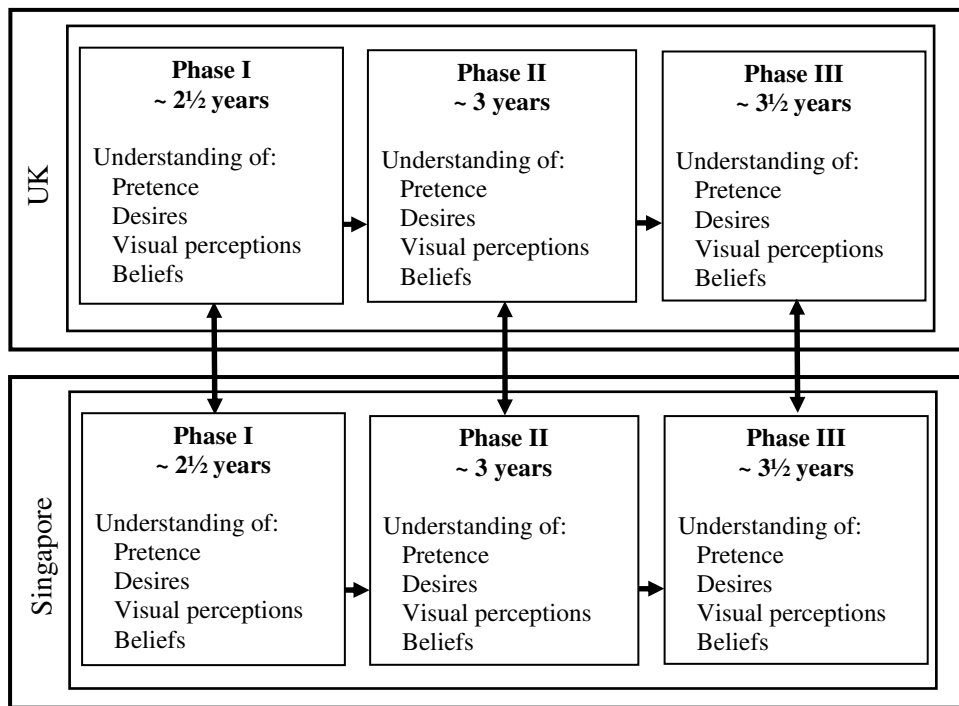
*Note.* The horizontal arrows show developmental changes over time. The vertical arrows indicate cross-cultural similarities and differences.

*Figure 1.* A longitudinal cross-cultural comparison of children's naïve psychology development between the ages 2½, 3 and 3½ years.

It is important to note that children's developing naïve psychology concepts occur in and are influenced by different cultural and social contexts. The next chapter reviews research on the roles of cultural and social environmental factors in shaping children's naïve psychology development to examine the issue of whether the patterns of development evident in Western literature are also observed in other cultural contexts.

# CHAPTER 2
# CULTURAL AND SOCIAL INFLUENCES ON
# NAÏVE PSYCHOLOGY DEVELOPMENT

## 2.1 Introduction

The focus of this chapter is to review empirical evidence on the important roles of cultural influences and social experiences in the development of children's naïve psychology. As noted in the previous chapter, the gradual development of a range of children's naïve psychology concepts from the ages of 18 months to 4 years has been widely investigated in Western cultures. Non-Western research to date, as will be discussed, has tended to focus on false-belief understanding and far too little attention has been given to children's understanding of other naïve psychology concepts. Individual differences in naïve psychology are influenced by social environmental factors and have important implications for children's social interactions with others. It is possible that the extent to which social environmental factors might influence naïve psychology development varies across cultures. Cross-cultural data, however, are sparse.

This chapter begins by discussing the key theoretical perspectives that consider the cultural and social dimensions of how children's naïve psychology develops. This is followed by an overview of cross-cultural universals and differences in children's acquisition of naïve psychology concepts. Attention then focuses on the diverse social environmental factors that shape individual differences in conceptual development. This chapter concludes by summarising the main findings and identifying gaps in existing research, and considers how this thesis contributes to addressing these gaps.

## 2.2 Cultural and Social Dimensions of Children's Naïve Psychology Development

Recent work in cognitive neuroscience, behavioural genetics and biocultural sciences offers another lens through which we view children's learning and development. This work highlights the significant roles of cultural and social environmental factors in influencing the ontogeny and evolution of human development. Children's naïve psychology development is shaped by varied and rich social experiences that reflect the values, norms and beliefs of their culture. This perspective is not new. Vygotsky's (1978) socio-cultural theory highlights the important roles of cultural and social experiences in cognitive development. Vygotsky (1978) introduced the concept of *zone of proximal development* (ZPD) to describe how children learn to use cultural tools to solve problems under adult guidance or in collaboration with more skilled peers. The *scaffolding* provided by more

capable partners supports children to participate in tasks that would be impossible for them to complete on their own (Wood, Bruner, & Ross, 1976). Drawing on examples of 3-year-old children's precocious performance on false-belief tasks (e.g. Mitchell & Lachohee, 1991; see Chapter 1, Section 1.2.4), Astington (1996) explains how children are guided by the adult's leading questions and how they develop false-belief understanding during their participation in a cooperative deception game with more skilled partners who provide scaffolding for them to complete tasks that are within their ZPD. In addition to learning through explicit tutoring, Rogoff (2003) suggests the concept of *guided participation* in cultural activities. In this view, children actively participate in and are guided by the values, skills and practices of their cultural communities through ways such as explanation, teasing and shaming to learn societally desired skills and avoid some kinds of learning.

These concepts are not the focus of the dominant theoretical frameworks for understanding naïve psychology development (see Chapter 1, Section 1.3). The guided participation provided by adults and peer collaboration in the ZPD may scaffold children to acquire a gradual understanding of various mental-states. Central to this premise is the idea that cultural values and norms are transmitted from generation to generation through the socialisation process which influences how children understand the thoughts and behaviours of other people. This thesis seeks to explore the role of culture in shaping the development of children's naïve psychology.

In recent years, some developmental researchers have embraced a socio-cultural perspective by examining how cultural factors and social interactions have an impact on naïve psychology development. Enculturation begins early in life (Lillard 1997, 1998a, 1999). Enculturation refers to "the process of acquiring the knowledge, behavioural expectations, norms and values associated with one's particular ethnocultural group" (Cauce, 2002, p. 296). Through participating in cultural activities and as children acquire linguistic ability, they understand how people relate to one another in different settings (Astington, 1996). Early abilities such as joint attention, intention reading and gaze direction may in part be shaped by cultural practices (Lillard, 1998a) and help infants to appreciate "others as informative, informing, meaning making, intentional agents with whom they share inter-subjective experiences" (Wellman, 1998, p. 36). The development of naïve psychology from infancy onwards is influenced by children's broader cultural context that plays a significant role in the socialisation of children.

Carpendale and Lewis (2004, 2010; Lewis & Carpendale, 2011; see also Lewis, Carpendale, Towse, & Maridaki-Kassotaki, 2010) argued that development is shaped not only by cultural transmission but also by dynamic social interactions which offer a promising

framework for thinking about how children gradually acquire an understanding of mind through interacting with others. Carpendale and Lewis (2004) suggested that communicative interactions help children recognise and reconcile the differences between their own and others' beliefs, perspectives and experiences. Garfield et al. (2001) proposed that naïve psychology develops in conjunction with children's language and emerging social competencies. Vinden and Astington (2000) considered social control over children's behaviour to be related to the development of naïve psychology. The present study adopts a socio-cultural perspective in exploring to what extent cultural diversity and social environmental factors contribute to children's naïve psychology development.

To sum up, when comparing and evaluating developmental data between different cultures, it is necessary to recognise that cultural values, practices and beliefs may contribute to cross-cultural similarities and differences. In addition, it is important to think of cultural processes as involving multifaceted and coherent relations among many interdependent variables (Rogoff, 2003). Therefore, culturally-dependent inter-related variables such as children's emerging language competency and social skills and their impact on naïve psychology concepts must be taken into consideration (see Chapters 8 and 9). The following sections consider how socio-cultural environment shapes children's understanding of mind by first reviewing research conducted in non-Western cultures and then studies of individual differences in acquisition of naïve psychology concepts.

## 2.3    Cultural Universals and Differences in Naïve Psychology Development

Most non-Western studies examining the influence of culture on the development of naïve psychology have focused on a single country, continent, or region including: Africa (e.g. Avis & Harris, 1991), Asia (e.g. Flavell, Zhang, Zou, Dong, & Qi, 1983b; Lee, Olson, & Torrance, 1999; Naito, Komatsu, & Fuke, 1994; Tardif & Wellman, 2000) and the Middle East (e.g. Yazdi et al., 2006). The findings of these studies were usually compared with existing research conducted in Australia (e.g. Nielsen & Dissanayake, 2004; Siegal & Beattie, 1991), Europe (e.g. Brown & Dunn, 1996; Perner et al., 1987; Wimmer & Perner, 1983) and North America (e.g. Gopnik & Astington, 1988; Gopnik & Slaughter, 1991; Moses, 1993; Moses & Flavell, 1990; Wellman & Bartsch, 1988; Wellman & Woolley, 1990). Together, these studies demonstrate that the development of naïve psychology concepts such as pretence, desires, emotions, perceptions, intentions and beliefs follows a similar marked shift between 2 and 5 years of age in a variety of different cultures. A limited number of direct cross-cultural comparisons have reported universal development (e.g. Callaghan et al., 2005). A meta-analysis of 178 studies of children's false-belief task performance, conducted by

Wellman et al. (2001), showed that children's understanding of beliefs develops similarly across a number of cultures. In a cross-cultural comparative study of false-belief understanding in Canada, India, Peru, Samoa and Thailand, Callaghan et al. (2005) found consistent patterns with children passing the false-belief task at approximately 5 years of age. To date, there is no published longitudinal cross-cultural work that directly compares children's naïve psychology development between the ages of 2 to 4 years. More importantly, no evidence has been presented to show whether various aspects of naïve psychology develop in universal patterns across cultures because most research focuses only on false-belief understanding.

A host of other studies, by contrast, have found cultural variations revealing that the dynamics of culture plays a central driving role in children's cognitive development. Vinden (1996) reported poor performance on false-belief and representational change tasks among children in Peru compared to Western norms. In another study, Vinden (1999) compared four groups of children living in Papua New Guinea: Western children and non-Western children from three cultural groups (Mofu, Tolai and Tainae). Vinden (1999) demonstrated a one-year time-lag in false-belief performance among the non-Western children. Furthermore, the Western cohort showed a lag of a year behind typical Western norms. Similarly, Mofu children in Cameroon showed a delay in false-belief understanding compared to Western norms (Vinden, 2002). There were also cross-cultural variations in other naïve psychology tasks, such as imaginary-reality distinction (Wahi & Johri, 1994) and real-apparent emotion distinction (Joshi & Maclean, 1994).

Where cultural differences have been identified it has often been between cultures located on the extreme end of the individualism-collectivism spectrum. According to Triandis (1996), in individualist cultures such as Western Europe and North America, personal goals are given priority over group goals, and attitudes shape social behaviour. In collectivist cultures such as Asia and Africa, on the other hand, individual goals conform to group goals and social behaviour is guided by norms, duties and obligations. The majority of non-Western studies to date have investigated false-belief understanding in children aged 3 years and above, comparing collectivist cultures such as Japan and China with Western cultures. In contrast to Western norms, Naito (2003) reported poor performance among 5-year-old Japanese children in inferring another's false-belief. Ruffman, Perner, Naito, Parkin and Clements (1998, Experiment 4) found that Japanese children performed more poorly on false-belief and understanding of sources of knowledge gained by seeing or feeling in comparison to British and Canadian children. Naito and Koyama (2006) revealed that Japanese children only acquired an understanding of false-belief at around 6 to 7 years of age,

a year and a half later than Western samples. Much of the non-Western research has focused on false-belief understanding. What is needed is a direct comparative study to determine whether Western developmental patterns for a variety of aspects of naïve psychology are also found in Eastern cultures.

With respect to false-belief explanation ability, Naito and Koyama (2006, Experiment 2) reported a cultural difference in that Japanese children aged 6 to 7 years tended to incorrectly justify action based on behavioural and situation cues rather than provide desire-based explanations to account for the character's false-belief. Among all 176 incorrect responses provided by Japanese children, only three justifications given by a 7-year-old boy referred to the puppet's desires. The majority of the Japanese children's incorrect justifications (74%) referred to the behaviour of the puppets, reality and other story facts rather than to the puppet's mental-states. Differences were also found in the explanation for causes of behaviours between Taiwanese and American children (Lillard, 2006b) and between Indian and American children (Miller, 1984). So far there is no longitudinal evidence to show how children from other cultures justify and explain a character's behaviour based on false-beliefs (see Chapter 7).

Comparisons of Chinese and Western cultures have also revealed differences. In a meta-analysis of 196 experimental conditions in published and unpublished studies from mainland China and Hong Kong as compared to 155 conditions from North America, similar patterns of performance on the false-belief task were found (Liu, Wellman, Tardif, & Sabbagh, 2008). Yet systematic cultural differences were also found, with children from North America performing at above-chance levels up to 2 years before children from Chinese cultures. Given the Western influences in Hong Kong, it was somewhat surprising that children from mainland China passed the task significantly earlier than children from Hong Kong in this study. In contrast, Sabbagh, Xu, Carlson, Moses and Lee's (2006) findings revealed that although preschoolers in China outperformed their U.S. counterparts from a previously studied sample (Carlson & Moses, 2001) on executive function tasks, there was no cross-cultural difference in performance on false-belief, deception and appearance-reality tasks. With regard to the developmental sequence of naïve psychology concepts, Wellman, Fang, Liu, Zhu and Liu (2006) reported that Chinese children in China showed a pattern similar to that found by Wellman and Liu (2004) of children living in the United States (U.S.) and Australia. Both Western and Chinese children understood desires before knowledge and false-belief, followed by hidden emotions. Subtle differences, however, were also found. While Western children performed better on the diverse-belief task compared to the knowledge-ignorance task, the order was reversed for the Chinese

sample. Wellman et al. (2006) attributed the different sequences of understanding to variations in cultural emphases on beliefs and perspectives. While Western culture emphasises belief and diverse belief, Eastern culture accentuates knowledge acquisition. These results, however, were based upon cross-sectional data and it remains unclear which sequences of naïve psychology concepts are culturally-specific at different time points in development between two diverse cultures (see Chapters 5 and 6).

The inconsistent pattern of results between Western and Eastern cultures is further confused by the fact that, even within Western cultures, performance on naïve psychology tasks is not uniform within age (e.g. Freeman, Lewis, & Doherty, 1991; Lillard, 1998b; Robinson & Mitchell, 1992; Wellman & Estes, 1986). In a recent study, Lecce and Hughes (2010) matched 5 to 6-year-old children in the UK and Italy in terms of chronological age (CA), verbal mental age (VMA), gender and maternal education. Their results indicated that British children outperformed Italian children in the mean aggregate scores for first-order and second-order false-belief understanding. Even within Western cultures, differences in socialisation goals, parent-child interaction, children's conversational styles and education system might have contributed to variations in naïve psychology development (Lecce & Hughes, 2010). This is also likely to be the case within Eastern cultures, and it would be unwise to regard them as homogeneous. The likelihood that these factors may also vary markedly across cultures should not be ignored.

Several explanations have been proposed by researchers to account for the differences in naïve psychology development between Eastern and Western cultures in terms of a variety of influences including: language differences such as bilingualism (e.g. Kobayashi, Glover, & Temple, 2007, 2008) and specific false-belief terminology (e.g. in Mandarin; Lee et al., 1999), social differences such as socio-economic status, parental factors, family composition and child-rearing practices (e.g. Liu et al., 2008; Wellman et al., 2006), differences in cultural experiences (e.g. Naito & Koyama, 2006; Vinden, 1996), and cross-cultural differences in executive function ability (e.g. Chasiotis, Kiessling, Hofer, & Campos, 2006; Sabbagh et al., 2006). These factors are likely to have an influence on naïve psychology in multifaceted and interactive ways (Liu et al., 2008).

Religious and philosophical traditions have influenced childcare practices and attitudes toward children in Eastern countries (Ang, 2007). For example, children's executive function development is influenced by parent-child interactions which are in turn mediated by cultural values and belief. In four studies conducted in China, Korea, Japan, and UK, Lewis et al. (2009) reported that children in Eastern cultures performed better on executive function tasks compared with a group of preschoolers in the UK (although this

ability was not related to false-belief understanding, as is the case in Western cultures, (e.g. Hughes & Ensor, 2007)). A possible explanation for children's ability to exhibit greater control over their behaviour is that Eastern cultures draw on traditional Chinese Confucian values and principles in the upbringing and education of children (Lewis et al., 2009).

Other countries which are strongly influenced by Confucianism include Hong Kong and Singapore, a nation with a predominantly Chinese ethnic population. There is a tendency to classify China, Hong Kong, Japan, Singapore and South Korea as one cultural setting under the names of 'Confucianism', 'Collectivist' or 'East Asian cultures'. However, these are diverse countries in terms of economic, social and political structures. Findings of differences in false-belief task performance between China and Hong Kong (Liu et al., 2008) lead us to question the view that children's naïve psychology development should be taken as universal within East Asian cultures or even within Western cultures. A characteristic that differentiates Asian cultures is the degree of Western influences. Singapore is a hybrid culture which draws on a mixture of Eastern and Western influences (see further discussion in Chapter 4, Section 4.2). Prior cross-sectional work revealed that preschoolers in the UK and Singapore were both able to infer false-belief at around 4 to 5 years of age (Tan-Niam, 2000a). Relatively little is known about whether a Western pattern of development in other aspects of naïve psychology emerging from 2 to 4 years can be found in this hybrid culture. The present study aims to fill this gap by comparing the development of a range of naïve psychology concepts between children in the UK and Singapore.

In Singapore, the political leaders have emphasised Confucian ethics as a national ideology in order to promote racial harmony and cohesion and reduce the influence of Western values which emphasise individualism and materialism (Tan, 1989). It has been shown that cultural beliefs such as Confucianism's emphasis on effort and will-power in learning have an influence on Singaporean students' cognition and self-definition as compared to students in the West (Liu, Wang, & Parkins, 2005). In addition, the five shared values promoted by the Singapore government might play an important role in shaping the mind and attitude of Singaporeans (Lee, 2003). The shared values are (1) nation before community and society above self, (2) family as the basic unit of society, (3) community support and respect for the individual, (4) consensus, not conflict and (5) racial and religious harmony (Singapore Ministry of Education, 2006). The values reflect Singapore's heritage, promote racial harmony and reduce the influence of Westernisation (Tan, 2001). Despite being influenced by Western culture, Confucian principles and the five shared values dictate the child-rearing practices and socialisation of children in Singapore. Lin and Fu (1990) have noted that traditional Confucian values and practices still have an important impact on child-

rearing practices of immigrant Chinese parents in America even though these parents are adapting to Western values and conventions. It is necessary to recognise the impact of childcare practices, especially in cultures that blend East and West values and norms, on children's socialisation experiences and the consequences for naïve psychology development. Since there has been no published longitudinal cross-cultural work on children's naïve psychology development between a Western and a hybrid culture, the cultural universals and differences reported in this thesis will have important theoretical and practical implications (see Chapter 10). To fully understand the nature of cultural influences on naïve psychology development, it is also necessary to examine the social environmental factors that could shape this development.

## 2.4    Social Influences on Naïve Psychology Development

Studying individual variability in naïve psychology is important in the present study because the wide variety of factors influencing individual variations in naïve psychology development vary across cultures. Furthermore, considering within-culture and between-culture individual variations across time may provide better understanding of the development of naïve psychology in diverse cultural settings. In this thesis, the term 'individual differences' will be used to refer to variations in acquisition of naïve psychology concepts that are related to different social environmental factors. The following sections discuss individual attributes (gender and language), family factors, social interactions, and contextual influences that contribute to individual differences in naïve psychology development.

### 2.4.1    Gender and naïve psychology

Existing Western studies have produced mixed results regarding the effect of gender on false-belief understanding. Some studies have documented no significant gender difference (e.g. Holmes, Black, & Miller, 1996; Jenkins & Astington, 1996; Taylor & Carlson, 1997), a near significant advantage for girls when CA and VMA were taken into account (Happé, 1995) and a weak advantage for younger girls, independent of language ability (Charman, Ruffman, & Clements, 2002). Other evidence showed that girls performed significantly better at false-belief tasks than boys, although language was found to correlate with false-belief understanding for boys only (Cutting & Dunn, 1999). This advantage has been attributed to gender differences in the frequency of supportive discourse (Leaper, Anderson, & Sanders, 1998) and amount of emotion talk (Cervantes & Callanan, 1998) that mothers provide for daughters compared to sons. Mothers and older siblings encourage more

communication about feelings among girls than boys at 18 months of age and girls refer to feeling states more frequently than boys by 2 years of age (Dunn et al., 1987). Girls also display more mental-state talk than boys (Hughes & Dunn, 1998). False-belief understanding significantly predicted more aggressive or disruptive behaviour for boys and prosocial behaviour for girls (Walker, 2005). Research into gender effects in relation to other aspects of naïve psychology is limited, but in relation to pretend-reality differentiation ability, no gender differences were found even though the ability to discriminate reality from pretence increased with age (Taylor & Howell, 1973).

Some non-Western research has found a gender effect in the same direction as that found in Western studies and indicated that girls performed better than boys on deceptive appearance (Naito, 2003) and false-belief (Chasiotis et al., 2006) tasks. One cross-cultural study has shown that 6-year-old girls in the UK and India outperformed boys on stories involving the concealment of positive emotion (Joshi & Maclean, 1994). Together, these findings highlight the importance of considering gender as a possible factor in children's naïve psychology development.

### 2.4.2 Language development and naïve psychology

Language aids children's ability to meet naïve psychology task demands and plays a major role in children's naïve psychology development (e.g. Astington, 2001; Astington & Baird, 2005; Milligan, Astington, & Dack, 2007). Some researchers suggest that the linguistic complexity of the false-belief task accounted for 3-year-old children's difficulty with understanding false-belief (e.g. Chandler et al., 1989; Moses, 1993). Children's ability to pass the false-belief task depends on a certain level of linguistic ability in order to understand the narratives of the story and make correct predictions and judgements (Astington & Jenkins, 1999). In the standard unexpected transfer task, as children listen to the story being narrated, they have to follow the story sequence, understand the test questions and provide appropriate answers. If the task demands require less linguistic ability by engaging children in acting out the role of the character, 3-year-old children show better performance (Freeman et al., 1991).

Prior research on the role of language in false-belief understanding has involved the measurement of language competence using receptive vocabulary, general language, semantics, syntax and memory of complements measures (see discussion in Milligan et al., 2007). Correlations between receptive vocabulary measured using either the British Picture Vocabulary Scale (BPVS; Dunn, Dunn, Whetton, & Pintillie, 1997) or Peabody Picture Vocabulary Test - revised (PPVT-R; Dunn & Dunn, 1981) and naïve psychology concepts

have been reported in the literature. Happé (1995) demonstrated the link between VMA as measured by BPVS and false-belief understanding for both typically developing children (CA range: 3 years 1 month to 4 years 9 months) and children with autism (CA range: 6 years 3 months to 18 years 7 months). Hughes and Dunn (1997) observed the interactions of children aged 3 years 3 months to 4 years 7 months from low-income families in the UK with their preschool friends and found that frequency of mental-state talk and pretence were correlated with both receptive vocabulary measured with BPVS and expressive language measured with children's mean length of utterance. Cutting and Dunn (1999) replicated the finding of the association between false-belief understanding and language using the BPVS for a group of children from working-class to middle-class backgrounds aged 3 years 6 months to 4 years 10 months in the UK.

In a study of the relation between individual differences in pretence and naïve psychology development of children aged 3 years 4 months to 4 years 8 months in North America, Taylor and Carlson (1997) reported that children's knowledge of mental-states was significantly correlated with PPVT-R scores. Jenkins and Astington (1996) showed that in a sample of children aged 2 years 11 months to 5 years 5 months in Canada, children's general language ability measured with The Test of Early Language Development (Hresko, Reid, & Hammill, 1991) was a significant predictor of false-belief understanding after CA was accounted for. This supports the premise that children need to reach a certain level of linguistic ability in order to pass the false-belief tasks. On the other hand, their results also demonstrated a weak relationship between language ability and false-belief understanding for children who had passed the threshold of language necessary for passing the false-belief tasks. This suggests that language development and false-belief understanding are mutually interdependent.

Again, rather less research has explored the relation between language and other aspects of naïve psychology, but in a study of appearance-reality distinction ability, Bialystok and Senman (2004, Study 2) reported that PPVT-R scores were correlated with both appearance and reality questions and with the overall proportion of items passed. Taken together, these findings highlight that language ability, as measured by receptive language skills, is important for aspects of naïve psychology understanding (see language measure in Chapter 4, Section 4.6.2).

Studies that examined the longitudinal relations between verbal skills and naïve psychology development have shown that early verbal skills play a fundamental role in facilitating children's acquisition of later naïve psychology concepts (e.g. Carlson, Moses, & Claxton, 2004b; Lockl & Schneider, 2007). Results from a one-year longitudinal study

demonstrated that children's earlier language competence predicted their later success in naïve psychology tasks, independent of mothers' mental-state discourse (Ruffman, Slade, & Crowe, 2002). Furthermore, mother's use of mental-state language (e.g. think, want, know and hope) at earlier time points predicted children's later naïve psychology task performance but a reciprocal relationship was not found. In a seven-month longitudinal study, Astington and Jenkins (1999) reported that while language at an early time point predicted later false-belief understanding at two of three time points, the opposite relationship never held. Furthermore, general false-belief understanding, summed across four standard tests of false-belief reasoning, was significantly correlated with measures of syntactic and semantic maturity on the Test of Early Language Development, even with CA taken into account. Similar patterns of findings were reported by De Villiers and Pyers (2002), who investigated sentential complements (e.g. think, believe, know, say). They found that scores on a memory for complements task (in describing mistakes) predicted the score on false-belief tasks but the reverse relationship never held. This suggests that children needed the full syntax of mental verbs plus sentential complements in order to represent other's mental-states in their mind. Results from a training study by Hale and Tager-Flusberg (2003) demonstrated that children trained on sentential complements showed improved performance on naïve psychology tasks. Altogether, these findings indicate that early language experiences influence children's naïve psychology development. It is not known whether cross-cultural differences in naïve psychology development might be associated with children's level of linguistic sophistication. Furthermore, the types of relationship (one-way or reciprocal) between language and naïve psychology concepts need further investigation (see Chapter 8).

In cross-cultural research which compares children from different linguistic backgrounds, like the present study, it is important to acknowledge that variations in native and second languages might influence naïve psychology development in children. For example, the mental-state terminology of particular languages may facilitate children's false-belief understanding. In the false-belief paradigm, the test questions are phrased using belief terms such as *think* and *believe*. In English, these mental verbs are considered neutral (Tardif, So, & Kaciroti, 2007) whereas equivalent verbs of *think* such as *yiwei*, *dang* and *xiang* in Mandarin carry a certain degree of false-belief connotations (Lee et al., 1999). Evidence suggests that the use of the explicit false-belief verbs (*yiwei* and *dang*) but not the more neutral verb (*xiang*) facilitated children's false-belief understanding in China (Lee et al., 1999). In a cross-linguistic study, Shatz, Diesendruck, Martinez-Beck and Akar (2003, Study 1) examined false-belief task performance of monolingual preschoolers in Turkey and Sao Paulo who speak languages with explicit false-belief terms (Turkish and Puerto Rican

Spanish) compared with monolingual preschoolers in Brazil and North America who speak languages without explicit terms (Brazilian Portuguese and English). Their findings revealed an advantage for speakers of language with explicit false-belief markings when the marker was used in the *think* question. In sum, these results underscore the possible influence of linguistic background on false-belief understanding. While not directly tested in the present study, exposure to these mental-state terms in their daily conversations may have an effect on children's naïve psychology development. Hence, it is important to document and take into account children's linguistic ability in the present study (see discussion on language spoken in both cultures in Chapter 4, Section 4.2 and Table 4.2b).

In recent years, research has focused attention on the naïve psychology development of bilingual children. Children growing up in a bilingual environment learn to switch between languages in their early years and this flexibility in shifting from one kind of response to another according to the needs of the listener may enhance their naïve psychology task performance. Previous work by Goetz (2003) has shown that 3 and 4-year-old Mandarin-English bilingual children performed somewhat better than English monolingual children on appearance-reality, level-2 perspective-taking and false-belief unexpected contents tasks but these results were only significant in the false-belief task. The false-belief unexpected transfer task was the only individual task in which the bilingual children obtained lower scores than the monolingual children. In contrast, Kovács (2009) reported that 3-year-old Romanian-Hungarian bilingual children performed better than Romanian monolingual children in both the standard unexpected transfer and a modified task. In the modified task, Kovács (2009) included a language-switch situation whereby a monolingual character heard a language that he did not speak and children were asked to predict the character's action. In another study, Bialystok and Senman (2004, Study 2) found that bilingual children from a range of linguistic backgrounds scored better than English monolingual children on the reality questions in appearance-reality distinction tasks, after language ability was taken into account, but both groups performed equivalently on the appearance questions. Based on existing evidence showing a bilingual advantage in inhibitory control, Goetz (2003) attributed the bilingual children's superior performance on distinguishing appearance-reality to their more advanced level of this executive function operation (see Bialystok, 1999; Bialystok & Craik, 2010; Carlson & Meltzoff, 2008, for empirical evidence of bilingual children's enhanced inhibitory control). Given this evidence, bilingualism is a factor which must be considered in cross-cultural research as a potential influence on naïve psychology development (see measures in Chapter 4, Section 4.6.4 and results in Chapter 8).

Children's language skills develop remarkably in concert with naïve psychology development between the ages of 18 months and 4 years. The rapid advances in language development are further exemplified in their social interaction skills. In other words, with greater language skills, children are able to participate in more sophisticated linguistic interactions with other people in social contexts such as pretend play and gain a deeper understanding of others' behaviours, feelings and thoughts (see Chapter 3).

### 2.4.3    Family and contextual influences and naïve psychology

Family can have a significant influence on children's naïve psychology development in variety of ways. A growing body of research in Western cultures has drawn our attention to the role of siblings in explaining individual differences in children's naïve psychology development (e.g. Dunn, Brown, Slomkowki, Tesla, & Youngblade, 1991b; Howe 1991; Howe, Petrakos, & Rinaldi, 1998). In a large longitudinal study of 1,116 pairs of twins, Hughes et al. (2005) demonstrated that 44% of variation in mental-state scores was accounted for by naïve psychology specific non-shared environment (e.g. differential siblings' relationship with parents), 20% by naïve psychology specific shared environmental influences (e.g. maternal discussions of mental-states), 21% by common shared environmental influences on naïve psychology and verbal ability (e.g. family socioeconomic status) and 15% by common genetic influences. The study reveals not only striking within-family differences but also suggests that siblings growing up in different cultures may turn out to be different from one another. Families transmit cultural beliefs, practices and norms to their children and make them "culturally similar" to one another compared to siblings in other cultures (Weisner, 1993, p. 12). It is worth highlighting that some children grow up in an environment without siblings, particularly in China where there is a single-child policy.

Conflicting results have been reported in studies investigating the relationships between naïve psychology task performance and sibling configurations (number of siblings, birth order, spacing between siblings and sibling gender). Some studies have found no association between number of siblings or birth order and naïve psychology task performance (e.g. Cole & Mitchell, 2000, Cutting & Dunn, 1999; Peterson & Slaughter, 2003). Taylor and Carlson (1997) investigated children with none, one or two siblings in North America and discovered no relation between number of siblings and naïve psychology concepts. Cole and Mitchell (2000) argue that it is quality of sibling relationships rather than quantity that matters. Indeed some studies have shown that quality of sibling interaction is closely related to the development of understanding of other people's feelings and thoughts (e.g. Dunn & Dale, 1984). Although Hughes and Ensor's (2005) study showed no

relationship between number of siblings and naïve psychology concepts, individual differences in the quality of children's relationships with their siblings accounted for significant variance in task performance, even when age, verbal ability, executive function, social disadvantage and parent-child relationship quality were taken into account. On the other hand, in a study of 3 and 4-year-old children in the UK, Perner, Ruffman and Leekam (1994b, Experiment 1) reported a linear effect between number of siblings and improved performance on false-belief tasks with children having one sibling scoring better than only-children and children with two siblings outperforming children with one sibling. Associations between number of siblings and naïve psychology development have also been illuminated in a longitudinal study. McAlister & Peterson (2007) demonstrated that amongst children in Australia, number of child siblings predicted naïve psychology development one year later.

Several studies have shown that older siblings could lead younger ones to acquire an understanding of naïve psychology concepts at a relatively early age (e.g. Dunn et al., 1991b; Howe, Petrakos, Rinaldi, & LeFebvre, 2005; Youngblade & Dunn, 1995). In a study of Western (UK and Canada) and Japanese children, Ruffman et al. (1998) reported that older but not younger siblings facilitate false-belief reasoning, after taking into account age and verbal ability. The frequent internal state talk among children with older siblings provides scaffolding for their younger siblings, resulting in advanced acquisition of various aspects of naïve psychology (e.g. Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003) because older siblings play a greater role than younger siblings in talking about beliefs, feelings and thoughts in the context of play (Jenkins & Dunn, 2009). Moreover, second-born children learn through observing parent-sibling conflicting interactions (Jenkins & Dunn, 2009). There is very little non-Western research on this topic. Farhadian et al.'s (2010) results revealed that birth order made a significant contribution to false-belief performance in a study of preschool children in Iran, after age and verbal ability were taken into account. On the contrary, Perner et al.'s (1994b) results showed that it did not matter whether siblings were younger or older or how close they were in terms of age. Similarly, Jenkins and Astington (1996) showed that birth order was not a significant predictor of false-belief understanding but that children from larger families in Canada performed better than those from smaller families, even after the effects of age and verbal ability had been accounted for. Peterson (2000, Experiment 1) reported that children with one or more siblings performed similarly on a false-belief task compared to firstborns with at least one sibling who were over 12 months of age.

Recent studies have explored age spacing between siblings as a factor influencing naïve psychology development. Peterson (2000) demonstrated an age band for sibling interactions to be influential on children's false-belief understanding: younger siblings should be at least 12 months and older siblings should be less than 14 years of age. Close-in-age siblings tend to share similar experiences, engage in rich and varied interactions and produce more conflict whereas infant siblings are too young to engage in appropriate social interaction and adolescent siblings may not share the likes and dislikes of their preschool siblings. McAlister and Peterson (2006) reported similar results for child-aged sibling advantage in children's representational understanding of pretence, appearance-reality distinction and false-belief. A twin study in America showed that twins with no other sibling performed on par with only-children on false-belief understanding, suggesting that twin siblings who were at the same developmental level conferred no facilitating effect on one's own (Wright Cassidy, Shaw Fineberg, Brown, & Perkins, 2005; *cf.* Peterson, 2000).

The effect of sibling gender has also been explored. Wright Cassidy et al. (2005) reported that children with at least one opposite-gender sibling performed better than children with same-gender siblings on false-belief tasks. The advantage bestowed by siblings of opposite gender might be facilitated by the increased portion of time parents spend on mental-state discourse if there are diverse perspectives between siblings of opposite gender (Wright Cassidy et al., 2005). In contrast, Ruffman et al. (1998) found no effect of sibling gender on false-belief understanding.

Various possibilities of how siblings may have a beneficial effect on children's naïve psychology development have been suggested. Sibling socialisation occurs during modelling (e.g. learning through observation as well as formal and informal instruction), sibling interactions, identity formation and deidentification (Kramer & Conger, 2009; Whiteman, Becerra, & Killoren, 2009). The amount of time that siblings spend together provides them with various opportunities to learn from one another and be influenced by each others' thoughts and behaviours (Kramer & Conger, 2009). Siblings teach or pass on relevant knowledge and provide opportunities for each other to enhance understanding in relevant activities such as pretend play (Perner et al., 1994b). Sibling dyads who engage in more pretend play employ more internal state language during high-level negotiations (e.g. Howe et al., 1998). Conversely, sibling dyads who display more conflict and nonmaintenance behaviours engage in less pretend play and internal state language (e.g. Howe et al., 2005; Howe, Rinaldi, Jennings, & Petrakos, 2002). These findings highlight that the collaborative nature of shared pretence enables siblings to use internal state language to agree on the mental-states of the role enacted. Hence, learning and interacting with siblings scaffolds

children's naïve psychology development. In addition, children observe the sophisticated interactions and hear a lot of mental-state talk between their mothers and older siblings in various contexts, including joint narrative pretend games (e.g. Dunn, Brown, & Beardsall, 1991a; Dunn et al., 1987; Dunn & Dale, 1984; Flavell et al., 1990b; Perner, 1991; Ruffman et al., 2002).

The influence of extended family and peers on children's naïve psychology has, to some extent, been examined in both Western and non-Western contexts. The study of Greek families by Lewis, Freeman, Kyraikidou, Maridaki-Kassotaki and Berridge (1996), demonstrated that not only do children benefit from having a greater number of siblings, but that the variables "number of non-sibling older children interacted with the day before" and "number of adult relatives interacted with the day before" explained a significant variance in false-belief task performance. Lewis et al. (1996) explained that living in large extended families and among neighbours offer numerous opportunities for adults to interact and guide children, providing a kind of general apprenticeship which supports children's naïve psychology development. In a cross-cultural study between Singapore and the UK, Tan-Niam (2000a) reported that when a child who passed the false-belief task was paired with a partner who had not, the former initiated more play bids during peer play. If development is influenced by social experience, then the rate of development will vary according to environmental and cultural differences (Mitchell, 2003). For example, in China's single child generation, Wang and Su (2009) demonstrated that children with classmates of different ages performed better on false-belief tasks than children with classmates of a similar age. The finding regarding whether presence of siblings contributes to children's naïve psychology development merits considerable attention because of the relative lack of cross-cultural work and the many ways in which cultural differences (e.g. patterns of living and interaction with extended family, single child policy, child-rearing practices) might have potential influence on development.

Individual differences in naïve psychology development also relate to differences in parenting styles (e.g. Ruffman, Perner, & Parkin, 1999; Ruffman, Slade, Devitt, & Crowe, 2006), maternal education (e.g. Cutting & Dunn, 1999; Pears & Moses, 2003), mothers' internal state talk (e.g. Peterson & Slaughter, 2003; Ruffman et al., 2002; Sourn-Bissaoui & Hooge-Lespagnol, 2006), socioeconomic status (e.g. Cole & Mitchell, 1998; Cutting & Dunn, 1999; Garner, Curenton, & Taylor 2005; Holmes et al., 1996; Lillard, 2006b; Shatz et al., 2003), genetic influences (e.g. Hughes & Cutting, 1999), family relationships (e.g. Hughes et al., 2005) and peer-related social competence (e.g. Dunn & Cutting, 1999; Walker, 2005). Although much of this work has been undertaken in Western contexts, parenting style

was also related to inter-cultural variations in naïve psychology development between Korean American and Anglo-American children (Vinden, 2001). In addition, intra-cultural variations in imaginary-real distinction ability were reported between affluent and less-affluent Indian children (Wahi & Johri, 1994). Although no association has been found between family structure (single-parent or two-parent family) and false-belief understanding, children from single-parent families score lower on affective perspective-taking and language measures (Cutting & Dunn, 1999). Overall, these findings emphasise the importance of considering demographic differences when comparing naïve psychology development between different groups of children.

The literature on individual differences in naïve psychology development raises three important issues. Firstly, the lack of family demographic information in the majority of non-Western research makes any comparison difficult. In the present study, the two cohorts share a number of family background characteristics but differ in some aspects (see Chapter 4, Section 4.4). Secondly, the inconsistent results from non-Western studies to date may be partially explained by confounding factors such as gender and VMA, which may mask or magnify cultural differences in task performance. Both variables were taken into account as covariates in the analyses presented in this thesis. Thirdly, the non-Western studies reported here have tended to deal only with a single individual difference variable, have analysed only within-cultural variation and have focused on a single point in time. Moreover, the majority of existing Western research on individual differences in naïve psychology has usually involved a single cultural context. Chapter 8 examines whether individual and social variables contribute to differences in the development of naïve psychology between two cultures.

## 2.5 Summary and Implications for Thesis

The findings on cultural similarities and differences in naïve psychology development are mixed. Non-Western research has often been confined to investigation of children's false-belief understanding within narrow age groups. However, children's ability to attribute mental-states should not be based on the false-belief prediction alone (e.g. Astington, 2001; Bloom & German, 2000; Carpendale & Lewis, 2004, 2006; Gopnik et al., 1994; Lewis & Carpendale, 2002). According to some research, while the developmental sequence is largely invariant, the age at which children acquire each naïve psychology concept may vary considerably across cultures (e.g. Liu et al., 2008). Additionally, while a range of individual and social variables have been identified as important in naïve

psychology development their role in cultural variations in children's acquisition of naïve psychology concepts remains unresolved.

| UK | | | |
|---|---|---|---|
| CA | **Phase I**<br>**~ 2½ years** | **Phase II**<br>**~ 3 years** | **Phase III**<br>**~ 3½ years** |
| Gender | | | |
| VMA | | | |
| Siblings | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs |
| Parental education | | | |
| Parental working status | | | |
| Family structure | | | |
| Preschool attendance scheme | | | |

| Singapore | | | |
|---|---|---|---|
| CA | **Phase I**<br>**~ 2½ years** | **Phase II**<br>**~ 3 years** | **Phase III**<br>**~ 3½ years** |
| Gender | | | |
| VMA | | | |
| Siblings | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs | Understanding of:<br>  Pretence<br>  Desires<br>  Visual perceptions<br>  Beliefs |
| Parental education | | | |
| Parental working status | | | |
| Family structure | | | |
| Preschool attendance scheme | | | |

*Note.* CA = chronological age, VMA = verbal mental age.

*Figure 2.* A longitudinal cross-cultural comparison of how social environmental factors relate to children's naïve psychology development between the ages 2½, 3 and 3½ years.

As illustrated in Figure 2 above, this thesis will contribute to identifying cross-cultural similarities and differences in the development of children's understanding of pretence, desires, visual perceptions and beliefs at 2½, 3, and 3½ years of age by comparing a Western culture and Singapore, a hybrid culture (Research Question 2). In view of the

importance of cultural, individual and social variables in the development of naïve psychology, the research reported in this thesis will also consider CA, gender, VMA, siblings (presence of sibling(s) and birth order), parental factors, family structure and preschool attendance scheme (part-time and full-time) as possible variables that might shape within-cultural individual differences in naïve psychology development (Research Question 4).

There are important links between the development of naïve psychology concepts and children's pretend play behaviour. The next chapter considers in detail the development of children's pretend play behaviour, how pretend play behaviour is influenced by cultural and social environmental factors, and the connections between pretend play behaviour and naïve psychology development (Research Question 5).

# CHAPTER 3
# YOUNG CHILDREN'S PRETEND PLAY BEHAVIOUR
# AND DEVELOPMENT OF NAÏVE PSYCHOLOGY

## 3.1    Introduction

The purpose of this chapter is to review the literature on the development of pretend play behaviour. Pretend play appears to be a natural and spontaneous activity of typically developing children in all cultures and some psychologists suggest that pretend play may be a biologically innate ability (e.g. Lillard, 2002b). While the development of pretend play behaviour may have a biological underpinning, cultural and social environmental factors may also shape children's everyday play behaviour. Cultural differences in pretend play are interesting in their own right and might also have important consequences for children's naïve psychology development.

From around 18 months of age, children learn to use their imagination to substitute real objects and invent pretend situations (e.g. Leslie, 1994, 2005; Nielsen & Dissanayake, 2004). Shared pretend play develops in the preschool years, with the partners collaborating to reach a common goal through discussion of pretend scripts, assignment of roles and attribution of pretend properties to objects, events and situations. During pretend role-play, children transform themselves to play the roles of people, animals or imaginary characters by speaking in a different tone or performing actions and gestures that deviate from children's normal behaviour. Children mimic the behaviours, thoughts and feelings of people. Hence, pretend play can be considered as an early context in which children learn to engage in cooperative social interactions and acquire a rudimentary understanding of naïve psychology concepts, potentially forming the fundamental groundwork for later acquisition of sophisticated concepts such as appearance-reality distinction and false-beliefs. Likewise, children's early understanding of pretence and visual perception may support their later ability to engage in rich and complex forms of social pretend play behaviour.

This chapter first defines what pretend play behaviour is. A number of key aspects of children's pretend play behaviour, which are examined in the present study, are then discussed in depth. These include pretend play with peers, the strategies used by children to recruit other children or join in a social play episode and to integrate pretence into social play, the pretend themes and types of social pretend role-play used by children, the communication tools used during pretend play and the modes of pretend transformation used. Subsequently, the chapter shifts the focus to socio-cultural environmental influences on children's pretend play behaviour. The cultural dimensions of young children's pretend play

are first reviewed, which is followed by a discussion of contributing social environmental factors to individual differences in pretend play. Drawing on both observational and experimental studies conducted in Western settings, this chapter then examines empirical evidence demonstrating reciprocal relationships between pretend play and naïve psychology development (for further review of pretend play behaviour and children's naïve psychology, see Lillard, 1993a). This is followed by an evaluation of cross-cultural research that investigates this relationship. Discussion then turns to the theoretical perspectives on the representational nature of pretence to explain the time gap between children's early emergence of pretend play behaviour and later understanding of sophisticated naïve psychology concepts. In addressing the limitations of existing research findings on the role of pretend play behaviour in children's naïve psychology development, the chapter then discusses the implications for the current thesis. The chapter concludes with a brief overview of the present study.

## 3.2    Defining Young Children's Pretend Play Behaviour

There are many definitions of pretend play behaviour. Garvey (1991, p. 82) defines pretend play as "a voluntary transformation of the Here and Now, the You and Me, and the This or That, along with any potential for action that these components of a situation may have". Leslie (1987, p. 413) describes "pretending is one kind of "acting as if" something is the case when it is not". Other researchers argue that understanding about pretence requires something more than mere 'acting-as-if' (e.g. Lillard 1993a). According to Rakoczy (2003, p. 4), the actor "intentionally and openly stops short of really acting as if the concept really applied to the action or trying to properly perform the pretended action". The majority of these definitions, along with the empirical evidence reviewed in Chapter 1 (Section 1.2.1), highlight that "Developmental psychologists preoccupied themselves with *pretend* ignoring *play*, and defined the activity only as using a signifier (e.g., a piece of cloth) to represent the meaning of something else, the signified (e.g., a wig)" (Göncü & Perone, 2005, p. 139, original emphasis). Consequently, it is important to explore both *pretend* and *play* in children's naïve psychology development.

## 3.3    Development of Children's Pretend Play Behaviour in Western Cultures

Children acquire a wide repertoire of pretend play behaviour as they gradually develop from solitary to social and finally to cooperative pretend play. For example, they learn to employ non-verbal cues and language to signal their intention to begin or join a pretend episode. At around 3 to 4 years of age, they develop the ability to position

themselves in another person's perspective and act out the thoughts and behaviours of that person in role-playing or role-enactment. As pretend play behaviour becomes more social, metacommunication is used to discuss scripts, assign roles, negotiate pretend themes and resolve conflicts. Children's developing ability to transform objects, actions and situations during pretend play demonstrates knowledge of multiple representations. The present study will compare the development of pretend play behaviours between 2½, 3 and 3½ years of age in two cultural contexts. Throughout this chapter, linkages between previous methods and the approaches adopted in the present study will be highlighted. There is a large volume of published studies documenting children's pretend play behaviour in Western cultures.

### 3.3.1 Developmental sequences in social play behaviour

Children up to 2 years of age generally display solitary play behaviour in Western cultures (e.g. Eckerman, Whatley, & Kutz, 1975; Howes, Unger, & Seidner, 1989). The earliest pretend play involves the infant directing actions towards self. Shortly thereafter, as children exhibit decentration by 2 years of age, they can incorporate other partners or direct actions toward animate or inanimate objects in their pretend episodes by attributing passive agency to replica or substitute objects (e.g. Belsky & Most, 1981; Bretherton, O'Connell, Shore, & Bates, 1984; Fenson & Ramsay, 1980; McCune-Nicholich, 1981; Smith, 2003; Wolf, Rygh, & Altshuler, 1984). As more mature forms of pretend play behaviour (e.g. other-referenced) appear, less sophisticated forms (e.g. self-referenced) drop out of children's play behaviour (Watson & Fischer, 1977).

Naturalistic studies of children's free play in preschool settings suggest that the proportion of social pretend play increases from approximately 3 to 6 years of age (e.g. Howes, 1985; Howes & Matheson, 1992; Rubin, Fein, & Vandenberg, 1983). Howes' (1980) peer play scale and the revised version (Howes & Matheson, 1992) are commonly used to measure the complexity of peer interactions (see Section 3.4 for evidence from non-Western studies). The developmental structure of social pretend play follows similar patterns to social play more generally (Howes, 1985; Howes et al., 1989). Children engage in simple social pretend play behaviour by 20 to 24 months of age (Howes et al., 1989). Complementary and reciprocal pretend play behaviour occurs by 24 and 30 months of age (Howes et al., 1989). Children display cooperative social pretend play behaviour by 30 to 35 months of age (Howes, 1985; Howes & Matheson, 1992; Howes et al., 1989) and complex social pretend play behaviour by 42 to 47 months of age (Dunn & Dale, 1984; Howes & Matheson, 1992). In complementary and reciprocal pretend play, children engage in similar pretend themes accompanied by smiles but show no integration of actions (Howes et al., 1989). In

cooperative social pretend play, children enact complementary roles but without explicitly communicating about their roles (Howes et al., 1989). Complex social pretend play involves a metacommunication function where children coordinate and employ verbal strategies for planning the play script, negotiation of roles, and continuation of play (Howes & Matheson, 1992).

Evidence suggests some younger children encounter difficulty in incorporating pretence into their social play because social play involves only the ability to communicate whereas social pretend play also involves the intellectual skill of using symbolic transformations (Howes et al., 1989). It has also been suggested that the transition from solitary to complex social pretend play involves development in children's understanding of the metarepresentational nature of pretence (see theoretical review in Section 3.6.3). It is important to understand the developmental sequences from solitary to social pretend play displayed by Western children in order to explore cultural variations in different aspects of pretend play behaviour.

### 3.3.2   Interaction strategies in social pretend play

During social pretend play, children must use a variety of strategies to ensure that they are able to join in the play, recruit other children to the play and maintain the play episode: sharing toys, establishing mutual pretence contexts, interacting in mental-state terms, and resolving conflicts. Intersubjectivity, defined by Göncü (1993, p. 99) as "shared understanding between the participants of an activity" is reflected in shared pretend play through interpersonal engagement and shared symbolic referencing. Intersubjectivity occurs when children jointly represent a given experience that they uniquely experience in real lives (Göncü, 1998). Empirical evidence supports the notion that pretend play is one social context that involves joint attention, social referencing and discussions about mental-states (e.g. Rakoczy, Tomasello, & Striano, 2005a; Randell & Nielsen, 2006; Tomasello & Rakoczy, 2003).

When engaged in social pretend play, children must handle multiple representations concurrently. In order to interpret partners' genuine pretence, children must be able to read and decode partners' nonverbal behaviours as cues to join a pretend game. First, children must infer the intention of partners through observations of overt behavioural expressions and actions that deviate from the norm so as to quarantine pretend acts from real ones. Then, they must be able to read the minds of their partners in order to decide whether to extend and expand partners' ideas and propositions by producing appropriate actions. Maintaining a joint pretence context involves both players holding the same mental representation of an

object, attributing pretend properties to objects and people, portraying pretend situations, and understanding the partners' perspectives, emotions, behaviours and actions. It also involves negotiating and assigning roles and resolving conflicts.

Social bids are strategies employed by children to recruit other children or join in an episode of social play and to integrate pretence in their social play. Howes (1985) identified three effective social bid strategies that she labelled as *recruitment*, *imitation* and *join.* In nonverbal recruitment, the child directs an intentional fantasy action to the partner by gestures such as offering an object. Imitation involves the child copying a partner's pretend actions (e.g. crawling on the ground and roaring like a lion). Children above 27 months of age tend to employ "join" strategies (e.g. the child performs a fantasy action not directed at the partner but the latter responds with a fantasy action). As children's language skills unfold, they learn to use their verbal ability as another way of integrating pretence into social play. For example, children's use explicit verbal recruitment statements such as "let's pretend". Age-related changes in children use of verbal and nonverbal strategies have been observed. Children displayed a greater proportion of the verbal recruitment strategy by 27 to 33 months of age and the join strategy by 21 to 33 months than younger children but no age-related differences were observed in nonverbal recruitment or in imitation strategies (Howes, 1985).

Conflicts during pretend play have also been studied to reveal how children acquire social skills and understand naïve psychology concepts. When children are placed in conflicting situations during social interactions, they learn to appreciate reciprocal relations, adopt another person's perspectives and understand the emotional states and desires of partner in order to reach a consensus and continue the pretend episodes (e.g. Farver, 1992). Research has shown that children aged between 3 and 5 years of age who do not use arguments such as negotiating, compromising, persuading or taking turns during their play performed poorly on false-belief tasks (Foote & Holmes-Lonergan, 2003). Internal state language during sibling conflicts was also associated with high-level pretence negotiation (Howe et al., 1998; Howe et al., 2002). It should be noted that children's pretend play behaviour can be influenced by the wider cultural environment. For example, conflict behaviour may be socially acceptable in one culture but discouraged in another (see Chapter 9).

### 3.3.3    Pretend play themes and types of pretend role-play

Pretend play themes reflect children's experiences during everyday interactions. Children are exposed to different media (e.g. stories, art and television) and they play out themes related to their cultural and social experiences. Western research has shown that 3-

year-old children tend to recreate familiar themes relating to everyday events and routines while 4-year-old children invent more imaginative fantasy themes (e.g. Black, 1989). The developmental sequence of the thematic content also indicates the increasing level of complexity in children's ability to engage in shared cooperative activities. Howes et al. (1989) proposed that at 24 to 30 months of age, dyads can engage in same theme but show no integration of pretend activities relating to this theme (e.g. both children pour and drink imaginary tea with smiles). At 30 to 36 months of age, the joint pretend theme reveals enactment of complementary roles such as mother-baby.

The thematic content is also dependent on types and quantity of toys and props available. Themes produced by younger children tend to rely upon available props while older children are more likely to engage in fantasy play themes which are unrelated to props or are generated independently of props (Black, 1989). Play themes have also been observed to differ according to partner choices. For instance, play episodes with mothers involve nurturing themes whereas play with siblings includes everyday routines and household activities (Dunn & Dale, 1984). Taken together, the findings reported in this section highlight that careful consideration should be given in the present study to the methodological choices of toys, props and partners (see Chapter 4, Section 4.8).

Past research has categorised children's overt representation of roles enacted and accompanying actions in terms of verbal and non-verbal behaviour (e.g. Hughes & Dunn, 1997; Miller & Garvey, 1984; Youngblade & Dunn, 1995). 'Role-enactment' refers to situations when the child exhibits the behaviours or characteristics of the pretend role with no explicit naming of role (e.g. "That's my work machine"). In contrast, 'role-play' involves verbal definition of the role portrayed (e.g. "I'm a crocodile. Snap"). Role-enactment emerges earlier than role-play (e.g. Miller & Garvey, 1984; Watson & Fischer, 1980). Based on observational data of caregiver-child and peer-child interactions, Miller and Garvey (1984) outlined the developmental sequence of children's understanding of role portrayal using the example of doll-play to illustrate this sequence. At 2 years of age, children enact a mother role by addressing a doll as a 'baby'. However, there is neither an indication that children regard themselves as pretending to be mothers nor that their behaviours symbolically represent specifically the role of a mother to a doll. At 2½ years of age, as children's mothering play become more elaborate, their talk reveals more maternal activities (e.g. comforting a crying baby, saying good night to baby). In their third year, children explicitly adopt the role of mother in relation to other children or a doll. As verbal means of reciprocal role portrayal emerge at this age, children are able to negotiate roles and incorporate partners in reciprocal roles (Miller & Garvey, 1984). However, children continue

to use non-verbal means of role portrayal during the third year (Miller & Garvey, 1984).

When engaged in reciprocal role-playing and enactment, children learn to appreciate that their partner's perspectives may differ from their own. When enacting the role of a character, children imitate the character enacted through language, tone of voice, facial expression and gestures, suggesting that children can embrace different perspectives through role-play (Dockett, 1998). Moreover, during pretend role-play, children step out of their pretend roles temporarily in order to discuss the development of pretence and establish whether a pretence or reality state exist (e.g. "I'm not crying for real. I was just playing."). Through considering the different perspectives of partners, enacting character roles and transiting between pretend-reality realms, engagement in role-play may support children's developing understanding of multiple mental representations (see Chapter 9).

### 3.3.4 Communication tools in pretend play: Non-verbal cues and verbal metacommunication

As already touched upon, children use non-verbal cues for a variety of communicative purposes during pretend play. One specific purpose is to communicate to others that their play is not real, which they do by displaying various types of nonverbal gestures, behaviours and exaggerated actions (Garvey, 1974). For example, smiles and laughter, exaggerated gestures (e.g. throwing one's head back while pretending to drink), body movement (e.g. acting silly deliberately and purposely), deviant action and content cues (e.g. absence of food on the spoon) are special cues used by children to distinguish non-literal pretend (signifier) from literal (signified) acts (e.g. Lillard, 1996; Lillard, Nishida, Massaro, Vaish, & Ma, 2007; Lillard & Witherington, 2004; McCune, 1995; Piaget 1951; Randell & Nielsen, 2006).

When children's language development becomes more advanced, they are able to communicate their pretence verbally. Language, including use of verbal metacommunication, becomes a tool for engagement in complex pretend play. According to McLoyd, Warren and Thomas (1984), verbal metacommunication consists of messages that establish or modify a script for the pretence, make explicit how other verbalisations and behaviour should be interpreted, clarify the organisation of the pretence such as naming and assigning roles (e.g. "I'm the pilot") and establishing the rules that govern pretence (e.g. "I'm mummy. You're sister, so you're supposed to go to nursery").

Giffin (1984) further categorises verbal metacommunication as within-frame metacommunication (e.g. "This is our boat") and out-of-frame metacommunication (e.g. "Let's pretend we're Bob the builder"). McLoyd et al. (1984) reported that 5-year-old

children used more out-of-frame metacommunication than 3-year-old children (see also Garvey & Kramer, 1989; Halliday-Scher, Urberg, & Kaplan-Estrin, 1995). This difference might be linked to variation in engagement in pretend themes because 3-year-old children used more domestic and occupational themes whereas 5-year-old children used more fantasy themes (McLoyd et al., 1984). Out-of-frame metacommunication might be more necessary during fantasy role-enactment because extensive negotiation and coordination were necessary in an unfamiliar fantasy script (*cf.* Halliday-Scher et al., 1995). As children's competency in making pretend-reality distinction increases with age, they become more capable of using out-of-frame metacommunication (Halliday-Scher et al., 1995). Identification of non-literal pretend play behaviour and language (metacommunication) is necessary to evaluate the extent to which the communication tools used during pretend play differ between cultures.

### 3.3.5 Modes of transformation

Another way to differentiate pretend play from sophisticated functional play is to look at children's transformation skills. As children's pretend play develops, so do their abilities to 'transform' everyday objects and situations into pretend ones. Symbolic pretend play involves acting "as if" one object or gesture represents another. Leslie (1987) identifies object substitution, attribution of pretend properties and imaginary objects as three fundamental types of pretend play behaviour. For example, one object (e.g. a funnel) symbolically stands for other unrelated objects (e.g. a hat). In addition, children's ability to attribute pretend properties to objects (e.g. toy car is treated as a real car) and to living things (e.g. pretending a playmate can fly) and make reference to an absence object (e.g. licking an imaginary lollipop) signifies the capability for symbolic representation. It is important to assess the developmental changes in children's transformation skills to determine their symbolic representational skills. This developing ability to hold multiple representations may in turn be helpful for the development of naïve psychology concepts.

Children's object substitution during pretend play is dependent on their familiarity with the form and function between the substituted and referent objects (Fein, 1975). Findings have shown that symbolic representation expressed in play increases from 3 to 6 years of age (e.g. Cole & LaVoie, 1985; Connolly & Doyle, 1984). Children under 3 years of age depend mostly on the presence of similar substitute objects that resembled their referents. As children acquire more experience of the physical and social environment, they gradually become more competent in representing reality (Millar, 1968). Once decontextualisation occurs at around 3 years of age, children become able to substitute or imagine objects that

bear little physical resemblance to the signified object or have a different function and appearance (e.g. Lillard, 1993a; McCune, 1995; McLoyd, 1980; Pederson, Rookgreen, & Elder, 1981; Ungerer, Zelazo, Kearsley, & Oleary, 1981). Subsequently, play shifts to object independence. Elder and Pederson (1978) found that 3½-year-old children are able to carry on their pretence in the absence of an object, for example by using their body parts to stand for other things (e.g. pretending their fingers were toothbrushes and using them to brush their teeth). Finally, 4-year-old children are able to internalise fantasy by making reference to an imaginary object, person or substance without any physical support from the real world (e.g. pretending to hold an imaginary toothbrush) (Overton & Jackson, 1973).

Matthews (1977) classified preschoolers' modes of transformation in pretend play as material (reference to an actual object) or ideational (reference to a mental idea or image). Empirical evidence shows that material pretend play increases and then declines with age while ideational pretend play follows a linear increment from 2 to 6 years of age (Cole & LaVoie, 1985; Wall, Pickert, & Gibson, 1990). This categorisation has subsequently become more detailed and refined (see Gosso, Morais, & Otta, 2007). This thesis employed Gosso et al.'s (2007) classification scheme for the coding of children's pretend transformation skills (Chapter 4, Section 4.8 and Appendix D).

### 3.3.6 Summary of pretend play research in Western cultures

Together, these Western studies demonstrate an increase in the complexity of peer pretend play, social interaction strategies, pretend themes, types of pretend role-play, communication tools, and pretend transformation skills between infancy and 6 years of age. It has long been recognised that exposure to cultural diversities and social experiences (e.g. culture-specific socialisation practices, sibling relationships) influence children's pretend play behaviour (see Göncü & Gaskins, 2006). What is not known, however, is whether differences in pretend play exist between a Western and a hybrid culture. Through social pretend play, children cooperate and share in meaning-making and learn the accepted customs and conventions of their cultures. The next two sections take up the related issues of cultural and social environmental influences in children's pretend play behaviour.

### 3.4 Cultural Similarities and Variations in Children's Pretend Play Behaviour

Extensive research has investigated cultural similarities and differences in pretend play. Cross-cultural similarities have been reported in pretend play interaction patterns (visual regard, social play and play bids) between children in the UK and Singapore (Tan-Niam, 2000a; see further discussion in Section 3.6.2). In terms of developmental sequence of

social play behaviour, the peer play scale (Howes, 1980) has been used in studies conducted in different countries and with different ethnic groups: Indonesia (Farver & Wimbarti, 1995) and Korean-American and Anglo-American children (Farver, Kim, & Lee, 1995; Farver & Lee-Shin, 2000). The results showed that peer pretend play emerges in a parallel sequence at similar ages across cultures. However, differences in the frequency of each type of play were observed. Farver and Wimbarti (1995) attributed the variations in frequencies and styles of pretend play behaviour found in their study to differences in the socio-cultural environmental context. For example, while sibling-child interactions were pro-social in Western settings, sibling caretaking was a key feature in non-Western families. Although scaffolding and social support provided by more competent older siblings enhanced the development of younger children's pretend play across cultures, the interaction context and scaffolding process were culture-specific. While Western measures may not capture all the important aspects of non-Western culture, the peer play scale has been validated in non-Western contexts indicating that the behavioural assessment is able to capture both universal development and cultural differences in pretend play behaviour. Nevertheless, none of these non-Western studies mentioned above are longitudinal.

Numerous non-Western studies have also documented different patterns of pretend play behaviour across cultures. A four cultural communities study (San Pedro, Guatemala; Keciroen, Turkey; Dhol-Ki-Patti, India; and Salt Lake City, U.S.) conducted by Göncü, Mistry and Mosier (2000) showed that frequency, type and themes of 12 to 24-month-old toddlers' social play reflected adults' beliefs about children's development and adults' knowledge of the educational importance of pretend play. Dyadic play involving adult partners was more common in Kecioren and Salt Lake where children were segregated from adult activity. In contrast, children engaged in group activities with adults and other children in San Pedro and Dhol-Ki-Patti where children were a more integral part of social life. Caregivers who valued play used it as a medium of instruction to teach and play with children during daily activities. These results highlight that multifaceted environmental factors (e.g. parents' work load) must be considered when explaining cross-cultural differences (Göncü et al. 2000; Haight, Wang, Fung, Williams, & Mintz, 1999). In a six cultures study of children in Kenya, Mexico, Philippines, Okinawa, India and the U.S., Edwards (2000) concluded that cultural norms, adults' attitudes towards play and access to props and materials contributed to variations in pretend play behaviour across the communities. In sum, these findings demonstrate that variations in frequency and interaction styles in pretend play could be attributed to differences in cultural values and practices associated with child-rearing, developmental goals and education. Cross-cultural differences

in early pretend play experiences (e.g. parental role and encouragement of pretend play) might contribute to variations in later naïve psychology development.

Several notable cultural differences in pretend play interaction strategies and themes have been identified in comparative studies between Western and Eastern cultures. Longitudinal research by Haight et al. (1999) of Irish-American children living in the U.S. and Chinese children living in Taiwan from 2½ to 4 years of age revealed that Chinese children pretended more with their caregivers while Irish-American children pretended more with other children. In contrast to Chinese children, Irish-American children frequently engaged in more group pretend play. The way in which caregivers played with their children also differed between the two cultures, reflecting the different values they attributed to pretend play. Chinese caregivers' initiations which served as a way to practice proper conduct, were highly didactic, directive and demanding whereas Irish-American caregivers allowed their children to initiate and lead the interactions. The use of miniature toys accounted for the greater emphasis on fantasy themes in Irish-American families, whereas the emphasis on proper conduct contributed to a relatively greater proportion of social routines with real non-kin adults during pretend play for Chinese families. These observations suggest that we need to take into account that children's play is embedded within a larger cultural context when comparing pretend play activities across different cultures. If joint activities in play provide a vehicle through which enculturation and socialisation takes place, then naturalistic observational data may reveal how children construct an understanding of mind in different cultural contexts.

Cross-cultural variations in pretend play behaviour also exist within particular subgroups of the population within a country. Previous studies have reported that the thematic content and communicative strategies used to initiate and maintain pretend play by children from both European-American and Korean-American communities differ, and were influenced by socialisation practices and environmental factors (e.g. Farver et al., 1995, Farver, Kim, & Lee-Shin, 2000; Farver & Shin, 1997). Differences in the frequency of social pretend play between the two cultural groups were due to opportunities provided by the cultures rather than differences in children's abilities to engage in pretend play. Korean-American parents placed less emphasis on creativity and play than European-American parents. Korean-American children engaged in less social pretend play behaviour during free play activities than their Anglo-American counterparts because there were fewer pretend play materials available in their preschools. Moreover, teacher-directed activities and culturally-valued school readiness tasks were emphasised more in the Korean-American than Anglo-American preschools. Furthermore, parental attitudes towards children's behaviour

influenced children's choice of play themes. These results suggest that distinct culturally-defined social environmental factors influence children's opportunities for social interaction and pretend play.

In another study, Mariano, Welteroth and Johnson (1999) found that the social play of Japanese children living in the U.S. is characterised by a strong focus on group cohesion, demonstrating the interdependent value orientation of the Japanese culture. However, cultural adaptation in child-rearing practices has been found. Korean-American immigrants have been reported to modify their parenting styles according to the values of the host culture (Farver & Lee-Shin, 2000). The process of acculturation by which people accustom to another culture while retaining some aspects of heritage cultural traits may have implications for hybrid and multi-ethnic countries like Singapore. The acculturation of Western values and ideas suggests the possibility that parenting styles in Singapore may be characterised by a combination of elements from Western values and Eastern ethnic traditions which in turn shape children's interaction styles in pretend play differently.

In summary, the findings demonstrate that the play environment (e.g. types and quantity of toys and props), frequency and quality of children's pretend play behaviour and choice of pretend themes are influenced by culture-specific socialisation practices. This line of research, however, has not examined the wide range of aspects of pretend play discussed in Section 3.3. The results from comparative studies among cultural sub-groups within a country indicate that the basic ideologies of Eastern cultural goals, norms, values and beliefs become somewhat modified by the parenting styles and educational practices of children who are exposed to Western cultures. The findings are consistent with the different views on the role of play in children's development held by adults in Eastern and Western cultures. In Western cultures, adults regard "pretend play as a valuable activity with developmental and educational significance" (Göncü, Patt, & Kouba, 2002, p. 419). In contrast, parents in Eastern cultures typically prefer structured forms of teaching and place great emphasis on academic achievement (e.g. Tan, 2007). The differences in pretend play behaviour between children in the UK and Singapore (if any) may provide some insight as to which ideology emerges in parents' conceptions of play between the two cultures. Although familial and environmental factors have been found to influence children's pretend play behaviour, cross-cultural work that investigates the subsequent impact on children's developing understanding of the mind has been sparse (see Section 3.6.2).

### 3.5 Social Influences on Children's Pretend Play Behaviour

This section reviews research on individual attributes, family factors and contextual influences that contribute to individual differences in pretend play behaviour in both Western and Eastern cultures. Exploring individual differences in pretend play behaviour is important in the present study because these differences are likely to contribute to cultural differences in pretend play behaviour. The literature reported here also highlights some methodological issues that will be taken into consideration in the naturalistic observations of the present study.

### 3.5.1 Gender and pretend play behaviour

Children acquire gender category knowledge at approximately 19 months and this is related to the development of gender-typed play behaviour (Zosuls et al., 2009). Their growing awareness of gender identities implies that they will tend to imitate same-gender roles and follow gender-appropriate activities (Smith, 1977, 2003). They are often teased by other children if there is a violation of this rule (Garvey, 1991). Some studies in Western cultures have found gender-stereotyped object play in children by 2 years of age, with boys preferring masculine toys like trucks and girls preferring feminine toys like dolls (e.g. Caldera, Huston, & O'Brien, 1989). Complementary data were found in an ethnographic study of Japanese children (Mariano et al., 1999) and through parent-report measure of childhood play behaviour in China (Yu, Winter, & Xie, 2010). Nevertheless, incidences of overt gender role in pretend play behaviour such as when a boy dresses up as a princess are common in preschoolers' pretend play episodes. Gender differences have also been found in pretend transformation skills (e.g. Göncü & Kessel, 1988; McLoyd, 1980) and pretend themes (e.g. Neppl & Murray, 1997).

Preschool children who engaged in social pretend play with same-gender peers were rated by teachers as being more socially competent than children who engaged in pretend play with other-gender peers (Colwell & Lindsey, 2005). Research has found that interactive and cooperative play occurs more in same-gender dyads than in mixed-gender dyads (e.g. Jacklin & Maccoby, 1978; Neppl & Murray, 1997). Moreover, same-gender dyads tend to show mutual interest in gender-typed preference for specific toys (e.g. Fabes, Martin, & Hanish, 2003; Jacklin & Maccoby, 1978). Other evidence, however, suggests that while girls use feminine toys more than boys when constructing pretend episodes there is no gender differentiation in the use of masculine toys (Lloyd, Duveen, & Smith, 1988). In addition, no gender differences were found in role-enactment and negotiation in sibling dyads (Howe et al., 1998). On the basis of these earlier studies, careful consideration was given to the choice

of gender of playmates and selection of toys and materials in the present study (see Chapter 4, Section 4.8).

### 3.5.2 Family and contextual influences on children's pretend play behaviour

Individual differences in pretend play behaviour are also related to quality of childcare setting (e.g. Holloway & Reichhart-Erickson, 1988; Howes, 1990; Howes & Matheson, 1992), physical layout of the dramatic play centre (e.g. Petrakos & Howe, 1996), teacher's attitudes and practices towards pretend play (e.g. Carlson, Taylor, & Levin, 1998), socio-demographic background (e.g. Göncü, Jain, & Tuermer, 2006; Gosso, Morais, & Otta, 2007), maternal education (e.g. Dunn & Hughes, 2001), sibling relationships (e.g. Howe et al., 1998; Howe et al., 2002), and amount of joint play with mothers or siblings (e.g. Dale, 1989; Dunn et al., 1991b; Dunn & Dale, 1984; Haight & Miller, 1992).

Individual differences in amount and sophistication of social pretend play were also found to be related to the social experiences children have with their mothers and siblings (Youngblade & Dunn, 1995). Siblings participated as active actors who performed pretend actions as compared to mothers, who often took a commentary role with reliance on toys or props to encourage their children to engage in non-literal behaviours. Similar finding that older siblings scaffolded young sibling's play whereas mothers employed more directives and corrections of children's behaviour was found in a study in Indonesia (Farver & Wimbarti, 1995). Child-sibling interactions are closely linked to the development of naïve psychology because children discuss the mental-states of other people with their siblings during cooperative role-play (Youngblade & Dunn, 1995).

In sum, the literature on individual differences in pretend play behaviour indicates that children's pretending skills should not be equated with innate ability since these skills are affected by a number of social environmental factors. An examination of the social interaction context will identify whether cross-cultural differences exist in different aspects of pretend play behaviour. Exploring the reciprocal relationships between specific aspects of pretend play behaviour and naïve psychology will contribute towards understanding cultural similarities and differences in the role of social pretend play behaviour in children's naïve psychology development and vice versa.

### 3.6 Children's Pretend Play Behaviour and Naïve Psychology Development

In discussions of the relationship between pretend play behaviour and naïve psychology development, the usual direction of effect posited is that pretend play is an antecedent in early social interactions contributing to individual differences in children's

naïve psychology development (e.g. Bartsch & Estes, 1996). It is important to note, however, that children's engagement in complex shared pretend play behaviour may be facilitated by early naïve psychology development. The following sections first examine whether pretend play influences naïve psychology or whether the reverse is the case, by presenting evidence from Western and then non-Western contexts. Subsequently, an explanation of the link between pretend play behaviour and naïve psychology development is provided. A brief discussion of theories pertaining to the links between pretend play behaviour and children's developing metarepresentational ability is also included. Understanding this theoretical link is important because it highlights that not all aspects of pretend play behaviour are associated with naïve psychology development. This review will provide a guide for the analysis conducted in this thesis (see Chapter 9).

### 3.6.1 Reciprocal relations between pretend play behaviour and naïve psychology development in Western cultures

Some Western studies which combined both observational and experimental approaches have provided support for the premise that quantity of pretend play is associated with children's naïve psychology development. Rubin and Maioni (1975) demonstrated that frequency of dramatic play was positively associated with perspective-taking skills. Children whose social pretend play included more multiple and complex transformations performed better on affective role-taking tasks (Connolly & Doyle, 1984). However, these studies did not relate any naïve psychology task performance to the qualitative aspects of children's pretending skills. Identifying qualitative differences may reflect individual child's capacity to engage in various types of pretend play. For example, numerous studies have reported that children with imaginary companions excel in naïve psychology tasks (e.g. Taylor & Carlson, 1997, 2002; Taylor, Carlson, Maring, Gerow, & Charley, 2004). Gleason (2002) suggests that by attributing human characteristics (e.g. speech, actions and intentions) to their invented friends, children learn to appreciate the existence of others' perspectives. In what follows, evidence that pretend play behaviour influences acquisition of naïve psychology concepts is first discussed and followed by evidence for the reverse relationship.

Studies have shown that individual differences in naïve psychology development are related to complexity of pretend play behaviour. A few studies have observed children playing with their peers in preschool settings. Schwebel, Rosen and Singer (1999, Experiment 2) observed 31 preschoolers aged 3 to 5 years of age during free-play in a day-care setting in the U.S. Their cross-sectional data revealed that children who engaged in more jointly constructed pretend play and were rated highly on transformation skills

performed better on the appearance-reality task. Furthermore, joint pretend play was a significant predictor of children's knowledge of appearance-reality distinction, after CA and VMA were taken into consideration. However, no relationships were found between solitary pretend play and naïve psychology concepts. Neither was any pretend play behavioural measures associated with false-belief understanding. Schwebel et al. (1999) attributed the differences within the results obtained to the specific use of the unexpected transfer false-belief task which tapped different cognitive abilities: other studies that used the unexpected content false-belief task have found associations between early role-enactment and later false-belief task performance (Youngblade & Dunn, 1995) and predictive relations for pretend actions and impersonation of person and non-living objects with false-belief measures (Taylor & Carlson, 1997). A limitation of Schwebel et al.'s (1999) research was that it failed to consider the reciprocal relationship between naïve psychology concepts and pretend play behaviour.

Nielsen and Dissanayake (2000) observed 40 children, aged between 36 and 54 months, playing with each parent in two sessions in a laboratory setting in Australia. The researchers conducted correlation analyses to test their hypothesis that children's pretend play behaviour would be associated with their ability to pass false-belief task. Their results revealed significant associations between false-belief understanding and certain components of pretend play (object substitution, role assignment and exhibition of imaginary object pantomimes e.g. children acted as if they were really holding a toothbrush) but no relation with other categories of pretend play (imaginary transformation, attribution of animacy, role-play and joint proposals). However, this research did not take VMA into account. These literature review chapters have highlighted the relationship of language with pretend play behaviour and naïve psychology, suggesting that the association between pretend play behaviour and naïve psychology might be confounded by the effect of individual differences in language ability. Therefore, VMA must be taken into consideration when investigating the link between pretend play behaviour and naïve psychology.

The studies reviewed so far have not explored the longitudinal relationship between pretend play behaviour and naïve psychology development, and so can indicate an association but not a causal link. Using longitudinal data from naturalistic settings, Dunn and colleagues examined the relationship between social pretend play behaviour and false-belief understanding of 50 children in a seven month study in the U.S. (Dunn et al., 1991b; Youngblade & Dunn, 1995). The researchers reported that children who had engaged in more role-enactment at the age of 33 months were better able to explain actions based on false-beliefs at 40 months of age. This research studied a group of children at two time points,

but because the children came from only one cultural setting it is difficult to discern the impact of diverse socialisation experiences of children from different cultural backgrounds on the relationship between pretend play behaviour and naïve psychology development.

No associations between composite play measures (functional or pretend) at 20 months of age and naïve psychology measures at 44 months were reported in a longitudinal study of 13 UK children conducted by Charman et al. (2000). A limitation of this study was that children were observed playing alone at 20 months of age; Section 3.3.2 highlighted the specific importance of intersubjectivity in shared pretend play in children's developing understanding of partner's perspectives and intentions.

As regard the reciprocal relation, the results of Hughes and Dunn's (1997) study of 25 friendship dyads of 4 years of age in the UK revealed that naïve psychology (false-belief and deception) task performance was significantly associated with frequency of pretend play and mental-state talk. Furthermore, children's task performance predicted frequency of mental-state talk, after age was accounted for. Importantly, children who displayed frequent talk in pretend episodes referred to mental-states more often in general than children who engaged in less overall talk. This research suggests that children talk about mental-states to initiate and foster shared pretend play. Alternatively, children's experience in shared pretend play may enhance their awareness of mental-states.

Further evidence of the causal relation between pretend play and naïve psychology development comes from a training study in Australia. Dockett (1998) demonstrated that 4-year-old children trained in a series of learning experiences, including setting up a pretend play pizza restaurant corner, achieved significant improvement in post-test performance on false-belief, appearance-reality and representational change. In contrast, another training study conducted by Rakoczy, Tomasello and Striano (2006, Study 2) in Germany did not produce a transfer effect of developments in pretend play behaviour and pretence understanding to tasks that tapped children's understanding of false-belief and appearance-reality distinction.

The research overviewed thus far examines how development of early pretend play behaviour facilitates children's later naïve psychology development. In contrast, though, relatively few studies have explored the reverse relationship, between children's early naïve psychology development and their subsequent competence to engage in complex forms of pretend play. A small-scale longitudinal observational study of 20 children between 34 to 45 months of age in Canada found predictive relations between early naïve psychology concepts (false-belief and appearance-reality distinction) and frequency of pretend play behaviour (joint planning and role assignment) seven months later, after CA and VMA were taken into

consideration (Jenkins & Astington, 2000). The relationship was not symmetrical. That is, there was no evidence that social behaviours in pretend play predicted later naïve psychology development. In explaining the differences in results compared to Youngblade and Dunn's (1995), Jenkins and Astington (2000) noted that role-enactment (the child acting out a role), which involves mental representation of action, would precede and enhance false-belief understanding. However, role assignment, which involves a more sophisticated level of representing two conflicting states (who the child really is and the character being enacted), would develop after children acquire false-belief understanding.

Taken together, the link previously found between some aspects of early pretend play behaviour and later acquisition of some naïve psychology concepts suggests a positive relationship. Regarding the reverse relationship, children's ability to consider contrasting perspectives and beliefs simultaneously will enhance their capacity to engage in complex forms of shared pretend play which involves planning of pretend scripts, negotiation of roles and themes and resolution of conflicts for the continuation of the pretend episodes. Despite this, relatively few studies have explored this direction of association. This is not surprising given that naïve psychology and pretend play may develop in a closely integrated manner. It is likely that some aspects of rudimentary social pretend play behaviour influence acquisition of naïve psychology concepts, which in turn support children's development of sophisticated social pretend play behaviour. It is noted that some of these studies identified social pretend play behaviour with peers as a promising avenue for exploring the relation between pretend play and naïve psychology development.

### 3.6.2 Cultural universals and differences in the role of pretend play behaviour in children's naïve psychology development

While extensive research has been conducted in non-Western contexts to explore cross-cultural differences in pretend play behaviour, few studies have investigated the relationships between pretend play and naïve psychology development. In a study of 56 preschoolers in Singapore, Tan-Niam (1994, 2000b) employed an experimental pre-test, intervention and post-test control group design to examine the impact of a fantasy play curriculum on aspects of naïve psychology. In the study an experimental group was exposed to thematic fantasy play curriculum for 14 sessions using role-enactment of fairy tales whereas the control group were told the fairy tales, but did not engage in playing the story characters and events. Children were assessed on five perspective-taking tasks (two perceptual tasks, two cognitive tasks, and one affective task) that tapped their ability to infer what others were seeing, thinking and feeling respectively. The results indicated that, despite

no differences at baseline, the experimental group performed significantly better on total post-test perspective-taking measures than the control group. This finding, in line with the Western studies reported above, suggests that the relationships between some aspects of pretend play behaviour and some naïve psychology concepts may be universal. Nonetheless, identification of culturally-specific dimensions of pretend play behaviour that may contribute to development of naïve psychology should be further explored.

In a cross-cultural study of 96 children in the UK and Singapore, the unexpected transfer false-belief task was administered and children were paired into three groups: child who passed the task was paired with another child who did not pass the task, both children passed the task, and both children did not pass the task (Tan-Niam, 2000a). Each dyad was then observed for 20 minutes engaging in pretend play. The results revealed that children in the first two groups spent a higher proportion of time in shared visual regard and shared engagement and initiated more reciprocal play bids compared to children in the last group. This demonstrated that children who had acquired a representational understanding of mind engaged in more intersubjective shared pretend play. No cross-cultural differences were found in the pattern of play interactions. Although both studies separately demonstrated the reciprocal relations between pretend play behaviour and naïve psychology concepts, they each focused on only one aspect of naïve psychology. A much more systematic cross-cultural study should investigate the reciprocal associations by comparing the developmental changes in pretend play behaviour with a range of naïve psychology concepts.

### 3.6.3   Developmental links between pretend play behaviour and naïve psychology

Several explanations have been provided to account for the associations between various aspects of pretend play behaviour and naïve psychology development. Some researchers have suggested that young children's pretend behaviour has similar structure of cognitive representational skills to naïve psychology concepts (e.g. Jenkins & Astington, 2000; Leslie, 1987, 1989; Lillard, 1993a, 1993b). For example, when engaged in role-enactment which involves mental representation of action, children attribute pretence, desires, emotions and perceptions to dolls. When assuming the roles of people or non-people, children behave and think according to the imagination states of the people or characters they are acting. Role-play also presents a useful platform for children to practise pretend-reality distinctions. For example, the adoption of anticipatory role (e.g. father) provides a context to rehearse the role of a 'real' person compared to a fantasy role (e.g. alien) and aids children's ability to make distinction between the two realms (McLoyd et al., 1984; see also Saltz, Dixon, & Johnson, 1977). Moreover, the stepping in and out of the pretend frame to

metacommunicate about plans, roles and themes may support children's mastery of pretend-reality distinction. Role reversals or exchanges may support children in coordinating viewpoints and actions of the roles adopted and other children in social pretend play episodes (e.g. Bretherton, 1984; Howes & Matheson, 1992). Hence, examining duration of engagement in role-enactment, role-play and metacommunication may reveal the link between types of pretend role-play and naïve psychology development (see Chapter 9).

Children's ability to attribute multiple representations to roles, objects and situations and distinguish between fantasy and reality in pretend play could serve as the foundation for their wider mastery of conflicting representation of mental-states and in turn support their ability to pass naïve psychology tasks. The ability to reflect on the mental-states of others during social pretend play may assist children to develop the type of skills necessary to pass the false-belief task. Children's ability to attribute multiple pretend identities to objects and situations may in turn enable them to distinguish between what an object looked like (appearance) and what it actually was (reality) in an appearance-reality task. When children discuss their pretend scripts and negotiate conflict resolutions, they may realise that their partners may not share the same viewpoints and learn to adjust their perspectives which is similar to level-2 perspective-taking task. Pretend play presents numerous opportunities for children to explore the boundary between the pretend and real worlds, thus assisting them to acquire the knowledge that the appearance of a deceptive object is momentary rather than having a permanent state as in an apparent colour task.

*Theoretical explanations of the representational nature of pretence*

Younger children can attribute mental-states in pretend play even though they acquire representational naïve psychology concepts at a later age. Several theories have focused on this age discrepancy. Leslie's (1987) and Harris' (2000) positions were discussed in Chapter 1 (Section 1.3). In what follows, two alternative models suggested by Jarrold et al. (1994) and Lillard (2001) are briefly discussed. According to Jarrold et al.'s (1994) transition model, children progress gradually from non-metarepresentational individual pretend play to metarepresentational complex forms of shared pretend play. In individual pretend play, children only need a decoupled secondary representation whereas in social pretend play children require metarepresentational understanding in order to make sense of their partners' pretend actions, intentions and perspectives and respond with appropriate pretend actions. The proposition that social pretend play involves metarepresentational ability is supported by research showing that jointly constructed cooperative pretence but not solitary pretend play is related to children's ability to make appearance-reality distinctions (e.g. Schwebel et al.,

1999). The gradual development from rudimentary non-representational to sophisticated representational understanding of naïve psychology concepts (reviewed in Chapter 1, Section 1.2) seems to parallel the transition pattern from solitary to simple social to complex social pretend play (discussed in Section 3.3.1). Consequently, it would be worthwhile to investigate whether social pretend play rather than solitary pretend play observed through free play supports understanding of naïve psychology concepts (see Chapter 9).

Jarrold et al. (1994) further highlighted that children's use of verbal metacommunication emerged by 3 years of age in social pretend play but was absent in early forms of pretend play at 18 months of age. Metacommunication involves an understanding of mental-states in order to create a complex form of joint pretend play. Evidence for this comes from Nielsen and Dissanayake (2000), who demonstrated that role assignment (explicit verbal assignment of roles to self, others or objects), but not role-play (enactment of a specific role), was associated with children's use of mental-state terms and false-belief understanding. If verbal metacommunication is the key to differentiating between non-metarepresentational individual pretend play and metarepresentational social pretend play, it would be interesting to consider whether engagement in metacommunication contributes to naïve psychology development (see Chapter 9).

Drawing on the modularity account of decoupling and the process of simulation in understanding naïve psychology concepts, Lillard (2001) proposed a Twin Earth model to explain the developmental relationship between pretend play behaviour and naïve psychology. According to Lillard (2001), children acquire an understanding of several naïve psychology concepts such as intention sharing, social referencing and joint attention during early social pretend play with parents and siblings. The mastery of these skills supports the development of more sophisticated naïve psychology concepts. With respect to cultural differences in pretending, Lillard (2001, p. 519) remarks that some non-Western cultures that discourage pretend play may be "less psychologically oriented" than Western cultures.

In sum, extensive research has investigated pretend play as antecedents to naïve psychology development but relatively few studies have examined whether children's early naïve psychology development facilitates their engagement in complex pretend play behaviour. Nonetheless, the findings support the view of reciprocal relationships between pretend play behaviour and naïve psychology. The majority of the studies have shown that not all aspects of pretend play behaviour are related to naïve psychology development. None of the research reviewed so far, however, has attempted to compare the diversity of children's pretend play behaviour across cultures and how variations might contribute to

cultural differences in naïve psychology development. The next section identifies the limitations of existing evidence and discusses how the current thesis attempts to fill this gap.

## 3.7    Summary and Implications for Thesis

The review presented in this chapter indicates that research in the Western contexts has tended to focus on distinctive developmental aspects of children's pretend play behaviour. Non-Western studies, on the other hand, have tended to consider how cultural belief and practice influence quantitative differences in children's play. To the extent that quantity and quality of play varies across cultures (e.g. Gaskins, Haight, & Lancy, 2006; Gosso, 2010), current notions of the manner in which pretend play behaviour is associated with naïve psychology development should be viewed cautiously. Hence, there is a need to link both Western and non-Western research in order to disentangle the relative impact of cultural and social environmental factors on children's pretend play behaviour and subsequent effects on naïve psychology development.

As shown in Figure 3 below, a combination of observations of children's pretend play behaviour and experimental tasks has been employed in the present study to examine cultural similarities and differences in the development of pretend play behaviour and assess the relationships between pretend play behaviour and naïve psychology concepts. Some studies provide evidence that individual differences in children's naïve psychology development are linked to early social experiences in pretend play. Other research has revealed that early naïve psychology is associated with later engagement in complex forms of pretend play. This promotes the view that pretend play behaviour and naïve psychology have "a complex and interdependent relationship" (Jenkins & Astington, 2000, p. 218). As highlighted in Chapter 1 (Section 1.2.1), few studies have demonstrated the relationships between pretence understanding and acquisition of other naïve psychology concepts. Additionally, there is no published longitudinal study that explores the direct connections between pretend play behaviour and pretence understanding in both a Western and a hybrid culture (see Chapter 9).
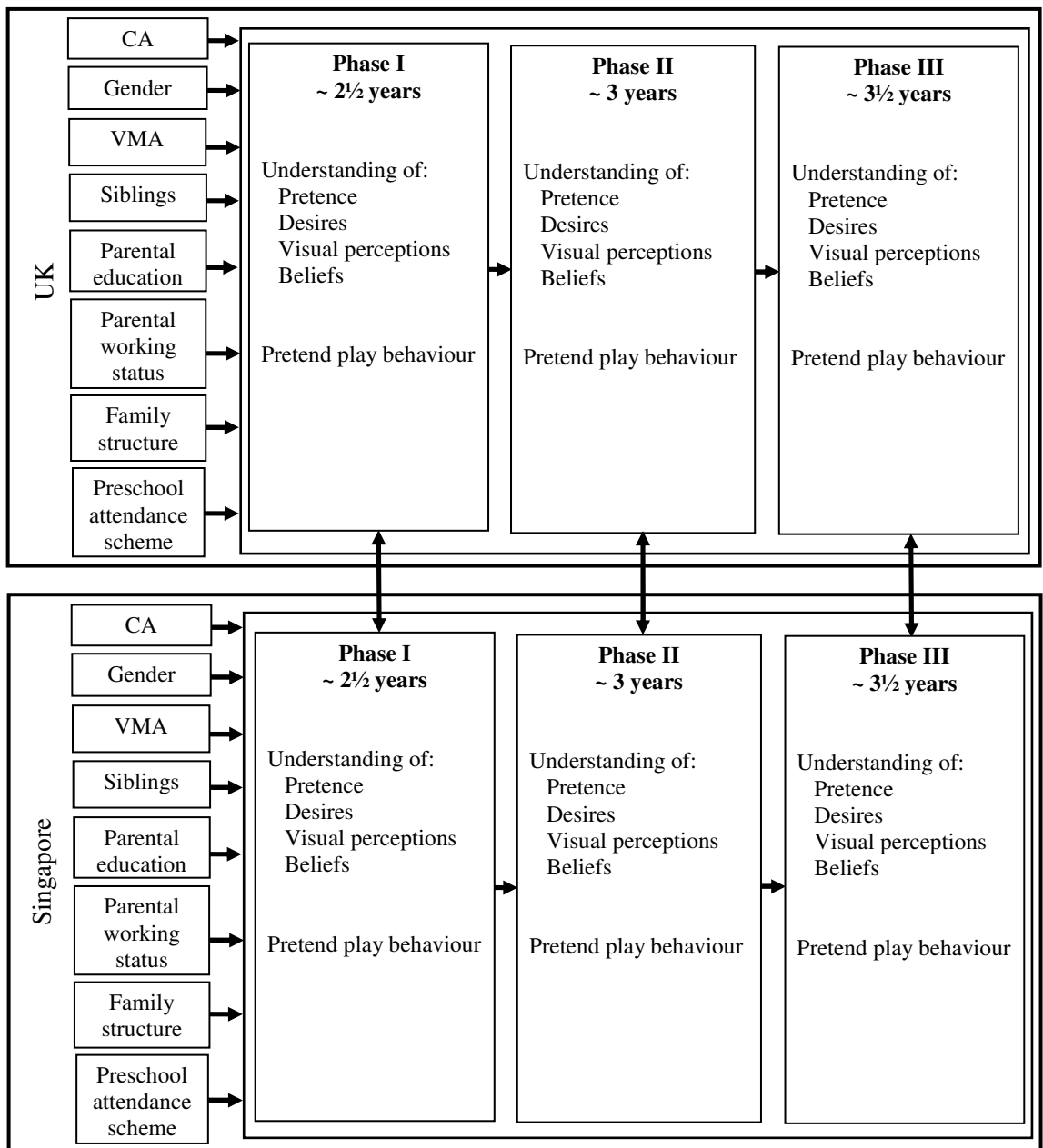
*Note.* CA = chronological age, VMA = verbal mental age.

*Figure 3.* A longitudinal cross-cultural comparison of the development of naïve psychology and pretend play behaviour between the ages 2½, 3 and 3½ years.

## 3.8    The Present Study

Chapter 1 has considered a range of Western studies that document the developmental patterns of various aspects of naïve psychology from the ages of 18 months to 4 years. Little is known about whether the longitudinal developmental sequences are similar between a Western and a hybrid culture. Subsequently, Chapter 2 has presented findings of cultural universals and differences in various social influences on children's acquisition of

naïve psychology concepts. It highlighted a narrow focus of naïve psychology development between 3 and 5 years of age which means that there are limited findings relating to children's rudimentary naïve psychology concepts at an earlier age. Moreover, the non-Western results were usually compared with existing empirical results reported in Western studies. A related methodological problem is the comparison of groups of children from various studies of different time periods. Finally, Chapter 3 has provided evidence of the developmental patterns of various aspects of children's pretend play behaviour. A range of studies reviewed supports the proposition that through mutual cooperation and coordination during shared pretend context, children acquire an early understanding of various aspects of naïve psychology. Limited reciprocal associations between naïve psychology concepts and pretend play behaviour were also reported. Taken together, the three chapters have shown that understanding of pretence, desires, visual perceptions and beliefs and development of pretend play behaviour unfolded progressively between 2 to 4 years of age. This age range is an important period for the development of naïve psychology and social pretend play behaviour and merits careful attention.

The present comparative research examines a range of naïve psychology concepts and different aspects of pretend play behaviour at three time points in development between children in the UK and Singapore. Systematic comparisons of children's understanding of pretence, desires, visual perceptions and false-beliefs are useful for identifying cross-cultural similarities or differences at 2½ year of age (Research Question 1) and in the developmental path of naïve psychology at 2½ , 3, and 3½ years of age (Research Question 2). Investigating specific developmental changes in belief and knowledge will reveal whether both cohorts follow a similar path in acquiring these important aspects of naïve psychology (Research Question 3). Relatively few researchers have examined social environmental factors that lead to individual differences in naïve psychology development in non-Western contexts. This study explores whether individual and social variables contribute to individual differences in naïve psychology development (Research Question 4). This study considers cross-cultural similarities and differences in the developmental patterns of various aspects of pretend play behaviour and clarifies the link between pretend play behaviour and naïve psychology development (Research Question 5).

The present study employed both naturalistic observations of free play with familiar peers and experimental task performance to illuminate the relations of pretend play behaviour and pretence understanding with children's acquisition of other naïve psychology concepts (see Chapters 6 and 9). Naturalistic observations of pretend play have the advantage of providing ecological data that provides insights into the cultural norms, values,

social conventions and rules for behaviour learnt from adults and siblings in their culture which are practiced in play with their peers. The observational data will also provide a detailed cross-cultural comparison of pretend play behaviour using a wider range of measures than most existing research. The pretence understanding experimental tasks will reveal children's true level of understanding of the mind's involvement in pretence that cannot be assessed through observing children's 'acting-as-if' pretend play behaviour. The following chapter provides a detailed description of and rationale for the methodological approach used in this thesis.

# CHAPTER 4
# METHODS

## 4.1 Introduction

The aim of this chapter is to present the methodological approach undertaken in this thesis, thus linking the previous three literature review chapters with the subsequent five results chapters. The present study compares naïve psychology development at 2½, 3 and 3½ years between preschool children in Edinburgh, UK and Singapore. This chapter will first briefly describe the two cultures studied. Then, the design of the study is explained. Here, information is provided on the participants (recruitment, demographic characteristics) and the data collection procedures. Next, the methods employed in both the experimental measures and pretend play observations will be discussed. Finally, this chapter concludes with an overview of the analyses that will be presented in the subsequent five results chapters.

## 4.2 The Context for the Study: Edinburgh, United Kingdom and Singapore

Edinburgh is the capital of Scotland, and is a cosmopolitan UK city. The population is around 477,600 (General Register Office for Scotland, 2009), which comprises 95.9% White, 1.5% from ethnic groups of the Indian sub-continent, 0.8% Chinese and 1.8% from other ethnic groups (The City of Edinburgh Council, 2001). Singapore is an island city-state, situated at the tip of the Straits of Malacca, in South-east Asia. It is a multi-ethnic and multilingual nation with a resident population of 3.7 million, which is made up of 74.2% Chinese, 13.4% Malays, 9.2% Indians and 3.2% others (Singapore Department of Statistics, 2010b). The average family sizes are 1.96 and 2.02 children respectively in the UK (Office for National Statistics, 2008) and Singapore (Singapore Department of Statistics, 2010a). Unlike Edinburgh, where the majority of residents are monolingual, Singapore has embraced an official bilingual education policy since independence in year 1965. English, Chinese (Mandarin), Malay and Tamil are the official languages. English is the administrative language and is used as the medium of instruction in schools, but pupils also have to acquire a compulsory second language. From the age of around 2 years, Singaporean children learn to switch between languages when addressing speakers of different ethnic groups. Parents, grandparents and live-in nannies routinely communicate with children in two or three languages. Most Singaporean children speak at least two languages fluently by the age of 3 years.

The blend of Eastern and Western influences and the use of English as the first language in Singapore offer a unique culture for comparative study. As a result of globalisation, Singaporean children are exposed to norms, values and ideas from Asia, America and Europe. Singaporean children are raised with childcare practices influenced by Asian values of collectivism, conformity to norms and filial piety and by Western theories of child development. With rapid commercialisation, Singaporean children have been exposed to a variety of media such as television programmes and advertisements featuring Western toys, sweets, fast food and cartoons. Although, as will be seen, the two samples in the present study are comparable in terms of age, number of siblings and birth order, they differ widely in other aspects such as family experiences.

## 4.3    Design

This research is a longitudinal three-phase cross-cultural study that combines both experimental and naturalistic observational data using a repeated-measure design to provide a more coherent account of children's naïve psychology and pretend play behaviour development. Figure 4 provides an overview of the design of the study. By collating data from other background measurements (e.g. receptive vocabulary and demographic variables) this study exceeds most existing studies in terms of range of data collected. It is noted that Figure 4 will be presented in the subsequent results chapters to guide the readers through the analyses that will be conducted for the research questions. The cross-cultural comparison with longitudinal design was chosen for several reasons. The longitudinal approach is considered more advantageous than cross-sectional design because it measures developmental changes over a period of time. The inclusion of cross-cultural comparison in this study, builds on the existing research, by allowing direct comparisons of the development of naïve psychology and pretend play behaviour between a Western and a hybrid Eastern-Western culture.

## UK

| CA | | | |
|---|---|---|---|
| Gender | | | |
| VMA | | | |
| Siblings | | | |
| Parental education | | | |
| Parental working status | | | |
| Family structure | | | |
| Preschool attendance scheme | | | |

**Phase I**
**~ 2½ years**

Baseline measures

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

**Phase II**
**~ 3 years**

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

**Phase III**
**~ 3½ years**

Follow-up measures

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

## Singapore

| CA | | | |
|---|---|---|---|
| Gender | | | |
| VMA | | | |
| Siblings | | | |
| Parental education | | | |
| Parental working status | | | |
| Family structure | | | |
| Preschool attendance scheme | | | |

**Phase I**
**~ 2½ years**

Baseline measures

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

**Phase II**
**~ 3 years**

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

**Phase III**
**~ 3½ years**

Follow-up measures

Understanding of:
  Pretence
  Desires
  Visual perceptions
  Beliefs

Pretend play behaviour

*Note.* CA = chronological age, VMA = verbal mental age.
The arrows give an indication of some of the analyses that will be conducted. The orange arrows show analysis of developmental changes over time. The brown arrows indicate the cross-cultural similarities and differences which will be explored.

*Figure 4.* A longitudinal comparison of the development of children's naïve psychology and pretend play behaviour between the UK and Singapore cohorts: An overview of the study.

Naïve psychology is a Western construct and the standard tasks were devised by scientists in the West. As reviewed in Chapters 1 and 2, most studies have classified children as having acquired an understanding of the representational nature of mind if they passed the

standard false-belief tasks. While a few non-Western studies have taken cultural differences into consideration by modifying the experimental task procedures (e.g. Avis & Harris, 1991), a large number of studies have employed the standard false-belief measures in their investigation of the universal development claim and have shown that these standard tasks are appropriate for a range of cultures (see review in Chapter 2). Since this research is an attempt to examine universality and cultural variability in the development of naïve psychology, a wide range of age-appropriate tasks will be replicated and adapted from previous studies. Established tasks were employed to allow an investigation of whether the findings reported in Western studies can be duplicated in a different cultural setting. Here, an attempt was made to find culturally appropriate materials to ensure that all the tasks were culturally relevant. The tasks were conducted in English as this was spoken fluently by all participants.[2] It also enabled the use of the original task wording, thus avoiding the risk of inadequate cross-cultural translation.

Critics have argued that children's true understanding of naïve psychology concepts may not be accurately reflected by these standard task measurements. Therefore, this study combined the use of these with naturalistic observational data to explore the association between children's social interactions during peer play in naturalistic settings and their task performance. These observations allowed an investigation of the play interactions in a shared social context that might illuminate cultural similarities and differences. The longitudinal free play observations also provide a rich source of data to explore the relationships between children's social pretend play behaviour and their naïve psychology development (Research Question 5).

A key advantage of a longitudinal repeated-measures design is that individual differences between children are reduced because each child is assessed at different time points. However, a drawback is the danger of practice effects resulting from repeating testing on the same battery of tasks. It is probable that children's performance might improve due to the experience of having taken the tasks previously rather than due to maturity or improvement on the skills being assessed. Steps were taken to reduce this practice effect. First, the time-lag between each phase of study was about seven months. Previous studies on test-retest reliability of false-belief tasks were conducted on two separate occasions within two to three weeks (Mayes et al., 1996) and four weeks (Hughes et al., 2000). The time intervals in this study were longer so the scores were unlikely to be inflated by practice effects. Second, where a task was used in more than one phase, subsequent phases employed

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2   It is important to note that even though the Singaporean children were fluent in and educated in the medium of English, the main language(s) spoken at home might be Chinese, Malay, Tamil or other dialects.

different materials (see Section 4.7.1). Third, no feedback was provided to the children regarding their success or failure on the tasks.

This research examined the early development of naïve psychology concepts from 2½ years of age and followed children through their development at approximately 3 and 3½ years of age.[3] A developmental approach informed the decision for the time-lags between phases. As noted in Chapter 1, existing Western literature has suggested that 2-year-old children understand some aspects of naïve psychology, and that this understanding then develops gradually over the preschool years. However, little is known about naïve psychology development during toddlerhood in non-Western contexts (Research Question 1). Therefore, the first phase of the study was conducted when the mean age of the children was 2½ years of age. The vast majority of developmental research on children's false-belief understanding has compared differences in performance between children aged 3 and 4 years. Consequently, the second phase was carried out at the mean age of 3 years. Microgenetic investigation showed that some children were able to pass the false-belief task before 3 years 5 months whereas other children developed false-belief understanding after 4 years of age (Flynn, 2006; see also Wellman et al., 2001). Thus, the final phase was conducted when the children were at the mean age of 3½ years. Although ideally the study would have continued until the children were 4 years of age, this was not possible within the PhD timescale. It was hoped that the three phases would allow a mapping out of the many different aspects of children's naïve psychology at different points in development from 2½ to 3½ years of age between the two cultures (Research Question 2).

## 4.4    Participants

A total of 87 children[4] were recruited in phase I of the study from six nurseries in Edinburgh, UK and eight childcare centres in Singapore. Eighty-two of these children participated in phase II. The final sample at phase III included 74 children. Details of each cohort's CA and VMA can be found in Tables 4.1a and 4.1b.

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[3]    Although the time-lag between each phase of study was about seven months, the differences in CA between phases were six months due to drop-outs after phases I and II.
[4]    A total of 13 children from both cohorts, whose parents have given consent, were not included because they did not want to participate in the 'games'.

*Table 4.1a.* Baseline and Follow-up Measures of Whole Sample at Each Time Point

| Measure | UK cohort | | | Singapore cohort | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Phase I | Phase II | Phase III | Phase I | Phase II | Phase III |
| | ($N = 43$) | ($N = 41$) | ($N = 36$) | ($N = 44$) | ($N = 41$) | ($N = 38$) |
| CA (in months) | | | | | | |
| *M* | 28.60 | 35.71 | 42.75 | 29.89 | 36.78 | 43.68 |
| *SD* | 1.90 | 1.94 | 1.84 | 2.76 | 2.79 | 2.79 |
| Range | 25 - 33 | 32 - 40 | 39 - 47 | 25 - 34 | 32 - 41 | 39 - 48 |
| BPVS-VMA (age equivalent in months) | | | | | | |
| *M* | 33.95 | - | 47.83 | 35.41 | - | 46.92 |
| *SD* | 2.96 | - | 6.05 | 3.53 | - | 6.43 |
| Range | 28 - 42 | - | 39 - 68 | 29 - 45 | - | 39 - 67 |

*Note.* CA = chronological age, BPVS-VMA = British Picture Vocabulary Scale – Verbal Mental Age (Dunn et al., 1997).


*Table 4.1b.* Baseline and Follow-up Measures of the Final Sample[a] across the Three Phases

| Measure | UK cohort ($N = 36$) | | | Singapore cohort ($N = 38$) | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Phase I | Phase II | Phase III | Phase I | Phase II | Phase III |
| CA (in months) | | | | | | |
| *M* | 28.75 | 35.75 | 42.75 | 29.68 | 36.68 | 43.68 |
| *SD* | 1.84 | 1.84 | 1.84 | 2.79 | 2.79 | 2.79 |
| Range | 25 - 33 | 32 - 40 | 39 – 47 | 25 - 34 | 32 - 41 | 39 - 48 |
| BPVS-VMA (age equivalent in months) | | | | | | |
| *M* | 33.94 | - | 47.83 | 35.11 | - | 46.92 |
| *SD* | 3.05 | - | 6.05 | 3.34 | - | 6.43 |
| Range | 28 - 42 | - | 39 - 68 | 29 - 45 | - | 39 - 67 |

*Note.* [a] 'Final sample' refers to the group of children who participated in all three phases.

One of the main challenges in the current study was maintaining the same sample over the 1 year 9 month period. During the investigation process, participants might move away or discontinue for other reasons and the remaining ones might differ from those who dropped out of the study. This loss of participants, or attrition, could result in a biased sample. Consequently, attempts were made to ensure that there was little drop-out between the different time-points. Following prior longitudinal study (e.g. Williams & Smith, 2006), there was regular communication through feedback information sheets with the parents and nurseries with the aim of reducing attrition across the three phases. Appendix B shows the feedback sheets for the three phases. Thank you gifts (book vouchers and biscuits) and cards were also given to the nurseries and childcare centres during the course of the research. In a few cases of transfer between childcare centres, parents and preschools were contacted to seek their permission for the continuation of the research. There was an attrition rate of 13.8% at the final phase. Results of independent t-tests on individual task performance revealed that children who remained in the study ($N = 74$) and children who dropped out of the study ($N = 13$) did not differ significantly at phases I and II. There were also no significant differences between children who remained in the study and children who dropped out of the study with regards to CA, VMA, gender, paternal education level, maternal education level, preschool attendance scheme (part-time and full-time) and number of languages used at phases I and II. These observations indicate that sample attrition was not a major source of bias in this study.

Tables 4.2a and 4.2b describe the demographic characteristics of the two cohorts.[5] The mean numbers of children in the family for the UK and Singapore cohorts for phase III were 1.75 and 1.84 respectively. This indicates that the average family size in both cohorts was somewhat representative of the family size in the UK and Singapore (see Section 4.2).

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[5]  Of the final sample in this study, one child in the UK cohort (2.8%) was from a single-parent family. In the Singapore cohort, two children were from divorced families (5.3%) and two had separated parents (5.3%). All other children were from two parent families.

*Table 4.2a.* Child and Demographic Characteristics[a] of the UK and Singapore Cohorts at Each Time Point

| Characteristic | UK | | | Singapore | | |
|---|---|---|---|---|---|---|
| | Phase I (N = 43) | Phase II (N = 41) | Phase III (N = 36) | Phase I (N = 44) | Phase II (N = 41) | Phase III (N = 38) |
| **Gender** | | | | | | |
| Girls | 23 (53.5%) | 23 (56.1%) | 20 (55.6%) | 17 (38.6%) | 16 (39.0%) | 13 (34.2%) |
| Boys | 20 (46.5%) | 18 (43.9%) | 16 (44.4%) | 27 (61.4%) | 25 (61.0%) | 25 (65.8%) |
| **Birth order** | | | | | | |
| Firstborn | 26 (60.5%) | 24 (58.5%) | 21 (58.3%) | 23 (52.3%) | 23 (56.1%) | 21 (55.3%) |
| Second-born | 12 (27.9%) | 12 (29.3%) | 12 (33.3%) | 14 (31.8%) | 12 (29.3%) | 12 (31.6%) |
| Third-born | 3 (7.0%) | 3 (7.3%) | 2 (5.6%) | 5 (11.4%) | 4 (9.8%) | 3 (7.9%) |
| Fourth-born | 2 (4.7%) | 2 (4.9%) | 1 (2.8%) | 2 (4.5%) | 2 (4.9%) | 2 (5.3%) |
| **Number of siblings[b]** | | | | | | |
| None | 20 (46.5%) | 18 (43.9%) | 12 (33.3%) | 18 (40.9%) | 17 (41.5%) | 15 (39.5%) |
| One | 18 (41.9%) | 18 (43.9%) | 21 (58.3%) | 17 (38.6%) | 16 (39.0%) | 16 (42.1%) |
| Two | 2 (4.7%) | 4 (9.8%) | 2 (5.6%) | 6 (13.6%) | 6 (14.6%) | 5 (13.2%) |
| Three or more | 3 (7.0%) | 1 (2.4%) | 1 (2.8%) | 3 (6.8%) | 2 (4.9%) | 2 (5.3%) |

*Note.* [a]Number of children (Percentages are shown in parentheses). [b]Figures include infant, child, teenage and adult siblings.

As shown in Table 4.2b, the UK cohort included predominantly children of Caucasian background whereas the Singapore cohort comprised of children from diverse ethnic backgrounds, including Chinese, Malay and Indian. The ethnic grouping of the Singapore cohort was also demographically representative of the general population in Singapore (see Section 4.2). Parents reported no case of learning disabilities or developmental disorders. All participants had normal hearing and normal or corrected to normal vision. The two cohorts differed from each other in some respects. While the majority of the mothers in the Singapore cohort engaged in full-time employment, a greater number of mothers in the UK cohort worked part-time. Consequently, the number of preschool hours[6] and number of hours cared for by non-parental caregivers were higher for the Singapore cohort compared to the UK cohort.

## 4.5     Ethical Issues

This research is guided by the British Educational Research Association's (BERA) Revised Ethical Guidelines (2004) and the British Psychological Society (2009) code of ethics and conduct. Enhanced disclosure was obtained from Disclosure Scotland and Certificate of No Criminal Convictions from the Singapore's Police Force before the commencement of the project.

Invitation letters were sent to the nurseries and childcare centres. Parents and preschool staff were provided with information about the study, such as how the data was to be collected, how it was to be used, where the information was to be kept and to whom it would be made available. Informed consent was obtained from the parents. They were informed that all personal particulars would be kept strictly confidential. Copies of the invitation letter and informed consent form can be found in Appendix A. Prior to the study and each data collection session, children were informally asked whether they would like to participate and were free to decline. The children were also free to end a session at any time. Given the relatively short attention span of younger children and to reduce fatigue, the battery of tasks was divided and administered over six to eight sessions, each lasting approximately 15-minutes and spaced one week apart. After each task, the experimenter took an opportunity to check whether the child was becoming tired or distracted. Sessions were ended if the children showed signs of restlessness.

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[6]     The normal operating hours of childcare centres in Singapore are from 7am to 7pm on weekdays and 7am to 2pm on Saturday. In contrast, nurseries in Edinburgh operate from 8am to 6pm on weekdays. Some nurseries provide an extra hour from 6pm to 7pm to suit working parents.

*Table 4.2b.* Demographic Characteristics[a] of the UK and Singapore Cohorts at Each Time Point

| Characteristic | UK | | | Singapore | | |
|---|---|---|---|---|---|---|
| | Phase I (N = 43) | Phase II (N = 41) | Phase III (N = 36) | Phase I (N = 44) | Phase II (N = 41) | Phase III (N = 38) |
| Paternal education[b] | | | | | | |
| M (SD) | 3.71 (.68) | 3.71 (.68) | 3.72 (.70) | 2.11 (1.39) | 2.17 (1.42) | 2.18 (1.45) |
| Maternal education[b] | | | | | | |
| M (SD) | 3.71 (.67) | 3.71 (.67) | 3.67 (.71) | 2.27 (1.43) | 2.24 (1.46) | 2.25 (1.48) |
| Paternal working status | | | | | | |
| Full-time | 41 (95.3%) | 39 (95.1%) | 34 (94.4%) | 42 (95.5%) | 40 (97.6%) | 37 (97.4%) |
| Part-time | 1 (2.3%) | 1 (2.4%) | 1 (2.8%) | - | - | - |
| Unemployed/Retired | 1 (2.3%) | 1 (2.4%) | 1 (2.8%) | 1 (2.3%) | - | - |
| No information available | - | - | - | 1 (2.3%) | 1 (2.4%) | 1 (2.6%) |
| Maternal working status | | | | | | |
| Full-time | 12 (27.9%) | 11 (26.8%) | 10 (27.8%) | 36 (81.8%) | 33 (80.5%) | 33 (86.8%) |
| Part-time | 27 (62.8%) | 26 (63.4%) | 23 (63.9%) | 2 (4.5%) | 2 (4.9%) | 1 (2.6%) |
| Unemployed/Retired | 1 (2.3%) | 1 (2.4%) | - | 3 (6.8%) | 3 (7.3%) | 2 (5.3%) |
| No information available | 3 (7.0%) | 3 (7.3%) | 3 (8.3%) | 3 (6.8%) | 3 (7.3%) | 2 (5.3%) |

*table continues*

Table 4.2b (cont.)

| Characteristic | UK | | | Singapore | | |
|---|---|---|---|---|---|---|
| | Phase I (N = 43) | Phase II (N = 41) | Phase III (N = 36) | Phase I (N = 44) | Phase II (N = 41) | Phase III (N = 38) |
| Ethnicity | | | | | | |
| Asian Chinese | - | - | - | 31 (70.5%) | 29 (70.7%) | 28 (73.7%) |
| Asian Indian | 2 (4.7%) | 2 (4.9%) | 1 (2.8%) | 4 (9.1%) | 4 (9.8%) | 4 (10.5%) |
| Asian Malay | - | - | - | 9 (20.5%) | 8 (19.5%) | 9 (15.8%) |
| White European | 41 (95.3%) | 39 (95.1%) | 35 (97.2%) | - | - | - |
| Number of languages spoken[c] | | | | | | |
| One language | 39 (90.7%) | 37 (90.2%) | 33 (91.7%) | - | - | - |
| Two languages | 4 (9.3%) | 4 (9.8%) | 3 (8.3%) | 34 (77.3%) | 32 (78.0%) | 30 (78.9%) |
| Three languages | - | - | - | 10 (22.7%) | 9 (22.0%) | 8 (21.1%) |
| Number of preschool hours per week | | | | | | |
| M (SD) | 25.51 (9.48) | 26.17 (8.51) | 26.17 (7.45) | 46.64 (12.17) | 47.73 (11.44) | 48.74 (10.47) |
| Range | 9 – 50 | 14 – 50 | 16 – 40 | 15 – 60 | 15 – 60 | 20 – 60 |
| Number of hours cared for by non-parental caregivers per week (excluding preschool) | | | | | | |
| M (SD) | 5.50 (2.59) | 5.50 (2.59) | 5.89 (2.42) | 30.13 (18.07) | 28.92 (17.92) | 28.92 (17.92) |
| Range | 2 – 9 | 2 – 9 | 2 – 9 | 4 – 70 | 4 – 70 | 4 – 70 |

*Note.* [a] Number of children (Percentages are shown in parentheses). [b] Parental educational level was scored according to the following scheme: 0 = No formal qualification; 1 = O'Levels/GCSE or equivalent; 2 = A-Levels/Highers education; 3 = College qualification or equivalent; 4 = University degree or higher. It is noted that for some children in both cohorts, no information was available for parental education level across phases. [c] Based on number of children who spoke official languages (English, Chinese (Mandarin), Malay and Tamil) in Singapore.

## 4.6    Baseline and Follow-up Measures

A parental questionnaire was distributed in phase I. Three measures were administered at baseline in phase I and repeated at follow-up in phase III:

### 4.6.1    Parental questionnaire

The parents completed a general questionnaire about their child's health, exposure to second language and their family demographics (see Appendix B). Parental educational level, working status, family size, family structure, preschool attendance scheme, day-to-day care-giving and number of languages spoken were identified as social variables that might influence naïve psychology development (Research Question 4). Other demographic variables such as parental occupation were not included due to the wide variation in definitions and classification schemes. Children's medical history information (e.g. prematurely born, major illness) might be related to growth in other areas which in turn have a long-term effect on acquisition of naïve psychology concepts.

### 4.6.2    Receptive vocabulary

Children's receptive language ability was assessed using the British Picture Vocabulary Scale (BPVS; Dunn et al., 1997) in order to ascertain their VMA and to ensure that their language was in line with their CA.[7] Previous studies have reported that children's language ability, assessed using receptive vocabulary, was a significant predictor of naïve psychology development (see Chapter 2, Section 2.4.2).

### 4.6.3    The Test of Pretend Play

The Test of Pretend Play (ToPP; Lewis & Boucher, 1997b) was administered in a non-verbal version in phase I because the children were below 3 years of age and a verbal version in phase III. The ToPP is a norm-referenced standardised play assessment of three types of symbolic play: (1) substitution of one object for another object or person; (2) attribution of an imagined property to an object or person; and (3) reference to an absent object, person or substance (Lewis & Boucher, 1997a). ToPP is considered an appropriate measure of competence and maturity of pretend play. To assess children's pretend transformation skills, ToPP scores will be compared with naturalistic pretend play behaviour (see Chapter 9).

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[7]    The English taught in Singaporean schools more closely resembles UK than American-English. Hence, the BPVS is considered more appropriate than the PPVT-R for the Singapore cohort.

### 4.6.4 Inhibitory control tasks

Some studies have shown performance differences in naïve psychology tasks between bilingual and monolingual children (e.g. Goetz, 2003; Kovács, 2009). The superior performance in bilingual children has been attributed to a more advanced level of executive function operation (Goetz, 2003), particularly in inhibition control (e.g. Bialystok & Senman, 2004). A verbal inhibitory control conflict task adapted from Hughes and Ensor (2005) and a non-verbal version were therefore administered to examine whether the bilingual children's advantage in naïve psychology (if any) was related to their ability to inhibit or suppress attention to competing cues.

### 4.6.5 Baseline and follow-up measurement procedures

The BPVS and ToPP were administered according to their instruction manuals. The procedures for the two inhibitory control tasks are described below.

*(a) Baby Stroop task[8] (Hughes & Ensor, 2005)*

Warm-up trial

This Stroop-like task required children to verbally label an object with the name of another object. There were two trials: spoon and cup trials. During the warm-up session, the children were shown a big 'mummy spoon' and a little 'baby spoon'. To ensure that they could differentiate these, they were asked to point to and label the mummy spoon and then the baby spoon. The procedures were repeated until they understood the instructions. Then, the experimenter said, "Now we are going to play a higgledy-piggledy game. We're going to swap the two spoons around. So now Mummy is going to use the baby spoon and baby can use the mummy spoon." The experimenter provided feedback during the practice trial. The rules were repeated until the children understood them, "If I show you this spoon, what do you say? Okay, let's do it again."

Experimental trials

After that, the experimenter hid both spoons behind her back and brought one forward saying, "In this higgledy-piggledy game, is this a mummy spoon or a baby spoon? You tell me." A total of six trials were presented in a 'pseudo-random' order: mummy / baby / mummy / baby / baby / mummy. Half of the sample was given the cup trials followed by

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[8]  Other inhibitory control tasks such as the Stroop-like colour or word (e.g. day-night test; Gersttadt, Hong, & Diamond, 1994) were considered too complex for the majority of children who were unable to label colours or match (mismatch) words with pictures in the initial phase of this study.

the spoon trials comprising of six trials each. The remaining children were shown the spoon trials followed by the cup trials.

Materials

| Phase | Materials |
|-------|-----------|
| I | Cups and spoons in baby and regular sizes |
| III | Different cups and spoons in baby and regular sizes |

*Note.* The same procedures were repeated using different types of cups and spoons in phase III.

Coding and scoring

Children received a point for each correct trial. The score ranged from 0 to 12.

*(b) Cartoon Stroop task[9]*

Warm-up trial

There were two trials for this Stroop-like task that required a non-verbal response. Each trial comprised two task stimuli (e.g. Mickey Mouse - Donald Duck). During the training session, the experimenter showed the children pictures of Mickey Mouse and Donald Duck and confirmed that the children could identify them. If the children could not identify the characters' names, they were told that one of them was a mouse and the other was a duck. The experimenter demonstrated how to use the finger pointer. The children were instructed to use this to point to one character when the experimenter said the name of the other character, "When I say Mickey Mouse, you must point to Donald Duck". If the children responded correctly, the experimenter praised them, and proceeded on to the second character, "When I say Donald Duck, which picture should you point to? Yes, that's right. You must point to Mickey Mouse." Two practice trials followed. If the children responded correctly in both trials, the experimenter praised the children and proceeded to the test trials, using the same materials. If the children responded incorrectly or did not respond at all on either of these trials, they were reminded of the rules and the warm-up procedures were repeated. The second episode followed the same warm-up procedures and eight test trials.

Experimental trials

Each child received eight test trials per pair of characters, presented in a pseudo-random order: Mickey Mouse (MM), Donald duck (DD), DD, MM, DD, MM, MM, DD and

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[9]   Luria's hand game (Luria, Pribram, & Homskaya, 1964), a nonverbal task, was dropped in phase I because the 2-year-old children in the current sample had difficulty coordinating their fingers and following instructions.

Pooh Bear (PB), Piglet (P), P, PB, P, PB, PB, P. If the children hesitated, the experimenter prompted by saying, "Which of them should you point to?"

Materials

| Phase | Materials |
|-------|-----------|
| I | Episode 1:<br>Drawings of a mouse (Mickey Mouse) and a duck (Donald Duck) mounted on stiff cardboard placed flat on the table<br><br>Episode 2:<br>Bear (Pooh Bear) and pig (Piglet) soft toys put in an upright position on the table |
| III | Episode 1:<br>Drawings of tiger (Tigger) and donkey (Eeyore) mounted on stiff cardboard placed flat on the table<br><br>Episode 2:<br>Fish (Nemo) and turtle (Squirt) soft toys put in an upright position on the table |

Coding and scoring

Children received a point for each correct trial. The score ranged from 0 to 16.

### 4.7    The Battery of Naïve Psychology Tasks

The experimental tasks (see Figure 4 and Table 4.3) were selected to track the development of four main aspects of children's naïve psychology concepts. The pretence understanding tasks were chosen based on Leslie's (1987; see Chapter 3, Section 3.3.5) three key components of pretence understanding and three of Lillard's (2002a; as reviewed in Chapter 1, Section 1.2.1) six defining features of pretence understanding. These tasks, as will be discussed, tapped children's developing pretence understanding from rudimentary to complex levels. Children's conceptual understanding of desires and beliefs was examined because belief-desire reasoning is considered to be the causal explanatory framework of naïve psychology (Wellman, 1990). The concurrent development of children's mastery of level-2 visual perspective-taking, appearance-reality distinction and false-belief understanding reflects children's representational conception of the mind (Flavell, 1993) and merits careful attention. Level-1 visual perspective-taking was included to outline children's changing understanding of visual perception. Importantly, there is sparse cross-cultural evidence of children's developing understanding of this diverse range of naïve psychology concepts between 2½ and 3½ years of age (as discussed in Chapters 1 and 2). The selection of tasks of different cognitive levels within some of these naïve psychology concepts,

replicated across the three phases offered a clear picture of the developmental patterns and consistency in children's conceptual understanding of different naïve psychology concepts. The administration of more sophisticated naïve psychology tasks (e.g. level-2 visual perspective-taking) at an early time point extends the methodological scope of many Western longitudinal studies.

Table 4.3. Schedule of Naïve Psychology Tasks

| Measurements at phase I | Measurements at phase II | Measurements at phase III |
|---|---|---|
| Task 1: Action prediction *(Wellman & Woolley, 1990)* (Non-verbal measure) *Time*[a]*: 5 minutes* | —— | —— |
| Task 2: Emotion prediction *(Wellman & Woolley, 1990)* (Non-verbal measure) *(5 minutes)* | —— | —— |
| Task 3: Representational change *(Taylor & Flavell, 1984)* (Non-verbal measure) *(5 minutes)* | —— | —— |
| Task 4: Object substitution *(Harris & Kavanaugh, 1993)* (Non-verbal measure) *(5 minutes)* | Task 1: Object substitution | —— |
| Task 5: Attribution of pretend properties *(Harris & Kavanaugh, 1993)* (Non-verbal measure) *(5 minutes)* | Task 2: Attribution of pretend properties | —— |
| Task 6: Pretend transformation *(Harris et al., 1994)* (Verbal & non-verbal measures) *(5 minutes)* | Task 3: Pretend transformation | Task 1: Pretend transformation |
| Task 7: Discrepant desires *(Repacholi & Gopnik, 1997)* (Non-verbal measure) *(5 minutes)* | Task 4: Discrepant desires | Task 2: Discrepant desires |
| Task 8: Level-1 visual perspective-taking *(Flavell et al.,1981)* (Verbal measure) *(3 minutes)* | Task 5: Level-1 visual perspective-taking | Task 3: Level-1 visual perspective-taking |
| Task 9: Level-2 visual perspective-taking *(Flavell et al.,1981)* (Verbal measure) *(3 minutes)* | Task 6: Level-2 visual perspective-taking | Task 4: Level-2 visual perspective-taking |

*table continues*

Table 4.3 *(cont.)*

| Measurements at phase I | Measurements at phase II | Measurements at phase III |
|---|---|---|
| Task 10: Appearance-reality distinction *(Flavell et al., 1983a; Flavell et al., 1986)* (Verbal measure) *(5 minutes)* | Task 7: Appearance-reality distinction | Task 5: Appearance-reality distinction |
| ——— | Task 8: Mental representation in pretence *(Davis et al, 2002)* (Verbal measure) *(5 minutes)* | Task 6: Mental representation in pretence |
| —— | Task 9: Pretend-reality distinction *(Sharon & Woolley, 2004)* (Non-verbal measure) *(5 minutes)* | Task 7: Pretend-reality distinction |
| —— | Task 10: Unexpected transfer false-belief prediction 'Sally-Anne' *(Baron-Cohen et al., 1985)* (Verbal measure) *(5 minutes)* | Task 8: Unexpected transfer false-belief prediction 'Sally-Anne' |
| ——— | Task 11: Unexpected transfer false-belief explanation *(Wimmer & Mayringer, 1998)* (Verbal measure) *(5 minutes)* | Task 9: Unexpected transfer false-belief explanation |
| ——— | Task 12: Unexpected content false-belief 'plasters'[10] *(Williams & Happé, 2009)* (Verbal measure) *(5 minutes)* | Task 10 Unexpected content false-belief 'plasters' |
| ——— | ——— | Task 11: Imaginary-reality distinction *(Woolley & Wellman, 1993)* (Verbal measure) *(5 minutes)* |

*Note.* [a] All administration times are approximate.

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[10] The unexpected content false-belief 'plasters' (band-aid) task was included because it did not involve a narrative and was considered less demanding than the unexpected transfer false-belief 'Sally-Anne' task. However, the task was dropped from the analysis because the children seemed to find it difficult and the results were difficult to interpret. There has been no published study of the 'plasters' task being tested cross-culturally.

Existing established batteries of tasks (e.g. Slaughter, Dennis, & Pritchard, 2002; Wellman et al., 2006; Wellman & Liu, 2004) were not adopted because some of the tasks were too complex for the young age of the sample at the beginning of the present study. This study employed age-appropriate tasks that would be likely to produce neither floor nor ceiling effects in each phase. The number of trials of some of the standard tasks used in the current study was decreased to reduce task demands. Warm-up trials were also conducted to familiarise the children with the tasks and to increase chances of them being able to follow task demands. Some of the tasks administered at phase I did not require verbal responses to ease task demands for the younger children.

The administration of specific tasks in each phase was selected on the basis of the developmental changes which might be expected during the age range of the study. For example, the standard unexpected false-belief task was not included in the first phase because Clements and Perner (1994) reported that none of the children they tested below the age of 2 years 11 months provided correct false-belief prediction (see also Wellman et al., 2001). Children's task performance during phase I was taken into consideration when deciding whether to retain or drop any of the tasks in subsequent phases. For instance, some of the tasks were dropped in phase II because the majority of children were very successful in these tasks during phase I.

Each task was presented using a variety of dolls, puppets and drawings. To ensure cultural relevance, religious sensitivity, familiarity and age-appropriateness, all materials employed were first piloted with different groups of children in both cultures at each phase. The procedures remained the same for each task across phases. Photographs and drawings of the materials employed for each task are shown in Appendix C. The names of the characters were carefully chosen to ensure that they did not duplicate the names of the participants, their classmates or siblings and were common in both cultures.

### 4.7.1 Naïve psychology task procedures

The procedures for the battery of experimental tasks are described according to the order administered from phase I to phase III (see Table 4.3).

*(a)*     *Action prediction (Wellman & Woolley, 1990)*

This task has previously been administered to children of similar age range to the current study and measured children's ability to predict another person's action based on that person's desires. It involved three trials in which children were asked to make a judgement about the actions of puppet characters who were seeking objects to take to a final destination.

In the Finds-Wanted situation, the puppet wanted something (a cat) that might be in one of two locations and the puppet searched and found it. In the Finds-Nothing situation, the puppet searched for a skateboard but found nothing. In the Finds-Substitution situation, the puppet searched for a horse, but found an appealing object (a cat) that was not what the puppet wanted. The puppet's reason for wanting to find the objects was explained to the children. For each trial story the children were told that the puppet had searched the first location and then asked to indicate whether the puppet would look in the second hiding location or go to the final destination.

Materials

Each story was enacted by the experimenter using puppets and a storyboard depicting three locations. The scripts are described below:

Acton stories

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Finds-wanted story

This is Jennifer. She wants to find her kitten to take the kitten to the school to show her friends because that's what she really wants to do. Her kitten might be in the house or it might be in the garden. Therefore, she is looking for her kitten to take it to school. Look, she is looking for her kitten in the garden. Watch, she finds her kitten.

Finds-nothing story

This is Bart. He wants to find his skateboard to play his skateboard in the park because that's what he really wants to do. His skateboard might be in the living room or it might be in the playroom. Therefore, he is looking for his skateboard to take it to the park. Look, he is looking for his skateboard in the living room. Watch, he doesn't find his skateboard.

Finds-substitute story

This is Bernard. He wants to find his horse to take his horse to the pond because that's what he really wants to do. His horse might be in the green barn or it might be in the red barn. Therefore, he is looking for his horse to take it to the pond. Look, he is looking for his horse in the red barn. Watch, he finds a kitten.

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Test question

"What will [character] do next, will [character] look in the [second hiding location] or will [character] go to the [final destination][11]?"

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[11]  Words in [ ] indicates substituted words for different trials, stories or phases and underlined words refer to counterbalanced alternatives.

*Coding and scoring*

Children received a score of 1 for either pointing or naming the correct location in each trial. The scores ranged from 0 to 3.

*(b)       Emotion prediction[12] (Wellman & Woolley, 1990)*

This task tapped children's understanding of others' emotions. There were three trials in which children were asked to make judgements about the emotional reactions of puppet characters in three types of situation similar to those described in the action prediction task. For example, in the Finds-nothing situation, the puppet did not find the desired object and so should feel sad. Children were asked to state the feelings of the puppets either verbally or point to the cut-outs of a happy or a sad face.

Materials

Each story was enacted by the experimenter using puppets, a storyboard depicting two locations and cut-out emotional faces. The scripts are as follows:

Emotion stories

Finds-wanted story

This is Peter. He wants to find his gingerbread cookie. His gingerbread cookie might be in the kitchen cabinet or it might be in the fridge. Therefore, he is looking for his gingerbread cookie. Look, he is looking for his gingerbread cookie in the fridge. Watch, he finds his gingerbread cookie.

Finds-nothing story

This is Mary. She wants to find her lamb. Her lamb might be in the barn or it might be on the hill. Therefore, she is looking for her lamb. Look, she is looking for her lamb on the hill. Watch, she doesn't find her lamb.

Finds-substitute story

This is Susan. She wants to find her teddy bear. Her teddy bear might be under the bed, or it might be in her school bag. Therefore, she is looking for her teddy bear. Look, she is looking for her teddy bear in her school bag. Watch, she finds a gingerbread cookie.

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[12]   The scoring for the action and emotion prediction tasks followed Wellman and Woolley (1990) procedures. However, both tasks were dropped in subsequent phases as it emerged that there was more than one answer for the Finds-substitute story. For example, the characters might feel happy or sad when they found an appealing object that was not what they wanted.

Test question

"Does [character] feel <u>happy</u> or does [character] feel <u>sad</u>?"

Coding and scoring

Children received a score of 1 for either pointing or naming the correct emotion for each situation. The scores ranged from 0 to 3.

(c)       *Representational change[13] (Taylor & Flavell, 1984)*

This task examined children's ability to report the discrepancies between apparent and real properties of object when placed behind coloured filters to disguise the object's true colour. It consisted of two trials. In the first trial, children were shown a yellow lemon that appeared green behind a green filter. In the second trial, they were shown a white toy dog that appeared red behind a red filter.

Test questions

**Representational Change**: What colour did you think the [name of stimulus] was before we uncovered it?

Forced-choice: "<u>true colour</u> or <u>colour when held behind filter</u>?"

**Reality:** "What is the colour of the [name of stimulus]?

Forced-choice: "Is it really <u>true colour</u> or <u>colour when held behind filter</u>"

**False-beliefs:** [Friend's name] hasn't seen this. What colour will he/she think the [name of stimulus] is before he/she uncovers it?

Forced-choice: "<u>true colour</u> or <u>colour when held behind filter</u>?"

Materials

| Phase | Warm-up trial | Experimental trial |
|-------|---------------|--------------------|
| I | Colour cards, replica pear, red filter | Replica lemon, white toy dog, green and red filters, picture colour cards |

*Note.* The colour cards were used to test whether the children could recognise the colours in the warm-up trial. In the experimental trials, the children were asked to select the apparent and real colours of the stimulus from three colour cards depicting the real, apparent and an unrelated colour of the object. A third colour option was included to reduce the possibility that the children might have used a matching strategy to simply select the remaining colour because they have already chosen the other option.

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[13] The representational change task was dropped in subsequent phases due to the difficulties in finding suitable materials.

Coding and scoring

If children passed the reality question they could be awarded points for correct answers to the representational change question (1 point per trial: total score 0 to 2) and the false-belief question (1 point per trial: total score 0 to 2). Scores from these two questions were not combined, but analysed separately. Children who failed the control reality question were rated as having failed the task.

*(d)      Object substitution (Harris & Kavanaugh, 1993)*

This task established whether children could follow and comprehend pretend scenarios. Children were also assessed on their ability to substitute one object for another, a key feature of pretence understanding as suggested by Leslie (1987). Children's appreciation of another's intended pretend acts, a feature of Lillard's (2002a) definition of pretence, was assessed in this task and in the attribution of pretend properties task (e).

Warm-up trial

This task consisted of a warm-up trial, followed by four experimental trials. The experimenter placed six yellow cubes to the right of the child and six blue cubes to the left, on the table within easy reach. In the warm-up trial, the experimenter introduced a Little Bee puppet and announced, "Little Bee is hungry. Let's give him some honey." Next, she pretended to feed a yellow cube to Little Bee while holding the block to its mouth and making "yummy" sounds. Then, the experimenter said, "Little Bee wants some more honey. You feed Little Bee some more honey," and passed the child another yellow cube. After the child fed Little Bee, the experimenter presented Mr Froggie and declared, "Mr Froggie is also hungry. He wants some blueberries. Let's give him some blueberries." The experimenter then fed the frog with the blue block and encouraged the child to do the same.

Experimental trials

The experimenter introduced soft toys from the Hundred Acre Wood Gang: Pooh Bear, Tigger, Eeyore and Piglet. Each child was presented with the four cartoon characters. The order of presentation was counterbalanced. Each animal character was positioned in front of the child between the two plates. For each animal character, the experimenter stated, "Here's [Character]. [Character] wants something to eat. [Character] wants some [honey/blueberry]. You give [Character] some [honey/blueberry]." No feedback was given during the experimental trials. After each trial, the character and the cube were removed to one side and the next character was introduced.

Materials

| Phase | Warm-up trial | Experimental trial |
|-------|---------------|--------------------|
| I | bee and frog puppets | Characters: Pooh Bear, Tigger, Eeyore and Piglet<br>Objects: six yellow cubes (honey), six blue cubes (blueberries), one yellow plate, one blue plate and one small plate |
| II | monkey and panda puppets | Characters: Mickey, Minnie, Pluto and Donald<br>Objects: six yellow cubes (bananas), six red cubes (strawberries), one yellow plate, one red plate and one small plate |

Coding and scoring

Children received a score of 1 for each correct trial. The four trials per phase yielded scores ranging from 0 to 4.

*(e)    Attribution of pretend properties (Harris & Kavanaugh, 1993)*

This task assessed children's ability to follow and comprehend a sequence of pretend scenarios and to attribute pretend properties, another key feature of pretence understanding (Leslie, 1987). Like the object substitution task, this task tapped children's rudimentary understanding of pretence. This task comprised two trials. Children were asked to pour imaginary cereal into two bowls. The experimenter then introduced four characters: Pooh Bear, Tigger, Eeyore and Piglet. The key prop was then subjected to a pretend transformation (e.g. Piglet ate all the imaginary cereal in one bowl). The children were then asked to feed Eeyore some cereal. In the second trial, Pooh Bear drank all the imaginary tea in one cup and the children were then asked to feed Tigger some tea. They were scored as correct if they fed Eeyore and Tigger from the bowl and cup which were 'full'.

Materials

| Phase | Experimental trial |
|-------|--------------------|
| I | Characters: Pooh Bear, Tigger, Eeyore and Piglet<br>Objects: two bowls, two cups, four spoons, a teapot and an empty cereal box |
| II | Characters: Mickey, Minnie, Pluto and Donald<br>Objects: two bowls, two cups, four spoons, a teapot and an empty cereal box |

*Note.* Different kinds of bowls, cups, spoons, teapot and cereal box were used in each phase.

Coding and scoring

Children received a score of 1 for each correct trial. The two trials yielded scores ranging from 0 to 2 for each phase.

*(f)      Pretend transformation (Harris et al., 1994, Experiment 3)*

In this task, children's understanding of causal transformations involving a sequence of two linked pretend actions and an object substitution were explored. Children's grasp of the words 'real' and 'pretend' was also examined. The implication is that when children acquire the ability to interpret other people's intended pretence actions and make causal predictions and pretend-reality distinctions in experimental paradigms, they may extend that insight to engage in complex forms of shared pretend play with peers.

Warm-up trial

Children were shown a group of five familiar items (the test items and some distracter items: replica apple, toy tiger, cotton wool, toothpaste box and empty cereal box) to ensure that they could recognise the test object.  The experimenter asked the children to point to each of the named items in turn, "Can you show me the [name of item]?" To ensure that the children could differentiate between 'wet' and 'dry', they were shown and asked to identify a wet cloth and a dry one.

Experimental trials

In Episode 1, the experimenter introduced the characters, Pooh Bear and Piglet. The experimenter said, "Listen to what Pooh Bear says. He says: "Piglet, can you give me some ice-cream? Piglet is looking for ice-cream. There he's giving Pooh Bear some ice-cream." The experimenter enacted the story by making Piglet pick up the cotton wool and put it in a basket near Pooh Bear (first pretend action). "Now, Pooh Bear comes to eat the ice-cream." Pooh Bear was brought close to the basket. "Look what Piglet does!" Piglet pushed Pooh Bear onto the cotton wool (second pretend action). In Episode 2, the experimenter introduced the characters, "This is penguin and donkey." The story followed a similar format as in Episode 1, except that in this episode, the penguin wanted to drink milk (really cotton wool).

Test questions

The children were asked five questions after each episode:

Question 1: "Oh dear!  What is the [character] sitting on?"

Question 2: "So now the [character's] feet are all …?"

Question 3: "Are the [character's] feet wet or dry?"

Question 4: Experimenter pointed to the [cotton wool] and asked, "Is that just (point to cotton wool) [pretend ice-cream] or [real ice-cream]?"

Question 5: Experimenter continued to point to the [cotton wool] and asked, "What is this (point to cotton wool) really?"

Materials

| Phase | Warm-up trial | Experimental trial |
|-------|---------------|--------------------|
| I | Replica apple, toy tiger, cotton wool, toothpaste box, empty cereal box, two cloths and a plate | Pooh and Piglet hand puppets, penguin and donkey toys, cotton wool and a basket |
| II | Replica orange, toy lion, white colour play dough, different brand of toothpaste and cereal boxes, two sponges and a plate | Eeyore and Tigger hand puppets and monkey & squirrel toys, white colour play dough and a basket |
| III | Replica pear, toy elephant, white tissue, different brand of toothpaste and cereal boxes, two flannels and a plate | Mickey Mouse and Donald Duck hand puppets, giraffe and leopard toys, white tissue and a basket |

*Note.* Materials chosen across the three phases were from similar categories. The white cotton wool, play dough and tissue represented the pretend identities. Different brands/materials were used at each phase, but served the same purpose. In the experimental trials, the pairs of characters were selected from the same cartoon series and beanie baby collection.

Coding and scoring

Question 1: Children received a score of 1 for answering in terms of the pretend identity of the prop rather than its literal identity.

Question 2: Children received a score of 1 for describing pretend consequences. Accepted responses for Episode 1 included dirty, cold, wet, soggy, covered in ice-cream, got ice-cream on or ice-cream. Accepted descriptions for Episode 2 included dirty, wet, milky, covered with milk, in the milk or milk.

Question 3: Children received a score of 1 for making a correct forced-choice judgement based on the outcome of each episode.

Question 4: Children received a score of 1 for making the correct judgement that the prop was pretend.

Question 5: Children received a score of 1 for identifying the prop's real identity.

Total scores therefore ranged from 0 to 10 over the two episodes.

*(g)      Discrepant desires (Repacholi & Gopnik, 1997)*

This task examined children's appreciation that desire is an important determinant of a person's action and another person's desire might differ from one's own. As noted in Chapter 2, there are reasons to predict differences in children's understanding of desires across cultures. In this task, children were presented with two illustrated story trials in which boy and girl puppets' favourite foods were relatively unappetising raw vegetables (celery and broccoli). Each vegetable was presented alongside an appetising food (biscuit and chocolate). The experimenter enacted the role of the puppet looking at the appetising food and making a facial expression of disgust while saying a long "Eeew, I don't like to eat biscuit". Then, she smiled and expressed pleasure with a long, "Mmmm, yummy, I like to eat celery" in reference to the raw vegetables. The children were asked to differentiate which of the two foods to give to the puppet. Memory and control questions were asked to ensure that the children were not simply reporting their own desires.

Test questions

**Other's desire:** "Which food/snack do you think [character] would want to eat, [celery] or [chocolate]?"

**Memory:** "Can you remember what [character's] favourite food/snack is?"

**Control:** "Which is your favourite food/snack, [celery] or [chocolate]?"

**Control:** "Which one would you want to eat, [celery] or [chocolate]?"

Materials

| Phase | Appetising food | | Unappetising food | | Characters |
|---|---|---|---|---|---|
| I | chocolate | biscuit | celery | broccoli | a pair of boy and girl puppets |
| II | lollipop | cake | cabbage | spinach | different pair of boy and girl puppets |
| III | jelly | crisps | green beans | lettuce | different pair of boy and girl puppets |

*Note*. The snacks and vegetables are common food to children in both cultures. The pair of boy-girl puppets was included to reduce gender bias.

Coding and scoring

Children received a score of 1 if their offer corresponded to the puppet's preference and if they answered all memory and control questions correctly. The scores ranged from 0

to 2. In order to reflect children's true understanding of discrepant desires in the present longitudinal repeated-measures design study, children who failed the memory question were considered as having failed the task, due to not understanding it. In contrast, children who did not report a preference that was in conflict with that of the puppet in response to the control questions, may simply have preferred the vegetables and reported their own desires. These children were considered as missing data because it would be inappropriate to rate them as having failed the task. The effect of including and excluding these children are further discussed in the results chapters.

*(h)      Level-1 visual perspective-taking (Flavell et al., 1981; Masangkay et al., 1974)*

This task measured children's understanding of whether they and another person could or could not see something based upon whether one's line of sight was obstructed by a barrier. Children's perceptual knowledge of the only view in front of them develops earlier than their awareness that others would have different view when looking from another position (Salatas & Flavell, 1976). In this task, the child and the experimenter sat on opposite sides of a table for both trials. Children were shown drawings of a bear (Pooh Bear) and a dog (Scooby-Doo) on either side of a poster stand. They were asked to indicate which drawing they and the experimenter could see (trial 1). The child and the experimenter then changed seats so that they could see the other drawing. Children were then asked to report their new perception and the initial state (trial 2). Following Gopnik and Slaughter's (1991) procedures, the third and fourth questions in the level-1 and level-2 tasks assessed children's understanding of changes in perceptions by asking them to report their previous perceptions. If the children failed to answer any of the questions immediately, they were presented with a force-choice set of alternatives.

Test questions

**Own perception:** "What picture do you see?"

**Other's perception**: "What picture do I (experimenter) see?"

**Own perception (after changing seats)**: "Now what picture do you see?"

**Initial state:** "When I first asked you, before we changed seats, what picture did you see?"

Materials

| Phase | Coloured drawing |
|-------|------------------|
| I | Dog and bear |
| II | Cat and elephant |
| III | Rabbit and giraffe |

*Note.* The pair comprised one domestic and one wild animal in each phase.

Coding and scoring

Children received a score of 1 for correctly answering both their own perception and other's perception questions and another point for giving correct responses to both the post-transformation perception and initial state questions. Scores for this task therefore ranged from 0 to 2.

*(i)      Level-2 visual perspective-taking (Flavell et al., 1981; Masangkay et al., 1974)*

In contrast to the level-1 task, level-2 visual perspective-taking requires more sophisticated cognitive abilities because children must visualise another person's viewpoint in order to appreciate that the same object may appear differently when viewed from another position. Documenting early development of both components of perspective-taking reveals how children solve visual perception tasks by making inferences about another person's perspectives and reconciling this with their own (Yaniv & Shatz, 1990).

Warm-up trial

The child and the experimenter were seated opposite each other at a table. Children were shown a drawing of a dinosaur standing on its feet, oriented to the children's perspective. The experimenter asked the children to point to the dinosaur's back and feet. Then, the experimenter said, "When you look at the dinosaur right now, does it look like it is standing on its feet? Is he standing up? That's right. He's standing up." The experimenter then rotated the drawing and said, "When you look at the dinosaur right now, does it look like it is lying on his back? Is he lying down? That's right. He's lying down." The same procedures were repeated three times.

Experimental trials

Children were initially shown a two-dimensional drawing of a tortoise and asked to identify how it looked from their perspective and from the experimenter's viewpoint. The

children and the experimenter then changed seats so that they could see the tortoise from the opposite viewpoint.

Test questions

**Own perception:** "When you look at the [tortoise] right now, does it look like it is <u>lying down</u> or <u>standing up</u>?"

**Other's perception:** "How do I see the [tortoise], <u>lying down</u> or <u>standing up</u>?"

**Own perception (after changing seats)**: "Now how do you see the [tortoise], <u>lying down</u> or <u>standing up</u>?"

**Initial state:** "When I first asked you, before we changed seats, was the [tortoise] <u>lying down</u> or <u>standing up</u>?"

Materials

The materials included 2-dimensional drawings of the following animals:

| Phase | Warm-up trial | Experimental trial |
|:-----:|:-------------:|:------------------:|
| I | Dinosaur | Tortoise |
| II | Rhinoceros | Sheep |
| III | Tiger | Horse |

*Note.* The animals in the warm-up trials were extinct or endangered animals. Domestic animals were used in the experimental trials.

Coding and scoring

Children received a score of 1 for correctly answering both their own perception and other's perception questions and another point for giving correct responses to both the post-transformation perception and initial state questions. The range of possible scores was 0 to 2.

*(j)*      *Appearance-reality distinction (Flavell et al., 1983a; Flavell et al., 1986)*

Children's knowledge about the differentiation between the appearance and reality of physical objects was studied in this standard task.

Warm-up trial

During the warm-up session, the children were familiarised with the concepts of appearance and reality. The words 'really and truly' were emphasised. They were presented with a candle that looked like an elephant. The experimenter introduced the item in the

following way: "What does this look like to your eyes right now? That's right, it looks like an elephant. But really and truly it's not an elephant. Really and truly, it's a candle. Feel it. It's hard and there is a wick here." The experimenter showed a photograph of an elephant candle which was lit. "Look, this is a photograph of the elephant candle when we light it, just like a birthday candle. This is really and truly a candle but when you look at this with your eyes, it looks like an elephant."

Experimental trials

The children were shown each object in its deceptive form and were asked, "What's this?" If the children responded by saying what the object looked like ('birthday cake' or 'fish'), the experimenter agreed that the object looked like its intended appearance, "That's right, it looks like a ('birthday cake' or 'fish')". If the children did not know what the object looked like, the experimenter said, "Take another closer look. What do you think it looks like?" For each stimulus, the experimenter then revealed the true identity of the object, allowing the children to wear the hat or write with the pen. If the children revealed the true identities of the object, the experimenter stated, "That's right. This is really and truly a ('birthday cake' or 'fish') but when you look at this with your eyes, it looks like something else." The children were then asked a reality, an appearance and a false-belief question. The open-ended question was posed twice before asking the forced-choice questions if the children did not respond. The questions were counterbalanced across the participants.

Test questions
**Appearance:** "When you look at this with your eyes right now, what does this look like?"
Forced-choice alternative: "Does it look like a [birthday cake] or does it look like a [hat]?"
**Reality:** "What is this really?"
Forced-choice alternative: "Is it really a [birthday cake] or a [hat]?"
**False-belief**: "I am going to ask [Friend's name] to play this game. He/She hasn't touched this. What will he/she think it is before he/she touches it?"
Forced-choice alternative: "He/She will think it is a [birthday cake] or a [hat]?"

Materials

| Phase | Warm-up trial | | Experimental trial | |
|---|---|---|---|---|
| | Object | Appearance | Object | Appearance |
| I | Candle | Elephant | Hat | Birthday cake |
| | | | Pen | Fish |
| II | Pencil case | Cat | Magnets | Chocolates |
| | | | Money box | Tortoise |
| III | Children's knife | Crocodile | Mirror | Chocolate bar |
| | | | Handbag | Rabbit |

*Note.* Animal-like objects were used in the warm-up trials. Food-like and animal-like objects were chosen for the experimental trials.

Coding and scoring

Children received a score of 1 for correctly answering both appearance and reality questions. The range of possible scores for appearance-reality distinction over the two trials was 0 to 2. Children received 1 point in each trial for correct responses to both the false-belief and reality questions. The range of possible scores for false-belief over the two trials was 0 to 2.

(k)     *Mental representation in pretence[14] (adapted from Davis et al., 2002, Study 2)*

This task examined children's understanding of mental representations involved in pretence. That is a defining feature of Lillard's (2002a) conception of pretence understanding. In this task, thought bubbles were used to denote what each character was thinking about. Previous work has demonstrated that 3 and 4-year-old children understand that a person's thoughts could be portrayed in thought bubbles (Wellman, Hollander, & Schult, 1996). A thought bubble warm-up session was conducted to ensure that children understood the use of thought bubbles. To determine whether children understood that a person, who was engaged in pretence, might be thinking about something, they were presented with both a pretending and a thinking task.

Thought bubble training

Following Wellman et al. (1996), children were presented with a drawing of a character with an empty bubble over her head. Children were asked to name various parts of the drawing such as the character's face, clothing and shoes. Next, the experimenter pointed

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[14]   Lillard's (1993b; 1996; 1998b) Moe the Troll task was not selected due to task demands and the methodological issues discussed in Chapter 1 (Section 1.2.1).

to the thought bubble and asked, "What is this?" Children were told that the thought bubble depicted what the character was thinking about, "This thought bubble shows what Judy is thinking about." Then, the experimenter showed another drawing, which contained a cake in the thought bubble, and asked the children, "What is Judy thinking about?" If an incorrect response was provided, the training trial was repeated.

Warm-up trial

In the warm-up session, the experimenter read the story about a character named Chloe, who was at the zoo looking at a tiger. Children were asked what Chloe was thinking about and whether she was standing close to the tiger or the lion. The correct answer was that she was standing near one animal but thinking of another animal. Children were given correct feedback if they responded incorrectly.

Pretending trial

Children were presented with an illustrated story in which the character was performing an action, which was typical of two animals. Children were told which animal the character was thinking about. The character was standing closer to a second animal than to a first animal but their thought bubble portrayed only the first animal. Three memory questions and a test question were asked. The test question asked what the character was pretending to be. The position of the thought bubbles and vertical placement of the second animal were counterbalanced between the children (see Appendix C). Children were allowed to point to the animals in the drawing. No feedback or explanation was provided.

Thinking trial

In the thinking trial, children were told which animal the character was thinking about rather than what the character was pretending to be. The task format was similar to the pretending trial except that one memory control question asked what the character was pretending to be and the test question asked what the character was thinking about. The right-left positions of the animals in the drawings were counterbalanced between the children (see Appendix C).

Materials

A storybook format was used in both warm-up and experimental trials (see Appendix C). Following Davis et al. (2002), the stories were presented in a particular context

(e.g. the zoo) to construct a more natural and realistic account of the character's actions with different types of animals. The full scripts of the stories are given below.

Phase II story script and questions for warm-up session and pretending and thinking trials

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Warm-up trial

Page 1:   Here is Chloe. She's at the zoo looking at the lion.
Page 2:   Now, Chloe walks over to the tiger cage. But, you know what, she is not thinking about the tiger at all, she is still thinking about the lion.

Questions
(1)   What is Chloe thinking about, the lion or tiger?
(2)   Whose cage is she standing close to, the lion or tiger?

Pretending trial

[Child's name], I am going to tell you some stories about people who are pretending. Now, listen carefully, because I am going to ask you some questions about what they are *pretending* to be.

Page 1:   Here is Brandon. He is at the zoo watching a kangaroo.  (The drawing shows Brandon with a kangaroo.)
Page 2:   The animal show is about to start, so Brandon walks over to the rabbit.  (The drawing shows Brandon with a rabbit.)
Page 3:   Brandon is pretending, so he is hopping up and down, kind of like a kangaroo and a rabbit like to hop about. But, you know what, Brandon is not thinking about the rabbit at all, he is still thinking about that kangaroo. (The drawing shows Brandon with both types of animals.)

Memory questions
(1)   Who is Brandon thinking about, the rabbit or kangaroo?
(2)   Who is Brandon standing close to, the rabbit or kangaroo?
(3)   Now, what is Brandon doing?

Test question
(4)   What is Brandon pretending to be, is he pretending to be a rabbit or a kangaroo?

Thinking trial

[Child's name], I am going to tell you some more stories about people who are pretending. Now, listen carefully, because I'm going to ask you some questions about what they are *thinking* about.

Page 1:   Here is Daphne. She is at the underwater world watching a dolphin. (The drawing shows Daphne with a dolphin.)
Page 2:   The seal show is about to start, so Daphne walks over to the seal. (The drawing portrays Daphne with a seal.)
Page 3:   Daphne is pretending, so she is flapping her hands together, kind of like a dolphin and a seal like to flap their flippers. But, you know what, Daphne is not pretending to be the seal at all; she is pretending to be that dolphin. (The drawing shows Daphne with both animals.)

Memory questions
(1)   Who is Daphne pretending to be, a dolphin or a seal?
(2)   Who is Daphne standing close to, the dolphin or seal?
(3)   Now, what is Daphne doing?

Test question
(4)   Remember, this thought bubble is supposed to show what Daphne is thinking. So, which animal is Daphne thinking about; is she thinking about the dolphin or seal?

---

Phase III story script and questions for warm-up session and pretending and thinking trials

Warm-up trial

Here is William. He is at the bird park looking at the parrot.
Now, William walks over to the eagle cage. But, you know what, he is not thinking about the eagle at all, he is still thinking about the parrot.

Questions
(1) What is William thinking about, the <u>parrot</u> or <u>eagle</u>?
(2) Whose cage is he standing close to, the <u>parrot</u> or <u>eagle</u>?

Pretending trial

[Child's name], I am going to tell you some stories about people who are pretending. Now, listen carefully, because I am going to ask you some questions about what they are *pretending* to be.

Page 1:    Here is Ivy. She is at the bird park watching a penguin. (The drawing shows Ivy with a penguin.)
Page 2:    The animal show is about to start, so Ivy walks over to the duck. (The drawing shows Ivy with a duck.)
Page 3:    Ivy is pretending, so she is waddling to and fro, kind of like a penguin and a duck like to waddle about. But, you know what, Ivy is not thinking about the duck at all, she is still thinking about that penguin. (The drawing shows Ivy with both types of animals.)

Memory questions
(1) Who is Ivy thinking about, the <u>duck</u> or <u>penguin</u>?
(2) Who is Ivy standing close to, the <u>duck</u> or <u>penguin</u>?
(3) Now, what is Ivy doing?

Test question
(4) What is Ivy pretending to be, is she pretending to be a <u>duck</u> or a <u>penguin</u>?

Thinking trial

[Child's name], I am going to tell you some more stories about people who are pretending. Now, listen carefully, because I'm going to ask you some questions about what they are *thinking* about.

Page 1:    Here is Scott. He is at the zoo looking at a worm. (The drawing shows Scott with a worm.)
Page 2:    The snake show is about to start, so Scott walks over to the snake. (The drawing portrays Scott with a snake.)
Page 3:    Scott is pretending, so he is wriggling his body to and fro, kind of like a worm and a snake like to wriggle their bodies. But, you know what, Scott is not pretending to be the snake at all; he is pretending to be that worm. (The drawing shows Scott with both animals.)

Memory questions
(1) Who is Scott pretending to be, a <u>worm</u> or a <u>snake</u>?
(2) Who is Scott standing close to, the <u>worm</u> or <u>snake</u>?
(3) Now, what is Scott doing?

Test question
(4) Remember, this thought bubble is supposed to show what Scott is thinking. So, which animal is Scott thinking about; is he thinking about the <u>worm</u> or <u>snake</u>?

Coding and scoring

The passing criterion for each story trial was set at correctly answering the test and the first and second memory check questions. Following Davis et al. (2002), the third memory check question was not coded because of its wide range of answers. The possible score range was 0 to 2 over the two trials.

*(l)        Pretend-reality distinction (adapted from Sharon & Woolley, 2004)*

Children's awareness of the difference between what is represented and what is reality, as assessed by this task, is an important feature of pretence understanding (Lillard, 2002a). Children were asked to sort 12 coloured line drawings of real and fantasy entities onto 'Real', 'Pretend' and 'Don't Know' plates. Three plates of different colours were placed in front of the children. The experimenter explained that "This blue plate is for real objects, this pink plate is for pretend objects. This yellow plate is for ones which you're not sure about, or you don't know. You give me the cards which you are not sure about and I will place them in this yellow plate." The placement of the two plates for the real and pretend objects was counterbalanced. Unlike Sharon and Woolley (2004), the 'Don't Know' plate was not placed in between the other two plates but at a distance away in order to reduce task demands.

Warm-up trial

The experimenter showed the child a picture of a real polar bear and said, "This is a polar bear. He is white. He is a real bear. We put him on the real plate." The experimenter placed the picture card on the blue plate and continued, "This is Winnie the Pooh. He is yellow. He is a toy and not a real bear. We put him on the pretend plate." The experimenter placed the card on the pink plate. The training set was then removed and placed beside the plates.

Experimental trials

After that, the children were shown individual drawings of entities presented in a fixed random order. They were asked, "What is this?" They were then given a brief description of the picture and asked, "Where does this one go?"

Materials (Coloured line drawings)

| | Astronomical object | Fantasy character | Real animal | Pretend character | Real person/ object | Pretend person/ object |
|---|---|---|---|---|---|---|
| Phase II | | | | | | |
| Warm-up trial | | Winnie the Pooh | Polar bear | | | |
| Experimental trial | Sun | Dragon | Bird | Garfield | Soldier | Doll |
| | Stars | Elf | Rabbit | Kung Fu Panda | Bananas | Thomas the train |
| Phase III | | | | | | |
| Warm-up trial | | Eeyore | Donkey | | | |
| Experimental trial | Clouds | Tinker Bell | Cat | Tweety Bird | Baby | Toy soldier |
| | Moon | Monster | Panda | Thumper | Train | Dancing bananas |

*Note.* The entities were classified into various categories (objects, characters, animals and people). The corresponding item in each pair (e.g. bird and Tweety Bird, panda and Kung Fu Panda) was used in different phases.

Brief descriptions of the objects, characters, animals and people:

(1) Sun: This is a picture of the sun. You see it in the day.

(2) Dragon: This is a picture of a dragon. He breathes fire.

(3) Bird: This is a picture of a bird. She has a beak.

(4) Garfield: This is a picture of Garfield. He is an orange cat.

(5) Soldier: This is a picture of a soldier. He wears a uniform.

(6) Doll: This is a picture of a doll. She has brown hair.

(7) Stars: This is a picture of stars. They twinkle at night.

(8) Elf: This is a picture of an elf. He is very little.

(9) Rabbit: This is a picture of a rabbit. He has long ears.

(10) Kung Fu Panda: This is a picture of Kung Fu Panda. He is very big.

(11) Bananas: This is a picture of bananas. They are yellow fruit.

(12) Thomas the Train: This is a picture of Thomas. He is a train.

(13) Clouds: This is a picture of clouds. They move in the sky.

(14) Tinker Bell: This is a picture of Tinker Bell. She is a fairy.

(15) Cat: This is a picture of a cat. She meows.

(16) Tweety Bird: This is a picture of Tweety Bird. He has yellow feathers.

(17) Baby: This is a picture of a baby. He is crawling on the mat.

(18)    Toy soldier: This is a picture of a soldier. He has a red hat.

(19)    Moon: This is a picture of a moon. You see it at night.

(20)    Monster: This is a picture of a monster. He is blue.

(21)    Panda: This is a picture of a panda. She is black and white.

(22)    Thumper: This is a picture of Thumper. He thumps his feet.

(23)    Train: This is a picture of a train. He runs on the track.

(24)    Dancing Bananas: This is a picture of bananas. They can dance.


The inclusion of the word 'picture' explained the drawings as representations of the real-world items. Each short description did not distinguish whether the item was a living or a non-living thing.


Coding and scoring

Children received a point for each correct categorisation, with scores for each phase ranging from 0 to 12.


*(m)    Unexpected transfer false-belief prediction (Baron-Cohen et al., 1985)*

This task assessed children's ability to comprehend that others may have beliefs different from their own, that other's beliefs may be false and that others' actions are determined by their beliefs. The 'Sally-Anne' task was used as this is considered less demanding than the 'Maxi' task which has a longer story plot (see Chapter 1, Section 1.2.4). In addition, children's understanding of true-belief ascription, false-belief justification and knowledge-ignorance attribution was examined.


Warm-up trial

The scenario was enacted using two doll characters identified as Sally and Anne. A memory check was conducted to ensure that the children knew which doll was which (Naming Question).


Experimental trial

The experimenter told the child: "Sally first puts a marble into her basket. Then, she leaves the room to play in the garden. While she is away, Anne moves the marble from the box to her basket. Anne leaves the room to go to school. Now, Sally comes back." The experimenter then asked the child the test questions.

Test questions

**False-belief:** "Where will [Sally] look for the [marble] first?"

Forced-choice alternative: "In the [basket] or in the [box]?"

**Justification:** "Why will [Sally] look there?"

**Reality:** "Where is the [marble] now?"

Forced-choice alternative: "In the [basket] or in the [box]?"

**Memory:** "Before [Sally] left the house, where did she place the [marble]?"

Forced-choice alternative: "In the [basket] or in the [box]?"

**Ignorance:** "Did [Sally] know that [Anne] moved the [marble]?"

**Seeing**: "Did [Sally] see [Anne] moved the [marble]?"

**True-belief:** "When [Sally] left the house, where did she think her [marble] was?"

Forced-choice alternative: "In the [basket] or in the [box]?"

The false-belief question included the 'look…first' manipulation to reduce the likelihood that children would interpret the question as asking where the character would eventually have to look for the object. Furthermore, this study attempted to replicate prior Western evidence which showed that the temporal prompt would aid children younger than 4 years of age to pass the standard false-belief task (e.g. Siegal & Beattie, 1991). Following Naito and Koyama (2006), the presentation order of the justification question differed depending on whether the children gave a correct or an incorrect false-belief response. For incorrect responses, the children were asked the justification question followed by the reality, memory, ignorance, seeing and true-belief questions. For correct responses, the reality control question was asked first. After confirming children's correct answers to the reality questions (i.e., "yes, actually the relocated item is in another location"), the experimenter asked the justification question, which was followed by the memory, ignorance, seeing and true-belief questions. The presentation order facilitated children's correct reasoning, especially about the main character's ignorance about the transfer of the item.

Materials

| Phase | Characters | Other props |
|-------|-----------|-------------|
| II | 2 girl puppets | a basket, a box, a marble and a living room backdrop |
| III | 2 boy puppets | a bag, a chest box, a ball and a different living room backdrop |

*Note.* Different props were used in each phase.

Coding and scoring

Children received a score of 1 if they passed the false-belief question by either pointing to or verbally indicating the location where the puppet first put the marble and answered both the reality and the memory questions correctly. Children who failed the reality or memory question were rated as having failed the task. The impact on the findings of including and excluding these children in the analysis is further discussed in the results chapters. Children received a score of 1 for answering both ignorance and seeing questions correctly. They received another point for correct response to the true-belief question. Scores for false-belief prediction, knowledge-ignorance attribution, true-belief ascription and false-belief justification questions were analysed separately (see Chapters 6 and 7).

Children received a point for justifying that the puppet had looked in the initial location because she did not know that the object had been moved. The responses to the justification question were coded into six categories based on previous studies (e.g. Clements & Perner, 1994; Clements, Rustin, & McCallum, 2000; Naito & Koyama, 2006; Wimmer & Mayringer, 1998). The categories for correct justification included: (1) epistemic-states (e.g. "Because Sally thinks the marble is in the basket") and (2) earlier location (e.g. "Because Sally put the marble in here"). Incorrect responses to the justification question included: (3) irrelevant ("Because flower girl goes home") or no explanation (e.g. "I don't know"); (4) current location (e.g. "Because the marble is in the box") or actual state of affairs (e.g. "Because nothing in the basket"); (5) desires/goal (e.g. "Because she wants to find the marble"); and (6) behaviour of second character (e.g. Because Anne moved the marble").

*(n)      Unexpected transfer false-belief explanation (Wimmer & Mayringer, 1998)*

In contrast to the previous task which requires children to *predict and justify* the action of someone on the basis of a false-belief, this task requires children to *explain* the action of someone who has a false-belief. True-belief ascription and knowledge-ignorance attribution questions were included to determine the consistency in performance between the two tasks.

Experimental trial

The experimenter told the child: "Mummy places her baby in the cot, covers it with a blanket and leaves the room. Daddy comes in, moves the baby from the cot to the buggy and covers it with a blanket. Daddy leaves the room. Mummy comes back to the room. Mummy looks for the baby in the cot." The experimenter then asked the child the test questions.

Test questions

The questions were presented in the following fixed order:

**Reality:** "Where is the [baby] really?"

Forced-choice alternative: "In the [cot] or in the [buggy]?"

**Explanation to false-belief:** "Why do you think [Mummy] is looking for the [baby] in the [cot]?" If the child did not respond, a prompt was provided: "What does [Mummy] think?"

**Memory:** "Before [Mummy] left the room, where did she place the [baby]?"

Forced-choice alternative: "In the [cot] or in the [buggy]?"

**Ignorance:** "Did [Mummy] know that [Daddy] moved the [baby]?"

**Seeing:** "Did [Mummy] see [Daddy] moved the [baby]?"

**True-Belief:** "When [Mummy] left the room, where did she think the [baby] was?"

Forced-choice alternative: "In the [cot] or in the [buggy]?"

Materials

| Phase | Characters | Other Props |
|-------|------------|-------------|
| II | Mummy, daddy and baby puppets | a cot and buggy |
| III | Boy and girl puppets and a teddy bear | a bed and pram |

*Note.* Family-related themes (mummy-daddy and brother-sister) were employed in each phase. A teddy bear replaced the baby puppet in phase III.

Coding and scoring

The scoring categories were similar to the prediction task. Children received a score of 1 if they passed the false-belief explanation question and answered both the reality and memory questions correctly. Children who failed either the reality or memory questions were rated as having failed the task. The impact on the findings of including and excluding these children in the analysis is further discussed in the results chapters. Children received a score of 1 for answering both ignorance and seeing questions correctly. They received another point for correct response to the true-belief question. Scores for each question were analysed separately (see Chapters 6 and 7).

Inter-rater reliability

Ten percent of the children's justifications for the false-belief prediction task and explanations for the false-belief explanation task were independently coded into the six

categories by a second coder who was unaware of the purpose of the study. The inter-rater agreement was 88.90% and Cohen's kappa was .87 ($p < .001$).

*(o)      Imaginary-reality distinction (Woolley & Wellman, 1993, Study 2)*

In contrast to the pretend-reality distinction task that assessed children's ability to distinguish between pretend and real entities, this task investigated whether the act of really imagining something had an effect on children's propensity to assert that imagination reflects reality. Imaginary object pretence is the third and final component of Leslie's (1987) concept of pretence understanding. As in Harris et al. (1991, Experiments 3 & 4), children were asked to look into an empty box and then imagine that it contained something.

Warm-up trial

To ensure that children were familiar with the terms used in the task and to give them some immediate practice in using their imagination, children were asked whether they know what it meant to imagine something in the imagination warm-up trial. Regardless of their answer, they were provided with a short description of imagination, using a variety of synonyms for the words 'imagine' ("It means you make up something in your head. You just close your eyes and make a picture of it in your head."). Then, the children were asked to try to imagine a lollipop, "Close your eyes and … make a picture of a lollipop in your head." Children were encouraged to talk about their images. They were asked to say what flavour of lollipop they had imagined.

In the knowledge warm-up trial, to ensure that the children were familiar with the question format, the experimenter alternated giving the children and a dolly, a toy aeroplane, and asked the children, in each situation, whether the dolly had the toy and whether they themselves had the toy. The format of this question was the same as the one used in the knowledge trial, except that it asked about having rather than knowing.

Experimental trials

Children were presented with two imagination trials (hypothetical imagination and actual imagination) and one knowledge trial for each object in the order indicated below. There were two objects for the imagination trials and two for the knowledge trials. The knowledge trials were designed both to compare knowing and imagining as well as a control to investigate whether younger children would typically claim that their mental images represent reality. Identical test questions were asked in all six trials. In all trials, the word in italics (see below) were emphasised (in a different tone) to highlight that the imagination

game had ended and the questions were asking about the real conditions. No feedback or explanation was given.

Test questions

Hypothetical imagination trial

Children were given a box and asked to look inside. After they had discovered that the box was empty, they were asked two imagination and a reality questions. The objects were a ball and a pencil in both the hypothetical and actual imagination trials.

(1) "Can you imagine that there's a [object] inside the box?"
(2) "Can I (experimenter) imagine that there's a [object] inside the box?"
(3) "Is there *really* a [object] in here?"

Actual imagination trial

Children were told to imagine that there was an object inside and asked if they had done so. "Let's try to imagine that there's a [object] inside the box. Close your eyes and make a picture in your head of a [object] inside the box. Is there *really* a [object] in here?"

Knowledge trial

Children were shown a bag with an object inside. The bag was then closed and the children were asked whether they knew the object in question and another unrelated object were really inside the bag. The objects were a key and a crayon. The unrelated objects were a spoon and a cup.

(1) "Do you know that there is something in here?"
(2) "Do I (experimenter) know that there's a [object] in here?"
(3) "Is there *really* a [object] in here?"
(4) "Is there *really* a [unrelated object] in here?

Materials

| Phase | Warm-up trial | Experimental trial |
|-------|---------------|--------------------|
| III | Doll and a toy aeroplane | 2 boxes, 2 bags, a key, a crayon |

*Note.* Emotionally charged contents could have explained the poor performances in Harris et al. (1991). Therefore, following Woolley and Wellman (1993), typical emotionally neutral contents (key and crayon) were used.

Coding and scoring

All answers were recorded as 'yes' or 'no'. For the hypothetical imagination trials, children received a score of 1 if they answered that they and the experimenter could imagine there was an [object] inside the box and that there was really nothing in the box. For the

actual imagination trials, children received a score of 1 if they answered that there was really nothing in the box. For the knowledge trials, children received a score of 1 if they replied that they and the experimenter possessed knowledge that there was something inside the bag and answered the two reality questions correctly. The range of possible scores was 0 to 6.

## 4.8    The Free Play Observations

Traditionally, observational methods used in studying children's play have been carried out in the laboratories (e.g. Charman et al., 2000; Jenkins & Astington, 2000; Slade, 1987). Although laboratory observational studies have greater flexibility in term of control over the variables under study and exclude extraneous variables, children may act differently in the laboratory from the way they behave in a more natural environment. The gap between the findings from naturalistic and laboratory studies often reveals different levels of ability (Hirschfeld, 1996). 'True' naturalistic behaviours observed outside the laboratory, especially in different cultural contexts, may indicate disparity from the theoretical framework. Additionally, naturalistic data will strengthen the results obtained from the experimental tasks and paint a more comprehensive picture of children's naïve psychology development between different cultures.

A non-participatory, semi-structured naturalistic method, without interaction with the participants, was employed as a more ecologically valid way to study children's naturally occurring play behaviour in this research. To control for variations in the availability of toys and play materials between cultures and childcare settings, children were observed playing with a familiar partner on a picnic mat with a basket containing standard set of replica toys (high-specificity) and open-ended (low-specificity) materials. Although there were constraints placed on children's choice of play materials and partner, this method provided a standardised micro-environment to track changes over time and compare development between diverse cultural contexts.

### 4.8.1    Free play observation procedures

The evidence documenting the emergence of gender-typed behaviour before two years of age and preferences for same-gender peer play has important implications for the design of the free play observations (reviewed in Chapter 3, Section 3.5.1). The majority of the children were paired into same-gender dyads matched for age in order to reduce gender bias and to control for between-dyad differences (for two dyads it was not possible to match the children with a partner of the same gender in phase I due to their preference to play with their close friends). The age difference between the target children and their playmates was

within 3 months. Following a 5-minute warm-up period, each child participating in the project was observed for 10 minutes. The observations were conducted in quiet corners of the preschools. The teachers were asked to go about their normal routine as far as possible. They were asked not to initiate interactions but to respond to the children as they normally would if approached. The children were then brought to the picnic mat. They were shown the toy basket and asked to play and stay on the picnic mat. The researcher then moved to a corner of the mat and sat on a chair beside the video camera recording the children's behaviour. During the play session, the researcher occupied herself with some paperwork. She remained as unobtrusive as possible and responded only if a child made a request (e.g. toilet breaks). When such interruptions within a session were necessary, the children were brought back to the picnic mat for completion of the session. At the end of the observation session, the two children were told it was time to tidy up, "It's time to put the toys back into the basket."

*Materials*

Picnic mat, notice indicating that only two players were allowed on the mat and a storage basket which contained the following toys, props and materials:

| **Frankie the Turtle's Treasure Basket** |
|---|
| Two teddy bears, two toy saws, six finger puppets (elephant, frog, duck, lion, bear and giraffe), two pairs of boy and girl wooden dolls, two cars with figures, two bags, two pairs of gloves, four hats (two boys' hats and two girls' hats), six bowls, six cups, two spoons, four measuring cups, one jug, two dish cleaners, two funnels, six blocks, two stacking rings (yellow and green), two pieces of padded blue cloth, two pieces of black cloth, two pieces of white cloth, one piece of net material and two pieces of long thin material (orange and blue). |

*Note.* The majority of the materials were in pairs to encourage cooperation and social interaction between children. Care was taken to ensure that gender, culture and race were considered when selecting the toys and props. Safety was also an important concern. As children mature, they are less dependent on similar objects in their pretend play. To cater for this developmental change in pretend play, both low-specificity materials (e.g. padded blue cloth) and high-specificity toys (e.g. teddy bears) were used. Photographs of the toys, props and materials used are shown in Appendix D.

*Instructions to the children*

"Wow, look at that. This is Frankie the Turtle's Treasure Basket. Do you want to look at what's inside there? You can play with any of these toys but both of you must stay on this mat. I need to do some work. Remember to keep the toys on the mat." The children were reminded of the instructions, "Remember what you've to do?"

If the children wanted to move away from the mat, the researcher said, "We've not finished just yet. Could you please stay on the mat until we have finished?" However, if the children showed clear signs of wishing to end the session, then the filming was discontinued, and children were asked on another occasion if they wanted to play on the mat.

*Pretend play behaviour coding*

Due to the wealth of data collected (222 video recordings of free play sessions across the three phases of study), analysis of full sessions for all participants was outwith the scope of this thesis. Therefore, play coding was conducted for the first 5 minutes following the 5-minute warm-up period. As reviewed in Chapters 2 and 3, children's CA, gender and language ability are related to pretend play behaviour. Hence, a subsample of 26 children from each culture, matched by gender (13 boys and 13 girls), CA and VMA, were selected to examine the role of pretend play behaviour in children's naïve psychology development (see Chapter 9). Only children who participated in all three phases of the study and played with same-gender partners in all observations were included in the analyses (see Chapter 9).

'Pretend play behaviour' in this thesis is defined according to Garvey's (1991) description (see Chapter 3, Section 3.2). To distinguish pretend play behaviour from functional play behaviour, one of the following behaviours must be present: (1) object substitution (e.g. pretending the stacking ring is a donut), (2) attribution of pretend properties (e.g. making "brrrmm" sound when moving the toy car), (3) verbal metacommunication (e.g. "I'm a policeman"), and (4) a range of behavioural cues to convey that children's non-literal actions are 'just pretend' (e.g. eating imaginary cereal). Five categories of pretend play behaviour, which were derived from the literature (Gosso et al., 2007; Howes, 1980, 1985; Howes et al., 1989; Howes & Matheson, 1992; McLoyd et al., 1984; Miller & Garvey, 1984; Youngblade & Dunn, 1995) and from preliminary observations of children's play, were coded continuously off video-recordings of the play sessions using The Observer XT 9 (Noldus Information Technology, 2009). Different pretend play behaviours were identified under each category. The pretend play behaviours within each category were mutually exclusive and independent of each other. For example, when the child is engaged in cooperative pretend play, the other behaviours (e.g. solitary and parallel pretend play) within the same category cannot be active. As discussed in Chapter 3, the five categories of pretend play behaviour would capture not only developmental changes but also cultural similarities and differences in social interaction styles. A detailed description and discussion of the specific procedural steps used to differentiate between different pretend play behaviour can be found in Appendix D.

*Pretend play behaviour standardised coding schemes*

(1)      Peer play scale: uninvolved in play, non-pretend play (solitary, parallel, simple social and cooperative), non-social pretend play (solitary and parallel), and social pretend play (simple, cooperative and complex) *(adapted from Fein, 1981; Howes, 1980, 1985; Howes et al., 1989; Howes & Matheson, 1992)*

(2)      Types of social bids: neutral, recruitment, positive imitative, positive complementary, and negative conflict *(adapted from Howes, 1985)*

(3)      Pretend play themes: no theme, family-related activities, daily activities, adult occupations, violence/aggression, animals, transportation, fantasy/adventure, music, construction play with pretend themes, and outings/holidays/parties/special events/weather *(adapted from Dunn & Dale, 1984; Gosso et al., 2007; Youngblade & Dunn 1995)*

(4)      Types of pretend role-play: no pretend play, other forms of pretence, role-enactment, role-play,[15] and metacommunication *(adapted from Halliday-Scher et al., 1995; Hughes & Dunn 1997)*

(5)      Modes of transformation: no transformation, property transformation, identity transformation, condition transformation, and creation transformation *(adapted from Gosso et al., 2007)*

Coding schemes 1, 2, 3 and 4 were coded for duration of occurrence and coding scheme 5 was coded for frequency. All standardised coding schemes resulted in continuous data. Metacommunication is considered as a category of pretend play behaviour under 'types of pretend role-play' in this thesis because children temporarily step out of their role-play and role-enactment to discuss the nature and content of the pretend play activities (e.g. 'Arm bands! I am going swimming').

*Intra-rater reliability of free play coding*

After coding the 158 five-minute play observations of 52 children in the matched-pairs design for the three phases, re-coding was conducted. Intra-rater reliabilities were obtained based on a randomly chosen event data of approximately 20% of the total children in the matched-pairs design across the three time points. In each phase, the five categories of pretend play behaviour of 5 boys and 5 girls from each cohort were re-coded. The second

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[15]    In the present study, Youngblade and Dunn's (1995) definitions of "role-enactment" and "role-play" were adopted. Jenkin and Astington's (2000) definition of "role assignment" was similar to Youngblade and Dunn's "role-play". However, Nielsen and Dissanayake (2000) defined "role-play" differently.

sets of coding were then compared to the originals. Intra-rater reliability was examined using the Reliability Analysis module in The Observer XT 9 (Noldus Information Technology, 2009). The results showed 15 kappa values (five categories of pretend play behaviour in each phase for both cohorts) ranging from .86 to .95 across the three time points.

## 4.9    General Procedure

Children were tested individually in quiet corners of the nurseries and childcare centres. The same experimenter conducted the testing across all sessions in English. All sessions were video-taped for later coding. The BPVS and ToPP were conducted during the first and the second to last session respectively in phases I and III. All other tasks were administered in randomised order. Free play observations were carried out during the final session in each phase. The order of all forced-choice alternatives was counterbalanced. The only feedback given during the test trials was non-specific praise. Children were offered stickers after each session as a thank you for participating.

## 4.10    Analysis Plan

This chapter has set out the methodological approach taken to the research reported in this thesis. The extent to which developmental changes in children's naïve psychology differs between the UK and Singapore cohorts was explored with a three-phase 21-month longitudinal study at approximately 2½, 3, and 3½ years of age. Children's developing understandings of pretence, desires, visual perceptions, and beliefs were examined using the experimental tasks. Semi-structured free play observations were conducted to identify cultural similarities and variations in pretend play behaviour and to examine the relationship between pretend play behaviour and naïve psychology concept development.

The methodology of this study is grounded by the five research questions stated in Chapter 1 (Section 1.1). The statistical analyses were selected according to the aims of the five results chapters. PASW Statistics version 17.0 (PASW Statistics, 2009) was used in all statistical analyses. Chapter 5 provides a comparative assessment of 2½-year-old children's understandings of different naïve psychology concepts at the baseline phase of the study (Research Question 1). As reviewed in Chapter 1, there is a developmental progression from non-representational to representational understanding of naïve psychology concepts from the age of 18 months to 4 years. Therefore, the tasks were grouped and analysed in these two domains of naïve psychology concepts. Chapter 6 presents a longitudinal cross-cultural comparison of developmental changes across different aspects of naïve psychology at 2½, 3, and 3½ years of age (Research Question 2). Furthermore, Chapter 6 explores the

relationships between pretence understanding and other naïve psychology concepts. Both Chapters 5 and 6 also explore task performance sequences and the coherence of naïve psychology concepts because little is currently known about this cross-culturally. Chapter 7 focuses specifically on children's understanding of beliefs in-depth by evaluating developmental onset of knowledge-ignorance attribution, true-belief ascription, false-belief prediction, false-belief justification and false-belief explanation at 3 and 3½ years of age (Research Question 3). The remaining two results chapters explore whether the development of children's naïve psychology is embedded within the social contexts. Chapter 8 investigates the degree to which variability in individual and social variables may affect individual differences in naïve psychology development (Research Question 4). Finally, Chapter 9 provides a cross-cultural perspective on the development of pretend play behaviour and how it is associated with naïve psychology development (Research Question 5).

# CHAPTER 5[16]

# NAÏVE PSYCHOLOGY AMONG TWO-YEAR-OLD CHILDREN:
# A CROSS-CULTURAL COMPARISON

## 5.1 Introduction

This chapter presents the results of the standardised naïve psychology tasks in phase I of the study. This chapter addresses Research Question 1 by examining the extent to which understanding of various naïve psychology concepts differs among 2½-year-old children from the UK and Singapore. The findings reported in this chapter will also form the baseline for further analysis of developmental changes in children's naïve psychology over the three phases (see Chapter 6). This chapter begins with a brief summary of the reviewed literature. Subsequently, the results of children's performance on the naïve psychology tasks are presented. The chapter concludes with a discussion of how culture shapes similarities and differences in 2½-year-old children's early understanding of mind.

As discussed in Chapter 1, a number of studies conducted in the West provide evidence that children possess a fairly rudimentary understanding of non-representational naïve psychology by two years of age. Around the age of 4 years, children develop a more sophisticated conceptual understanding of mind. Two-year-old children are capable of understanding a number of mental-states including pretence (e.g. Nielsen & Dissanayake, 2004), discrepant desires (e.g. Repacholi & Gopnik, 1997), action and emotion prediction (e.g. Wellman & Woolley, 1990) and level-1 visual perspective-taking (e.g. Flavell et al., 1981). In contrast, the Western literature has demonstrated that children younger than 4 years of age exhibit difficulty in appreciating that people can interpret a single object differently (level-2 visual perspective-taking; e.g. Flavell et al., 1981), that an object may look like one thing but in reality be something else (appearance-reality distinction; e.g. Flavell et al., 1983a), and that another person's mental representation may differ from reality (false-belief; e.g. Wimmer & Perner, 1983). Non-Western studies are limited to comparing children's abilities to understand false-belief and distinguish appearance-reality from 3 years of age (see Chapter 2, Section 2.3). There has been no published cross-cultural research that comparatively examines children's understanding of various naïve psychology concepts from 2 years of age. Moreover, relatively few Western studies have tracked children's developing understanding of sophisticated mental-states from an early age. As illustrated in

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[16] The results in this chapter have been published in the Journal of Cognition and Culture in co-authorship with my supervisors (see article in Appendix F).

Figure 5.1, cross-cultural similarities and differences in naïve psychology concepts at 2½ years of age were examined (**brown** arrows), with verbal mental age (VMA) as a covariate (**green** arrow). Specific individual characteristics, social variables and naïve psychology concepts that are the focus of analysis within each results chapter are depicted in **green** colour in the model.
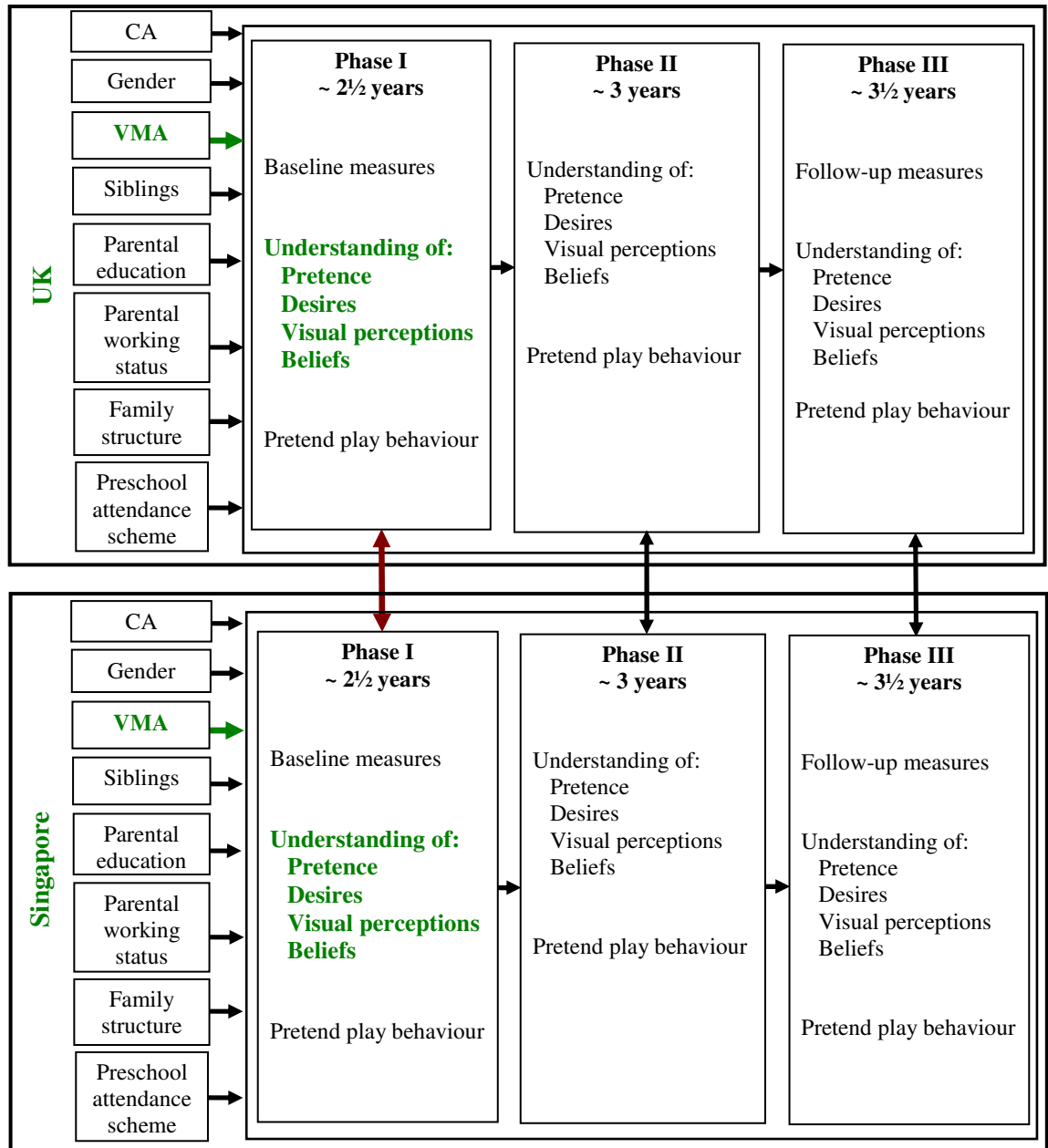


*Note.* CA = chronological age, VMA = verbal mental age.

The **brown** arrows indicate the cross-cultural similarities and differences which will be explored.

*Figure 5.1.* A cross-cultural comparison of young children's naïve psychology development at 2½ years of age.

Based on the theoretical view that acquisition of naïve psychology concepts shows a gradual and continuous change from non-representational to representational understanding, children's task performance was grouped and analysed into these two conceptual domains. This categorisation permits an exploration of whether non-Western children's understanding of naïve psychology concepts are non-representational at 2½ years of age as proposed by theorists and supported by Western results (see review in Chapter 1).

Wellman and Liu (2004) devised a developmental scale to assess the age of onset of children's understanding of diverse desires, diverse belief, knowledge access, false-belief and real-apparent emotion. Their results revealed that 3, 4, and 5-year-old preschoolers in the U.S. displayed an order of task difficulty, with understanding diverse desires developing earliest, followed by diverse beliefs, knowledge access, unexpected content false-belief, and real-apparent emotion acquired last. In a subsequent study of preschoolers of similar age groups in China, Wellman et al. (2006) reported an almost identical developmental sequence except that knowledge access developed earlier than understanding diverse belief for the Chinese children. Wellman et al. (2006) explained that different cultural emphases on knowledge and belief might have contributed to the subtle differences. There is great importance placed on acquiring knowledge at an early age in Eastern cultures. In contrast, Western culture emphasises belief and diverse belief. The second issue addressed in this chapter is the degree to which the performance sequences of rudimentary and sophisticated naïve psychology tasks at 2½ years of age differ between the two cultures.

A third issue considered in this chapter is the extent to which naïve psychology concepts are acquired in an interconnected coherent structure in different cultural contexts. Theory theorists propose that young children's naïve psychology concepts are coherently interrelated (Gopnik, 2003; Gopink & Meltzoff, 1997; Gopnik & Wellman, 1992, 1994). A great deal of research has found correlations among false-belief, appearance-reality distinction, representational change and visual perspective-taking task performance (e.g. Flavell et al., 1986; Gopnik & Astington, 1988; Taylor & Carlson, 1997; see Chapter 1, section 1.3). Further support for this view comes from a training study which demonstrated that two groups of 3-year-old children who did not pass a pre-test false-belief task and were trained on either the concept of belief or on the related concepts of desire and perception both showed improvement in a post-test false-belief task (Slaughter & Gopnik, 1996, Study 1). In addition, the training experiences produced a transfer effect to other naïve psychology tasks, including those that tap children's understanding of appearance-reality distinction, degree of certainty of different mental-state terms and understanding of sources of knowledge (Slaughter & Gopnik, 1996, Study 2). Relatively few studies have investigated

whether children from non-Western cultures display similar coherence patterns in conceptual development compared to Western norms.

In sum, there has been little cross-cultural work on 2½-year-old children's naïve psychology. A cross-cultural developmental study of naïve psychology should examine similarities and differences in children's understanding of pretence, discrepant desires, action and emotion prediction, visual perspective-taking, representational change and appearance-reality distinction from this early age. Moreover, there has also been no published cross-cultural research that explores the performance sequence of these naïve psychology concepts at 2½ years of age. The view that children's grasp of naïve psychology concepts are interconnected also requires replication in different cultures before drawing a general conclusion about the proposition that children's naïve psychology forms a coherent set of domain-specific concepts.

## 5.2    Research Questions

Based on the reviewed theoretical concepts, existing empirical evidence and gaps in the literature, this chapter sets out to explore Research Question 1 (stated in Chapter 1) and two subsidiary research questions:

1. **Are there differences between the UK and Singapore cohorts in naïve psychology concepts at 2½ years of age?**
   a. **Are there differences between the UK and Singapore cohorts in the performance sequences on various naïve psychology tasks at 2½ years of age?**
   b. **Are naïve psychology concepts coherent among children in the UK and Singapore?**

## 5.3    Results

Before the analysis relating to each of the research questions is presented, preliminary analysis of the cross-sectional data is carried out.

### 5.3.1    Control questions and missing value analysis

In longitudinal research such as this, particular attention must be paid to the treatment of data from children who fail memory or control questions. The number of children who failed the memory and control questions for the phase I discrepant desire task is shown in Table 5.1. In this study, no child made more than one error on the memory or control questions in this task. To avoid loss of data, previous longitudinal research has

included children who failed the control questions in the analysis (e.g. Hughes & Dunn, 1997; Hughes & Dunn, 1998). As explained in Chapter 4 (Section 4.7.1), children were assessed on the same battery of tasks across phases. To truly reflect the developmental changes in children's ability to understand and pass the discrepant desire task across the three time points, children who failed the memory question were rated as having failed the task, as opposed to being regarded as missing data. In subsequent analyses of the three research questions within this chapter all children were therefore included. The analyses were then rerun, excluding children who failed the memory question for the discrepant desire task. There were no differences in the results.

Table 5.1. Number of Children Who Failed the Memory and Control Questions for the Phase I Discrepant Desire Task for the UK ($N = 43$) and Singapore ($N = 44$) Cohorts

| Discrepant desire task | UK | Singapore |
|---|---|---|
| Memory question for puppet's favourite food | 2 | 2 |
| Control question for child's favourite food | 1[a] | 1[b] |
| Control question for child's food preference | 1[a] | 3[b] |

Note. [a] The same child failed both control questions. [b] Among the three children, one of them failed both control questions. However, none of the children failed more than one memory or control question.

The two control questions of the discrepant desire task asked children about their favourite food and food preferences. As discussed in Chapter 4 (Section 4.7.1), children who failed these control questions could have reported their own desires in response to the test question. Hence, these children were classified as missing data.[17]

Since the analysis in this chapter is the first phase of the longitudinal study, missing value analysis was used to impute missing data. For the baseline sample of 87 children, the following data were missing. Representational change, appearance-reality distinction, the false-belief questions in the representational change and appearance-reality distinction tasks and level-2 visual perspective-taking scores were missing for two Singaporean children who were absent due to illness. Four children failed the control questions for the discrepant desire task, as described above. Missing data patterns were examined using the Missing Value

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[17] In the published paper based on cross-sectional data (see article in Appendix F), children who did not report a preference that was in conflict with that of the puppet were dropped from the analysis. In this chapter, these children were treated as missing data and values were imputed for the missing cases to avoid loss of data. There were no differences in the results reported in the paper and this chapter.

Analysis module in PASW Statistics (2009). Little's MCAR test was not significant, ($\chi^2(5) =$ 1.16, $p = .95$), suggesting that the variables in the whole data set exhibited a pattern of values that were missing at random. To minimise the loss of cases in the longitudinal analyses, maximum likelihood estimation (Expectation-Maximisation (EM) algorithm in PASW Missing Value Analysis Module) was used to impute values for the missing data. There were no significant differences between the rest of the data for the missing cases. Imputation strategies provide a more accurate estimation of all parameters compared to listwise deletion, pairwise deletion, mean substitution, and regression substitution (Jeličič, Phelps, & Lerner, 2009; Widaman, 2006). The EM method has been employed in previous longitudinal study of children's false-belief understanding and executive function to replace missing values (Razza & Blair, 2009).

### 5.3.2 Comparable scale

Two trials were administered in most of the naïve psychology tasks, except for the object substitution, pretend transformation, action prediction and emotion prediction tasks. Following Gopnik and Astington's (1988) procedures, to create a comparable scale on all the measures, the object substitution scores were transformed by multiplying each score by ½, the pretend transformation and mental-reality distinction scores by $^1/_5$, the action prediction scores by $^2/_3$ and the emotion prediction scores by $^2/_3$. This resulted in all tasks having a minimum possible score of 0 and a maximum possible score of 2.

### 5.3.3 Descriptive statistics and gender differences

There were no significant differences with regards to phase I CA ($t(85) = 2.33$, $p =$ n.s.), VMA ($t(85) = 2.08$, n.s.) and gender ($\chi^2(1, N = 87) = 1.93$, $p =$ n.s.) between the two cohorts. Since phase I CA was correlated with phase I VMA for the UK ($r(43) = .30$, $p < .05$) and Singapore ($r(44) = .39$, $p < .01$) cohorts, it is necessary to ascertain the relative importance of one variable independently. As longitudinal changes in CA were fixed, this variable was not included as a covariate in all between-group analyses presented in this thesis. By contrast, VMA was treated as a covariate in all between-group analysis in this thesis to ensure that cohort differences were not driven by variations in children's language skills at different time points.[18] Language skills may provide more useful information about

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[18] CA was treated as a covariate in the published paper (see article in Appendix F) because the analyses were based on a cross-sectional stand-alone data set. The paper was submitted while the data collection was in progress. With a completed data set and further analyses, it appeared more appropriate to treat VMA rather than CA as a covariate for the baseline and longitudinal analyses in this thesis (see explanation in Section 5.3.3). As shown in the paper and this chapter, there were no differences in the results reported using either CA or VMA as a covariate for phase I analyses.

whether children's cognitive competence is close to their CA. Although there was an overrepresentation of boys in the Singapore cohort, gender was not significantly related to children's individual task performance in phase I for both cohorts and was therefore excluded from the analyses in this chapter. Table 5.2 presents the breakdown of scores by non-representational and representational tasks for the UK and Singapore cohorts at phase I.

Table 5.2. Mean[a] (Standard Deviation) Scores of Non-representational and Representational Naïve Psychology Measures between the UK ($N = 43$) and Singapore ($N = 44$) Cohorts

| Naïve psychology measure | UK | Singapore |
|---|---|---|
| Non-representational tasks | | |
| (1) Attribution of pretend properties | 1.65 (.65) | 1.80 (.51) |
| (2) Object substitution | 1.55 (.52) | 1.60 (.48) |
| (3) Discrepant desires[b] | 1.26 (.85) | 1.55 (.73) |
| (4) Action prediction | 1.22 (.68) | .92 (.63) |
| (5) Emotion prediction | 1.13 (.68) | 1.27 (.59) |
| (6) Level-1 visual perspective-taking | 1.00 (.76) | .93 (.79) |
| (7) Pretend transformation | .92 (.49) | .94 (.41) |
| | | |
| Representational tasks[19] | | |
| (1) Representational change | .53 (.70) | .59 (.79) |
| (2) False-belief question in representational change task | .44 (.63) | .50 (.79) |
| (3) Appearance-reality distinction | .40 (.62) | .45 (.63) |
| (4) False-belief question in appearance-reality distinction task | .44 (.67) | .39 (.54) |
| (5) Level-2 visual perspective-taking | .26 (.54) | .27 (.62) |

*Note.* [a] Range of scores: 0 to 2. [b] If children who failed the memory or control questions were excluded, the mean (standard deviation) scores would be 1.30 (.82) and 1.62 (.67) for the UK and Singapore cohorts respectively.

### 5.3.4 Research question 1: Are there differences between the UK and Singapore cohorts in naïve psychology concepts at 2½ years of age?

Figure 5.2 illustrates the non-representational task performance. A two-way 2(culture) x 7(task) mixed-model analyses of covariance (ANCOVA), with VMA as covariate, was computed to compare task performance between the two cultures on the non-

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[19] Given that the standard deviations were larger than the means for the representational tasks, it could be that the data were skewed. The representational tasks were considered more sophisticated than the non-representational tasks. Previous studies have found that children passed these tasks at around 4 years of age (reviewed in Chapter 1). Compared to children's task performance at 3 and 3½ years of age in the present study (see Chapter 6, Table 6.2), it was likely that there was more variability in the data at 2½ years of age.

representational tasks.[20] Culture was not significant as a main effect. However, a significant main effect of task ($F(6, 504) = 3.71$, $p = .001$, $\eta_p^2 = .05$)[21] and culture by task interaction ($F(6, 504) = 2.88$, $p < .01$, $\eta_p^2 = .03$) were found. One-way between cultures ANCOVAs, with VMA as a covariate, were conducted for each task. The results indicated that the UK cohort ($M = 1.22$, $SD = .68$) performed significantly better than the Singapore cohort ($M = .92$, $SD = .63$, $F(2, 84) = 5.76$, $p < .05$, $\eta_p^2 = .06$) on the action prediction task. On the other hand, the Singapore cohort ($M = 1.55$, $SD = .73$) scored significantly better than the UK cohort ($M = 1.26$, $SD = .85$, $F(2, 84) = 4.31$, $p < .05$, $\eta_p^2 = .05$) on the discrepant desire task.
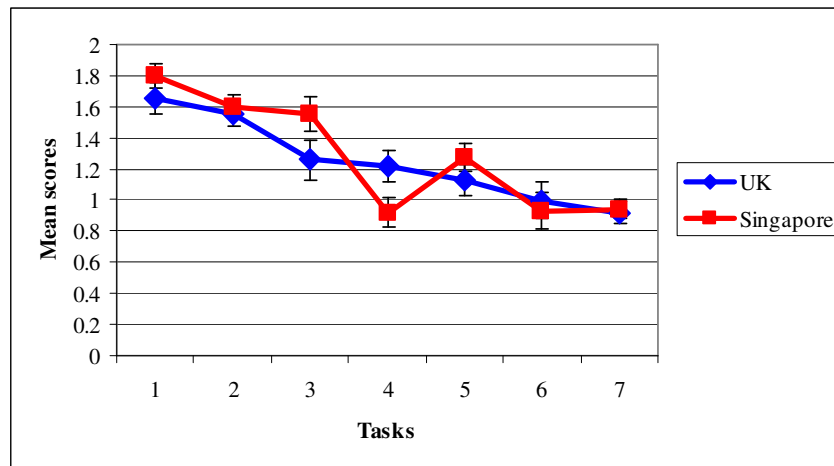


*Note.* 1 = Attribution of pretend properties; 2 = Object substitution; 3 = Discrepant Desires; 4 = Action prediction; 5 = Emotion prediction; 6 = Level-1 visual perspective-taking; and 7 = Pretend transformation.

*Figure 5.2.* Performance on non-representational tasks of the UK ($N = 43$) and Singapore ($N = 44$) cohorts.

The effect of each demographic factor on task performance for each cohort was analysed using separate two-way 1(demographic variable) x 7(task) mixed-model ANCOVAs, with VMA as a covariate. The results indicated that birth order (firstborn, second-born, third-born or fourth-born), number of siblings (none, one, two or three or more),

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[20] It is worthwhile to note that the seven non-representational tasks tapped rudimentary understanding of naïve psychology but assessed different cognitive skills. Previous longitudinal studies have constructed and analysed data based on composite scores for batteries of tasks that assess different conceptual understanding. Hughes and Ensor (2007) created an aggregate score for the penny hiding, pretend, picture-book false-belief, object-transfer false-belief and deceptive-content false-belief tasks. Carlson, Mandell and Williams (2004) employed a composite score for the intentions, discrepant desires, visual perceptions and pretence comprehension tasks.

[21] $\eta_p^2$ refers to partial eta-squared.

ethnic groups (Asian Chinese, Asian Indian, Asian Malay or White European), parents' education (no formal qualification, O'Level/GCSE, A-Levels/Highers, College or University degree or higher) and working status (part-time, full-time or unemployed/retired), number of languages used (monolingual or bilingual) and preschool attendance scheme (part-time or full-time) showed no effect on task performance.

The representational task performance is shown in Figure 5.3. A two-way 2(culture) x 5(task) mixed-model ANCOVA, with VMA as a covariate, was used to compare task performance between the two cultures on the representational tasks.[22] This analysis revealed no significant main effects of culture or task and no culture by task interaction.
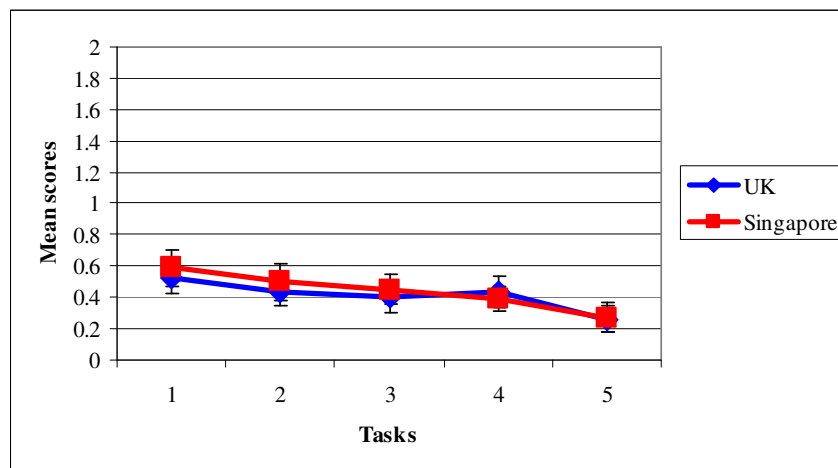


*Note.* 1 = Representational change; 2 = False-belief question in representational change task; 3 = Appearance-reality distinction; 4 = False-belief question in appearance-reality distinction task; and 5 = Level-2 visual perspective-taking.

*Figure 5.3.* Performance on representational tasks of the UK ($N$ = 43) and Singapore ($N$ = 44) cohorts.


Separate two-way 1(demographic variable) x 5(task) mixed-model ANCOVAs, with VMA as a covariate, were computed to evaluate the effect of each demographic factor on task performance for each cohort. Consistent with the results for the non-representational tasks, birth order, number of siblings, ethnic groups, parents' education and working status,

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[22] It is noted that log transformations ($\log(X_i + 1)$) were conducted to normalise the data (see Field, 2005). There were no differences between the transformed and untransformed data. Even though the standard deviations were larger than the means for the representational tasks, the sample sizes and standard deviations for each representation task were similar for both cohorts. Hence, the assumption of ANOVA that the variances of the dependent variable were the same between the two groups was not violated (see Field, 2005).

number of languages used and preschool attendance scheme showed no effect on representational task performance.

In summary, the results revealed greater cultural similarities than differences in children's understanding of naïve psychology concepts at 2½ years of age. There were no significant gross cultural differences in non-representational and representational task performance. As already discussed, 2½-year-old children exhibited a somewhat rudimentary understanding of the non-representational concepts of pretence, discrepant desires, action and emotion prediction and level-1 visual perspective-taking. Despite the fact that children from the two cohorts displayed similar patterns overall in both domains of understanding, subtle differences were observed in two individual non-representational tasks. The UK cohort scored significantly better on the action prediction task than the Singapore cohort. Conversely, the Singapore cohort performed better on the discrepant desire task compared to the UK cohort.

### 5.3.5  Research question 1a: Are there differences between the UK and Singapore cohorts in the performance sequences on various naïve psychology tasks at 2½ years of age?

As shown in Table 5.2 and the non-representational task analyses above, the children achieved significantly higher scores in some of the seven non-representational tasks than others. This suggests that children acquire the conceptual understanding required to pass the different tasks at slightly different ages. For both cohorts, the attribution of pretend properties task was the easiest task followed by the object substitution task, then the discrepant desire task. The order of difficulty for the remaining four tasks differed for the two cohorts. As the earlier analysis shows, however, these slight differences between the two cohorts in order of task difficulty were not significant (see Section 5.3.4).

In terms of the representational tasks, Table 5.2 indicates that there was an almost identical sequence of performance for the two cohorts. The performance sequence of representational tasks for the UK cohort was: representational change, false-belief question in representation change task, false-belief question in appearance-reality distinction task, appearance-reality distinction and level-2 visual perceptive-taking. The sequence is similar for the Singapore cohort.

Another issue of interest is whether children passed the non-representational tasks before representational ones. In order to examine age-related changes in naïve psychology, a two-way 2(culture) x 2(task type) mixed-model analysis of variance (ANOVA) was conducted to compare non-representational and representational task performance between

the two cohorts. This analysis only revealed a significant effect of task type ($F(1, 85)$ = 337.79, $p < 0.001$, $\eta_p^2 = .79$). The main effect of culture and culture by task interaction were non-significant. Overall, children in both cohorts obtained significantly higher scores for non-representational tasks ($M = 1.27$, $SD = .30$) than representational tasks ($M = .43$, $SD = .40$). For instance, paired-samples t-tests indicated that the children received significantly higher level-1 visual perspective-taking scores compared to level-2 visual perspective-taking scores ($t(42) = 5.58$, $p < .01$, $r = .65$ and $t(43) = 4.54$, $p < .01$, $r = .57$)[23] for the UK and Singapore cohorts respectively. Their discrepant desires scores were also significantly better than appearance-reality distinction scores ($t(42) = 5.44$, $p < .001$, $r = .64$ and $t(43) = 7.74$, $p < .001$, $r = .76$) for the UK and Singapore cohorts respectively. A two-way 2(culture) x 2(task type) ANCOVA, with VMA as a covariate, did not indicate significant differences in task, suggesting that the task effect found above could be attributed to VMA-related differences in understanding representational mental-states. It is noted that ANCOVA may be more robust than ANOVA in revealing cross-cultural similarities or differences because ANCOVA allows for control for covariates.

Overall, there were no significant cohort differences in the sequences of tasks within the batteries of non-representational and representational tasks. Children did score more highly on the non-representational than the representational tasks. These differences in performance could be attributed to the fact that 2½-year-old children possess a rudimentary knowledge of mental-states and have difficulty understanding more sophisticated mental-states. It is worthwhile to note that the performance sequences may be slightly influenced by the particular tasks used to tap each of the naïve psychology concepts.

### 5.3.6 Research question 1b: Are naïve psychology concepts coherent among children in the UK and Singapore?

Partial correlations controlling for the effect of VMA were conducted to explore the relationships among the tasks within cohorts. For the UK cohort, children's attribution of pretend properties scores were significantly correlated with discrepant desires scores ($r(40)$ = .46, $p < .01$). Their appearance-reality distinction scores correlated significantly with object substitution scores ($r(40) = .31$, $p < .05$) and the false-belief question in the appearance-reality distinction task ($r(40) = .70$, $p < .01$).

A much larger number of correlations were found for the Singapore cohort. Singaporean children's understanding of object substitution was significantly correlated with

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[23] The effect sizes for paired-samples and independent t-tests in this thesis were calculated using $r$ = square root of ($t^2$/ [$t^2$ + degrees of freedom]) (Field, 2005).

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action prediction ($r(41) = .37$, $p < .05$). Emotion prediction scores were significantly correlated with discrepant desires scores ($r(41) = .36$, $p < .01$). Pretend transformation was significantly correlated with the false-belief question in the representational change task ($r(41) = .33$, $p < .01$). Representational change scores was significantly correlated with pretend transformation scores ($r(41) = .34$, $p < .05$) and with the false-belief question in the representational change task ($r(41) = .66$, $p < .01$). Level-1 visual perspective scores were significantly correlated with appearance-reality distinction scores ($r(41) = .31$, $p < .05$), representational change scores ($r(41) = .34$, $p < .01$) and with the false-belief question in the representational task ($r(41) = .40$, $p < .01$). Lastly, appearance-reality distinction scores were significantly correlated with the false-belief question in the appearance-reality distinction task ($r = .61$, $p < .01$).

The correlation patterns were supported by Cronbach's alphas indicating that the internal consistency for the seven non-representational tasks was higher for the Singapore cohort compared to the UK cohort (UK cohort: Cronbach's $\alpha = .34$ and Singapore cohort: Cronbach's $\alpha = .53$). Similar results were found for the five representational tasks (UK cohort: Cronbach's $\alpha = .42$ and Singapore cohort: Cronbach's $\alpha = .68$). It is noted that this analysis does not take into account differences in VMA (although there were no significant cohort differences in VMA at phase I). The observed larger number of correlations and higher alpha coefficient values among tasks indicated that the Singapore cohort demonstrated a more coherent pattern in their task performance than the UK cohort.

## 5.4    Discussion

The baseline findings presented in this chapter show that non-representational naïve psychology concepts were acquired at relatively similar ages in the UK and Singapore. Results also indicated that 2½-year-old children in both cohorts encountered difficulty understanding representational naïve psychology concepts. However, important but subtle cultural differences in two non-representational tasks were found. The findings suggest that cultural and social environmental factors play a role in shaping the mixed pattern of naïve psychology development even at 2½ years of age. Recognising the culturally-specific ways in which naïve psychology concepts are understood is an important step in understanding how children acquire their naïve psychology in different cultural contexts.

### 5.4.1 Cross-cultural similarities in naïve psychology among 2½-year-old children between the UK and Singapore cohorts

The findings from these analyses show no gross cross-cultural differences in the development of naïve psychology between UK and Singapore preschoolers in terms of task performance and sequence of acquisition of mental-states. Although the present study only compared two cultures and could not therefore fully address the notion of universalities in naïve psychology development, these findings are in agreement with Wellman et al. (2006) who revealed a common sequence of understanding of mental-states in Chinese children from China and Western children from the U.S. and Australia. The results also accord with Liu et al.'s (2008) meta-analysis showing that compared to Western norms, false-belief understanding is acquired in the same pattern from below-chance to above-chance performance of children in Hong Kong, a hybrid culture similar to Singapore.

The analyses presented in this chapter also demonstrate that children's naïve psychology remains largely non-representational at 2 years of age. This is in line with previous findings in Western cultures (e.g. Flavell et al., 1981; Harris & Kavanaugh, 1993; Repacholi & Gopnik, 1997; Wellman & Woolley, 1990). Children of this age develop a rudimentary understanding of four key aspects of naïve psychology, namely pretence, desires, emotions and level-1 visual perspective-taking. As noted in Chapter 1, this pattern could be interpreted as a consequence of two distinct developmental stages suggested by Perner (1991), whereby 2-year-old children have simple conceptions of pretence, desires, emotions, visual perception and beliefs without understanding these mental-states as representations. Only around 4 years of age, do children acquire a representational naïve psychology when they recognise mental-states as representational and not simply as the true state of affairs. Wellman (1990) also proposes two distinct shifts in theory formation. At 2 years of age, children acquire a 'simple desire psychology' and at 4 years of age when children acquire a 'belief-desire psychology', they understand that people's actions and behaviour are guided by their desires, thoughts and beliefs. The results from the present study showing no cultural differences in representational task performance are also consistent with studies conducted in both the West (e.g. Wellman et al., 2001) and the East (e.g. Flavell et al., 1983b). This indicates that 2-year-old children have yet to acquire an understanding of mental representation.

The theory theory proposes that the cognitive path might be expected to converge at the same time for children, who begin with the same initial theory and undergo the same theory-formation processes (Gopnik, 2003; Gopnik & Meltzoff, 1997). The comparative results at baseline in this study indicate striking similarities in naïve psychology

understanding in the UK and Singapore cohorts. Despite this, it is important not to disregard the fact that the cultural and social environments play a significant role in shaping children's development, something which may be more evident at later ages. This will be explored further in Chapters 6 and 7, with analysis of the stability and developmental changes across the range of naïve psychology concepts between the two cultures.

Children from the UK and Singapore cohorts share some commonalities that might contribute to the similar developmental trends in naïve psychology task performance reported in this chapter. Children in both cohorts spoke English as their first language and the cohorts were similar in terms of birth order and family size. The two cultures did differ, though, in terms of average number of hours spent in preschools and number of languages used. From a young age, children in the Singapore cohort learn to switch between different languages when conversing with different adults. However, in contrast to some evidence of bilingualism influencing naïve psychology task performance at later ages (e.g. Goetz, 2003), neither number of language spoken, nor any of the other demographic factors were found to influence task performance at phase I. These social and cultural differences will be explored further in Chapter 8.

In sum, the present analysis indicated no apparent gross differences in naïve psychology development between the two cohorts. The subtle differences found, however, may reflect important cultural influences on development.

**5.4.2    Subtle differences in naïve psychology among 2½-year-old children between the UK and Singapore cohorts**

There was evidence of subtle differences in non-representational naïve psychology task performance in this analysis. While the UK cohort performed significantly better on the action prediction task, the Singapore cohort achieved significantly better scores on the discrepant desire task. Both tasks assessed children's understanding of desires. The action prediction task required children to predict a puppet's action on the basis of the puppet's desires while the discrepant desire task examined children's understanding of subjective desires by choosing between a desired and an undesired food. It seems possible that the Singapore cohort performed better on the discrepant task because they employed emotion-based experience to explain desires, as shown by the significant correlations between their emotion prediction and discrepant desires scores, which was not found in the UK cohort. This result suggests that Singaporean children's understanding of conflicting desires might be confined to the notion that certain emotional expressions correspond to subjective desires. As highlighted by Perner, Zauner and Sprung (2005), understanding the nature of

subjectivity does not require an understanding of another person's viewpoint so the Singapore cohort might have selected the unappetising vegetables for the puppet based on their objective assessment that this food tasted good in the puppet's mouth, rather than a true understanding of the puppet's desires.

Cross-cultural studies in the U.S. and China have also shown that children in the two cultures differ in the degree to which they express empathy (Wang, 2001; Wang & Leichtman, 2000). In contrast to American children, Chinese children made more references to the emotional states of other people. Western children are encouraged to be self-expressive and independent whereas Asian children are taught to be more sensitive about other people's feelings. It is possible that the Singapore cohort in the present study may have developed a better appreciation of the subjective nature of desires through a growing emphasis on other's emotional states in their everyday social interactions with siblings, peers and adults. These daily interactions shape how children from different cultures learn about their own and others' desires, perspectives, feelings and thoughts, thus contributing to the subtle variations in task performance.

While the Singaporean 2½-year-old children demonstrated a better understanding of subjective desires, their understanding that our motives for action is guided by our desires, tapped by the action prediction task, was still rudimentary. This finding supports Meltzoff, Gopnik and Repacholi's (1999) explanation that children's understanding of directedness of mental-states (i.e. different emotional expressions are directed at different objects) need not be identified with one's actions. The reasons for the cross-cultural difference on the action prediction task are unclear.

There were also cross-cultural differences in the coherence of task performance. According to theory theory, children's knowledge of the mind is made up of a coherent set of domain-specific concepts and learning one naïve psychology concept could affect other concepts (e.g. Slaughter & Gopnik, 1996; Wellman, 1990). The Singapore cohort's performance was more consistent and interrelated for both the non-representational and the representational tasks. In contrast, 2½-year-old children's naïve psychology was fragmented and not conceptually coherent for the UK cohort. Hence, the current results provide partial support for theory theorists' claim that children's naïve psychology is a coherent system of interrelated concepts. The findings are consistent with previous studies which reported that 2-year-old children demonstrate only understanding of connections between two naïve psychology concepts (perception, desire or emotion), not all three concepts (e.g. Wellman et al., 2000; Wellman & Woolley, 1990). In Wellman et al.'s (2000) study, 2-year-old children correctly inferred how a person feels when she is looking at desirable or undesirable object.

In addition, the 2-year-old children correctly infer a person's perceptions on the basis of her emotions about desirable and undesirable object. In Wellman and Woolley's (1990) study, 2-year-old children know that desiring something and getting it leads to happiness whereas not getting it leads to sadness. Nonetheless, it is possible that initial understandings of naïve psychology concepts are incomplete and separated and only become fully coordinated at later ages. The current results indicate significant correlations, after VMA was accounted for, among some of the non-representational and representational naïve psychology concepts for both cohorts. These correlations suggest that it is possible that the non-representational skills might form the foundation for understanding subsequent representational mental-states. For example, children's understanding that one object (e.g. a cube) symbolically stands for an unrelated object (e.g. a strawberry) may support their later ability to make appearance-reality distinction. To shed further light on the issue of conceptual coherence, Chapter 6 of the present thesis will compare children's naïve psychology at 3 and 3½ years of age between the two cultures.

The cultural difference in coherence of children's knowledge of mental-states suggests that for Singaporean children, the related mental-states are closely integrated such that understanding of one mental-state shapes the development of another mental-state and that these mental-states form together as a cohesive set of concepts. This pattern of results is consistent with the preschool curriculum guidelines set by the Singapore Ministry of Education, which focus on the integration of knowledge and skills across different subject areas in order to facilitate concept development and promote Asian values and national identity (Sharpe, 2000). The incorporation of interdisciplinary activities in the curriculum helps Singaporean children to understand how skills are linked together and can be applied from one context to another (Singapore Ministry of Education, 2003). Although the influence of the curriculum on children's naïve psychology development was not empirically tested here, the differences found in the present study do highlight the need to consider the cultural context in order to investigate whether both cohorts will undergo a different process and whether they will reach the same goal at the same time.

## 5.5    Conclusion

The results of this chapter highlight substantial cross-cultural similarities in the development of naïve psychology among 2½-year-old children in the UK and Singapore. Subtle and potentially important cultural differences, however, have been identified in the performance on two non-representational tasks and also in the coherence of naïve psychology concepts. The data support the premise that an account of children's naïve

psychology should address both universalities as well as cultural and social differences when examining factors influencing development (discussed in Chapter 2). It would be interesting to further assess whether both cohorts continued to display differences in the coherence of conceptual development at 3 and 3½ years of age. The next chapter examines longitudinal changes in naïve psychology between the ages of 2½, 3 and 3½ years among children growing up in the UK and Singapore.

# CHAPTER 6

# LONGITUDINAL CHANGES IN

# NAÏVE PSYCHOLOGY DEVELOPMENT

## 6.1    Introduction

This chapter reports a longitudinal analysis of developmental changes in children's naïve psychology between the UK and Singapore cohorts (Research Question 2). As illustrated in Figure 6.1 (below), the central focus of the analyses presented in this chapter is to document the extent to which children's acquisition of naïve psychology concepts differ between the two cohorts across the three time points from 2½ to 3½ years of age. This chapter proceeds with a brief summary of the reviewed literature from Chapters 1 and 2 and proposes the research questions. This is followed by the presentation of the empirical analyses and findings. The chapter concludes with a discussion of the main results in relation to the role of culture on children's naïve psychology development. Given the variability in coherence of naïve psychology concepts between the two cultures found in phase I, the issue of whether differences in conceptual coherence persist in subsequent phases will also be examined.

Chapter 1 provides a systematic literature review of both cross-sectional and longitudinal data in Western cultures showing that there is a developmental pattern in naïve psychology between the ages of 18 months and 4 years. In accordance with existing Western literature, the results reported in Chapter 5 show similar age of onset of rudimentary understanding of some aspects of pretence, discrepant desires, action and emotions prediction and level-1 visual perspective-taking in the two cultures at 2½ years of age. In terms of representational abilities, the 2½-year-old children in both cultures encountered difficulties understanding level-2 visual perspective-taking, appearance-reality distinction and false-belief prediction. Western literature has shown a concurrent emergence of this representational conceptual understanding at around 4 years of age (e.g. Flavell et al., 1981; Flavell et al., 1983a; Wimmer & Perner, 1983). In line with most Western research findings (e.g. Peterson & Siegal, 1999; Wellman et al., 2001), some non-Western results show that children's awareness that their beliefs may differ from the beliefs of others emerges around 3 years and 5 months to 5 years of age (e.g. Avis & Harris, 1991). However, several studies have demonstrated a time lag in the development of false-belief understanding across cultural groups (e.g. Naito & Komaya, 2006; Vinden, 1996). Given the cross-sectional nature of these studies and reliance on false-belief as an index of children's acquisition of an understanding of mind, the present study explores the degree to which the developmental

patterns of various naïve psychology concepts differ between two cultural contexts across three time points.
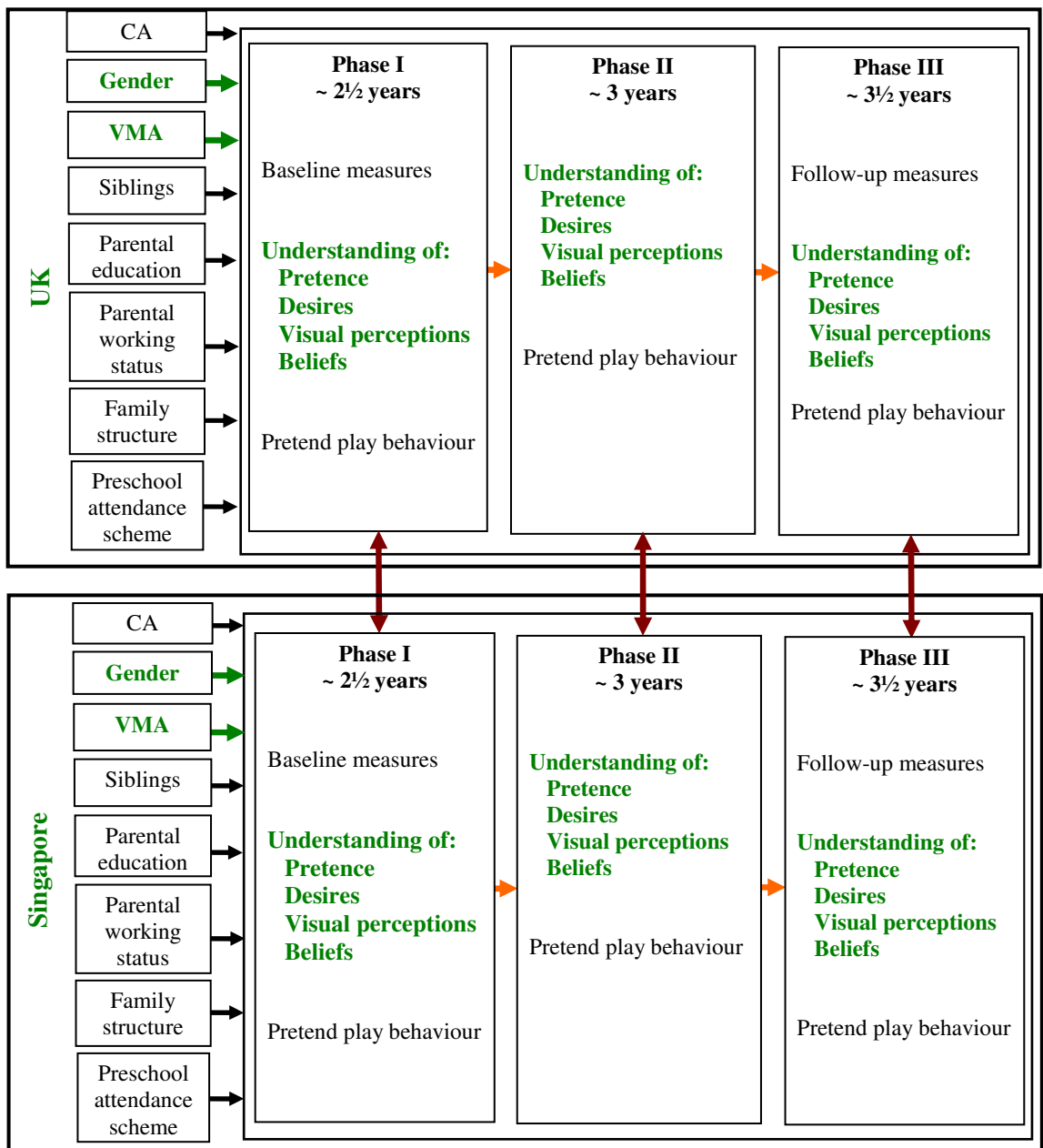


*Note.* CA = chronological age, VMA = verbal mental age.

The **orange** arrows show analysis of developmental changes over time. The **brown** arrows indicate the cross-cultural similarities and differences which will be explored.

*Figure 6.1.* Longitudinal cross-cultural comparison of children's naïve psychology development between 2½, 3 and 3½ years of age.

As illustrated in Figure 6.1, culture may influence the extent to which individual characteristics (gender and VMA) affect naïve psychology development (depicted in **green**

arrows). Culture, gender and VMA might also influence the performance sequences of these concepts at each time point. The results of the phase I analysis indicated cohort similarity in task performance sequences at 2½ years of age (see Chapter 5, Section 5.3.5). However, further analysis is required to evaluate whether both cultures demonstrate similar developmental sequences in naïve psychology concepts at the subsequent two time points.

As reviewed in Chapter 1 (Section 1.3), four dominant theories have been proposed to explain children's developing understanding of naïve psychology concepts. The modularity theory, theory theory, representational theory of mind and simulation theory are often drawn upon the same empirical evidence. A limitation is that these theories have seldom been applied to longitudinal comparative evidence in non-Western contexts to understand developmental changes in children's naïve psychology. This chapter seeks to begin to fill that gap.

An interesting unexplored issue for longitudinal research on the development of naïve psychology is the extent to which children's pretence understanding is associated with the development of other naïve psychology concepts. As discussed in Chapter 1, Leslie (1987) suggests that when children engage in pretend play behaviour, they display simultaneous appreciation of the mentalistic nature of pretence. However, several researchers have argued that engagement in pretend play per se is not enough to facilitate children's naïve psychology development, but rather that this is limited to certain aspects of pretend play (e.g. role-play and metacommunication; as discussed in Chapters 1 and 3) and understanding of the mental representational nature of pretence (e.g. Harris, 2000; Lillard, 2001). Hence, children's early pretence understanding may be related to their understanding of other more complex mental-states. Alternatively, children's early understanding of others' perspectives and beliefs may be associated with children's developing pretence understanding. Prior Western research has shown that 3-year-old children who correctly attributed a pretender's thoughts and beliefs were better able to solve false-belief and appearance-reality distinction tasks (Rosen et al., 1997). The lack of published evidence on the relationships between pretence understanding and acquisition of other naïve psychology concepts in non-Western contexts warrants further attention. This chapter explores the associations among knowledge of mental representation in pretence and understanding of level-2 visual perspective-taking, the appearance-reality distinction, false-belief prediction and false-belief explanation. Some of these naïve psychology concepts are acquired at similar ages and are considered more complex than some other concepts. Chapter 9 relates children's pretend play behaviour with their developing understanding of naïve psychology concepts.

In summary, several limitations constrain the results drawn from previous non-Western studies: (a) lack of longitudinal comparative cross-cultural data, (b) limited findings on the transition period between 3 and 4 years of age, (c) failure to consider confounding factors, and (d) over-reliance on false-belief tasks (discussed in Chapters 1 and 2). The longitudinal empirical analyses presented in this chapter address the limitations of previous non-Western research by exploring the developmental changes in children's understanding of pretence, desires, visual perceptions and beliefs. The task performance sequences in phases II and III are explored to establish whether a similar pattern exists between the two cultures as found in phase I. Due to the scarcity of cross-cultural research on the associations between children's understanding of mental representational nature of pretence and other naïve psychology concepts, this link is also examined in this chapter.

## 6.2 Research Questions

Based on the reviewed theoretical concepts, phase I results and existing empirical evidence, this chapter sets out to examine Research Question 2 (stated in Chapter 1) and two subsidiary research questions:

**2. Are there longitudinal differences between the UK and Singapore cohorts in naïve psychology development between 2½, 3 and 3½ years of age?**

    **a. Are there differences between the UK and Singapore cohorts in the performance sequences on various naïve psychology tasks at 3 and 3½ years of age?**

    **b. Are there differences between the UK and Singapore cohorts in terms of the associations between pretence understanding and other naïve psychology concepts?**

## 6.3 Results

The data cleaning and reduction procedures of the longitudinal data are reported before the results are presented. The analysis carried out in this chapter and thereafter was based on the final sample of children and excluded children who dropped out of the study after phases I and II.

### 6.3.1 Control questions, missing value analysis and comparable scale

Table 6.1 shows the number of children who failed the memory and control questions for the discrepant desires, false-belief prediction and false-belief explanation tasks. Following the procedures outlined in Chapter 5 (Section 5.3.1), children who failed the

memory question for the discrepant desire task and the reality and memory questions for the false-belief tasks were rated as having failed the task (see further explanation in Chapter 4, Section 4.7.1). All these children were included in subsequent analyses. There were no significant differences in the results when the analyses were rerun excluding children who failed the memory and reality questions. The data of those children who failed the control questions for the discrepant desire task were classified as missing data.

Table 6.1. Children Who Failed the Memory and Control Questions for the Naïve Psychology Measures for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| Naïve psychology measure | Phase II | | Phase III | |
|---|---|---|---|---|
| | UK | Singapore | UK | Singapore |
| Discrepant desire task | | | | |
| Memory question for puppet's favourite food | 3 | 1 | 1 | 0 |
| Control question for child's favourite food [a] | 3 | 1 | 2 | 1 |
| Control question for child's food preference [a] | 3 | 3 | 2 | 1 |
| | | | | |
| False-belief prediction task | | | | |
| Reality question | 0 | 1 | 0 | 0 |
| Memory question | 1 | 1 | 1 | 1 |
| | | | | |
| False-belief explanation task | | | | |
| Reality question | 0 | 0 | 0 | 0 |
| Memory question | 1 | 0 | 0 | 0 |

*Note.* [a] The same children failed the control questions for the discrepant task within each phase. However, none of the children failed more than one memory or control question in different tasks within and across the three phases.

For the longitudinal sample of 74 children, the following data were missing. Four, six and three children did not pass the control question for phases I, II and III discrepant desire task respectively (see Tables 5.1 and 6.1). None of the children were absent due to illness in phases II and III. Little's MCAR test was non-significant, ($\chi^2(7) = 12.74$, $p = .08$). EM algorithm was used to impute values for the missing data (see Chapter 5, Section 5.3.1). There were no significant differences between the rest of the data for the missing cases. [24]

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[24] Cook's distance was employed to identify potential outliers in all tasks across phases. According to Thomas et al. (2009), as a reasonable rule of thumb, a Cook's distance of over 1.00 suggests that a data point exerts undue influence on the regression (see also Field, 2005). In the present study, no value of Cook's distance exceeded 0.3. Hence, no value was identified as a potential outlier.

The same procedure that was employed in phase I was used to create a comparable scale on all the measures (see Chapter 5, Section 5.3.2). The pretend-reality distinction scores were transformed by multiplying each score by $\frac{1}{6}$, the imaginary-reality distinction by $\frac{1}{3}$ and false-belief prediction and false-belief explanation by 2. Again this resulted in a minimum possible score of 0 and a maximum possible score of 2 for all tasks.

### 6.3.2 Data reduction

The previous chapter analysed the cross-sectional data by categorising the battery of tasks into two broad domains of non-representational and representational naïve psychology concepts. Reliability analyses were conducted here to establish whether this categorisation could also be used for the longitudinal data. It was found that the coherence for the non-representational tasks was low in phase II ($\alpha$ = .39) and phase III ($\alpha$ = .20). Similarly, coherence for representational tasks was low in phase II ($\alpha$ = .36) and phase III ($\alpha$ = .57). This suggested that categorising the tasks into non-representational and representational would be unwise in the longitudinal analysis.

Reliability analyses were then carried out for the subsets of pretence, visual perception and belief tasks, to establish whether the data from the individual tasks could be collapsed into these categories for subsequent analyses. The low Cronbach's alphas [pretence ($\alpha$ = .53, .22, .25), visual perceptions ($\alpha$ = .31, .38, .36) and beliefs ($\alpha$ = .09, .12, .46) for phases I, II and III respectively] again suggested that these categories should not be used for subsequent analyses.

There were theoretical reasons for analysing tasks as non-representational or representational in the previous chapter. However, the low coherence among the non-representational and representational tasks for the longitudinal data and the possibility that summed scores might reduce the sensitivity of analyses to cultural differences led to the decision to treat tasks separately in the analyses presented in this chapter. Likewise, analysing individual tasks rather than subsets of pretence, visual perception and belief tasks allows a clear mapping out of the different cognitive level of conceptual understanding assessed by each task (discussed in Chapter 4). Therefore, the longitudinal analysis adopts a task-specific approach, taking into account differences in performance in individual tasks both between and within cohorts. The issue of conceptual coherence of naïve psychology concepts is discussed in Section 6.4.

### 6.3.3 CA, VMA and gender differences

This section discusses the covariates employed in the longitudinal analyses. There were no significant cultural differences with regards to CA ($t(72) = 1.69$, $p$ = n.s.) at each of the three time points. There were also no significant cultural differences in phase I VMA ($t(72) = 1.56$, n.s.) and phase III VMA ($t(72) = .63$, n.s.). Given the similarities between the two cohorts in terms of CA, this variable was not included as a covariate thereafter in all between-group analyses in this thesis. Following phase I procedure, VMA was controlled for as a covariate in all subsequent major analyses presented in this chapter to ensure that any cohort differences found could not be explained by variations in individual children's language ability.

There was a near significant gender difference ($\chi^2(1, N = 74) = 3.41$, $p = .07$) between the two cohorts. The ratios of girls to boys were 20:16 for the UK cohort and 13:25 for the Singapore cohort. Gender differences were revealed for the UK cohort in phase III pretend transformation task performance ($t(34) = 2.22$, $p < .05$, $r = .36$). For the Singapore cohort, significant gender differences in phase II level-2 visual perspective-taking ($t(35) = 2.92$, $p < .01$, $r = .44$) were found. Given the overrepresentation of boys in the Singapore cohort and the associations between gender and some naïve psychology measures, all subsequent major analyses presented in this thesis include gender as a covariate.

### 6.3.4 Research question 2: Are there longitudinal differences between the UK and Singapore cohorts in naïve psychology development between 2½, 3 and 3½ years of age?

Table 6.2 presents the descriptive statistics for the naïve psychology tasks at each developmental time point. To examine age-related changes in children's naïve psychology, two-way 2(culture) x 2 or 3(phase) mixed-model repeated-measures ANOVAs were first conducted for each task that was administered across two or three phases. This approach has been adopted in previous longitudinal Western studies to explore developmental changes in task performance (e.g. Hughes & Ensor, 2007). Subsequently, to obtain more robust results and reveal true cross-cultural differences, two-way 2(culture) x 2 or 3(phase) mixed-model repeated-measures ANCOVAs, with phase I VMA[25] and gender as covariates, were then carried out for each task.

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[25] Similar results were obtained when the analyses were rerun using phase III VMA as covariate.

Table 6.2. Mean[a] (Standard Deviation) Scores of Naïve Psychology Measures across Phases for the UK ($N$ = 36) and Singapore ($N$ = 38) Cohorts

| Naïve psychology measure | Phase I | | Phase II | | Phase III | |
|---|---|---|---|---|---|---|
| | UK | Singapore | UK | Singapore | UK | Singapore |
| (1) Attribution of pretend properties | 1.61 (.69) | 1.76 (.54) | 1.86 (.42) | 1.87 (.34) | - | - |
| (2) Object substitution | 1.60 (.53) | 1.59 (.48) | 1.97 (.17) | 1.89 (.31) | - | - |
| (3) Pretend transformation | .98 (.49) | .93 (.39) | 1.28 (.44) | 1.19 (.36) | 1.80 (.29) | 1.66 (.25) |
| (4) Discrepant desires[b] | 1.19 (.86) | 1.58 (.72) | 1.47 (.85) | 1.58 (.68) | 1.86 (.42) | 1.87 (.48) |
| (5) Level-1 visual perspective-taking | 1.11 (.75) | .95 (.77) | 1.53 (.61) | 1.34 (.82) | 1.97 (.17) | 1.82 (.51) |
| (6) Level-2 visual perspective-taking | .31 (.58) | .29 (.65) | .47 (.65) | .37 (.59) | 1.67 (.63) | 1.42 (.79) |
| (7) Appearance-reality distinction | .42 (.65) | .45 (.65) | .42 (.60) | .42 (.55) | .83 (.81) | .55 (.69) |
| (8) Mental representation in pretence | - | - | 1.14 (.83) | .87 (.70) | 1.42 (.60) | 1.13 (.74) |
| (9) Pretend-reality distinction | - | - | .81 (.47) | .84 (.37) | .81 (.25) | .73 (.26) |
| (10) False-belief in appearance-reality task | .44 (.65) | .29 (.46) | .31 (.47) | .39 (.55) | .67 (.72) | .50 (.56) |
| (11) False-belief prediction[b, c] | - | - | .44 (.84) | .21 (.62) | 1.33 (.96) | .58 (.92) |
| (12) False-belief explanation[b, c] | - | - | .17 (.56) | .16 (.55) | .72 (.97) | .47 (.86) |
| (13) Imaginary-reality distinction | - | - | - | - | 1.31 (.33) | 1.21 (.35) |

*Note.* A dashed line indicates that the task was not administered. [a] Range of scores: 0 to 2. [b] The mean (standard deviation) scores after excluding children who failed the memory or reality questions are presented in Appendix E1. [c] False-belief prediction referred to the unexpected transfer false-belief 'Sally-Anne' task. False-belief explanation referred to the unexpected transfer false-belief explanation task. Scores for the justification, ignorance, seeing and true-belief questions are considered in Chapter 7. As noted in Chapter 4 (Section 4.7), the unexpected content 'Plasters' task was dropped from the analysis.

The results of the ANOVAs and ANCOVAs revealed cultural similarities in children's performance on the following tasks: attribution of pretend properties, object substitution, pretend transformation, level-2 visual perspective-taking, appearance-reality distinction, pretend-reality distinction, false-belief questions in appearance-reality task, false-belief explanation and imaginary-reality distinction. The ANOVAs and ANCOVAs also indicated significant cultural variations in children's performance on the following tasks: discrepant desires, mental representation in pretence and false-belief prediction. While no significant cultural differences in level-1 visual perspective-taking task were found using ANOVA, subsequent ANCOVA showed a significant difference between the two cohorts. These findings are discussed in further detail below.

*Cultural similarities in naïve psychology measures*

For the object substitution task, the ANOVA analysis indicated a significant main effect of phase ($F(1, 72) = 30.63$, $p < .001$, $\eta_p^2 = .30$). Similarly, ANCOVA results revealed a significant main effect of phase ($F(1, 70) = 11.21$, $p = .001$, $\eta_p^2 = .14$). There was no significant main effect of culture and no culture by phase interaction in both the ANOVA and ANCOVA.

The ANOVA results showed significant main effect of phase for these tasks: attribution of pretend properties, pretend transformation, level-2 visual perspective-taking, appearance-reality distinction, the false-belief question in the appearance-reality task and false-belief explanation. There was no significant main effect of culture or culture by phase interaction. ANCOVA analysis revealed no significant main effects of culture, phase or culture by phase interaction for these tasks. ANOVA and ANCOVA analyses indicated no significant main effects of culture and phase and no culture by phase interaction for the pretend-reality distinction task. The main effect of phase for the ANOVA results is presented below:

For the attribution of pretend properties task, there was a significant main effect of phase ($F(1, 72) = 2.13$, $p < .05$, $\eta_p^2 = .06$). For the false-belief explanation task, the analysis indicated a significant main effect of phase ($F(1, 72) = 12.46$, $p = .001$, $\eta_p^2 = .15$).

For the pretend transformation task, the results indicated a significant main effect of phase ($F(2, 144) = 102.81$, $p < .001$, $\eta_p^2 = .59$). Paired-samples t-tests indicated that both cohorts scored significantly better in phase II compared to phase I ($t(73) = 4.78$, $p < .001$, $r = .49$). Both cohorts also scored significantly better in phase III than in phase I ($t(73) = 13.91$, $p < .001$, $r = .85$) and phase II ($t(73) = 10.15$, $p < .001$, $r = .77$).

For the level-2 visual perspective-taking task, the analysis showed a significant main effect of phase ($F(2, 144) = 97.90$, $p < .001$, $\eta_p^2 = .58$). Paired-samples t-tests indicated that both cohorts scored significantly better in phase III compared to phase I ($t(73) = 11.28$, $p < .001$, $r = .80$) and phase II ($t(73) = 12.44$, $p < .001$, $r = .82$). There were no significant differences between phases I and II.

For the appearance-reality distinction task, there was a significant main effect of phase ($F(2, 144) = 3.85$, $p < .05$, $\eta_p^2 = .05$). Paired-samples t-tests indicated that both cohorts scored significantly better in phase III than in phase I ($t(73) = 2.08$, $p < .05$, $r = .24$) and phase II ($t(73) = 2.51$, $p < .05$, $r = .28$). There were no significant differences between phases I and II.

For the false-belief question in the appearance-reality distinction task, the results revealed a significant main effect of phase ($F(2, 144) = 3.64$, $p < .05$, $\eta_p^2 = .05$). Paired-samples t-tests indicated that both cohorts scored significantly better in phase III compared to phase I ($t(73) = 2.24$, $p < .05$, $r = .25$) and phase II ($t(73) = 2.32$, $p < .05$, $r = .26$). There were no significant differences between phases I and II.

*Cultural differences in naïve psychology measures*

For the discrepant desire task, ANOVA results revealed near significant main effect of culture ($F(1, 72) = 3.68$, $p = .06$, $\eta_p^2 = .05$) and significant main effect of phase ($F(2, 144) = 8.97$, $p < .001$, $\eta_p^2 = .11$). There was no significant culture by phase interaction. With respect to the main effect of phase, paired-samples t-tests indicated that both cohorts scored significantly better in phase III than in phase I ($t(73) = 4.14$, $p < .001$, $r = .44$) and phase II ($t(73) = 3.43$, $p = .001$, $r = .37$). There were no significant differences between phase I and II for both cohorts. However, ANCOVA results revealed a significant main effect of culture ($F(1, 70) = 4.02$, $p < .05$, $\eta_p^2 = .05$).[26] The total mean across the three phases for the discrepant desire task was higher for the Singapore cohort ($M = 1.68$, $SD = .37$) than the UK cohort ($M = 1.51$, $SD = .38$). There was no significant main effect of phase or culture by phase interaction in the ANCOVA.

For the level-1 visual perspective-taking task, ANOVA results revealed a significant main effect of phase ($F(2, 144) = 37.65$, $p < .001$, $\eta_p^2 = .34$). Paired-samples t-tests indicated

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[26] The effect size from previous research comparing children's false-belief understanding in the UK and Italy was small ($\eta^2 = .04$; Lecce & Hughes, 2010), suggesting little differences between two Western cultures. The cohort differences in the present study, however, showed small to large effect sizes in task performance. The observed small to large effect sizes provide an indication of variations in the degree of cultural differences in naïve psychology concepts along a continuum.

that both cohorts showed significant improvement between phases I and II ($t(73) = 3.57$, $p = .001$, $r = .39$), between phases II and III ($t(73) = 5.45$, $p < .001$, $r = .54$) and between phases I and III ($t(73) = 8.93$, $p < .001$, $r = .72$). There was no significant main effect of culture or culture by phase interaction. However, ANCOVA results indicated a significant main effect of culture ($F(1, 70) = 4.74$, $p < .05$, $\eta_p^2 = .06$) and phase ($F(2, 140) = 4.36$, $p < .05$, $\eta_p^2 = .06$) but no significant interaction effect. With regard to the main effect of culture, the total mean across the three phases was higher for the UK cohort ($M = 1.54$, $SD = .32$) than the Singapore cohort ($M = 1.37$, $SD = .48$).

For the mental representation in pretence task, ANOVA results revealed a significant main effect of culture ($F(1, 72) = 4.52$, $p < .05$, $\eta_p^2 = .05$) and phase ($F(1, 72) = 6.43$, $p < .05$, $\eta_p^2 = .08$). There was no significant culture by phase interaction. With regard to the main effect of culture, the total mean across the two phases was higher for the UK cohort ($M = 1.28$, $SD = .58$) than the Singapore cohort ($M = 1.00$, $SD = .55$). With respect to the main effect of phase, paired-samples t-tests indicated that both cohorts scored significantly better in phase III compared to phase II ($t(73) = 2.56$, $p < .05$, $r = .29$). ANCOVA results also revealed a significant main effect of culture ($F(1, 70) = 4.48$, $p < .05$, $\eta_p^2 = .06$). There was no significant phase effect and no culture by phase interaction.

For the false-belief prediction task, ANOVA analysis revealed significant main effects of culture ($F(1, 72) = 11.35$, $p = .001$, $\eta_p^2 = .14$), phase ($F(1, 72) = 23.28$, $p < .001$, $\eta_p^2 = .24$) and culture by phase interaction ($F(1, 72) = 3.99$, $p = .05$, $\eta_p^2 = .05$). Similarly, ANCOVA analysis showed significant main effects of culture ($F(1, 70) = 14.50$, $p < .001$, $\eta_p^2 = .17$), phase ($F(1, 70) = 7.28$, $p < .01$, $\eta_p^2 = .09$) and culture by phase interaction ($F(1, 70) = 7.12$, $p < .01$, $\eta_p^2 = .09$). To explore the interaction effect, separate one-way between cultures ANCOVAs, rather than t-tests, were conducted for each phase to take into account the effects of VMA and gender. This approach has been adopted in a previous study of individual differences in false-belief (see Repacholi, Slaughter, Pritchard, & Gibbs, 2003). The results indicated that the UK cohort ($M = 1.33$, $SD = .96$) performed significantly better than the Singapore cohort ($M = .58$, $SD = .92$) in the phase III ($F(1, 70) = 18.81$, $p < .001$, $\eta_p^2 = .21$) but not in the phase II false-belief prediction task. Further paired-samples t-tests revealed the UK cohort ($t(35) = 4.78$, $p < .001$, $r = .63$) showed significant improvement in false-belief prediction between phases II and III but the Singapore cohort did not ($t(37) = 2.02$, n.s.).

Given the substantial cultural differences in the false-belief prediction task, children's CA and performance across phases II and III were compared between the two cultures. The mean CA of the 24 UK children who passed the false-belief prediction task at phase III was 43.17 months of age. The mean CA of the 12 UK children who failed this task at phase III was 41.92 months of age. The mean CA of the 11 Singaporean children who passed this task at phase III was 45.36 months of age. The mean CA of the 27 Singaporean children who failed this task at phase III was 43.00 months of age. (Tables 7.2 and 7.3 in Chapter 7 present more detailed information on the number and mean age of children who passed and failed all of the belief measures). Among the 11 children in the Singapore cohort who passed the task, five of them were between 47 to 48 months of age. The findings show that the ability to explicitly predict a character's action on the basis of that character's false-belief emerged by a mean CA of 3½ years for two-thirds (66.7%) of the UK cohort, but only for 28.9% of the Singapore cohort. Children's performance on the false-belief prediction task was compared between phases II and III (see Figure 6.2).
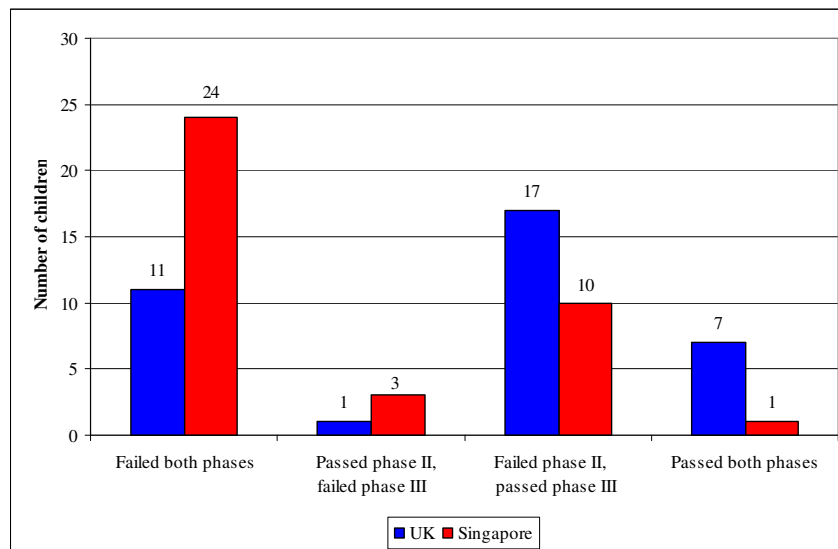


*Figure 6.2.* Developmental changes in children's understanding of false-belief prediction between phases II and III for the UK ($N = 36$) and Singapore ($N = 38$) cohorts.

Taken together, the results of the longitudinal analyses demonstrate cultural similarities in several naïve psychology concepts, including attribution of pretend properties, object substitution, pretend transformation, level-2 visual perspective-taking, appearance-reality distinction, pretend-reality distinction, the false-belief questions in appearance-reality task, false-belief explanation and imaginary-reality distinction. With regard to age-related changes in these various naïve psychology concepts, there was significant developmental improvement in task performance for both cohorts for all these tasks, except for the pretend-

reality distinction task. Comparison between phases I and II scores indicated significant improvement in attribution of pretend properties, object substitution, pretend transformation and level-1 visual perspective-taking tasks for both cohorts. From phases II to III, both cohorts continued to show improvement in the pretend transformation and level-1 visual perspective-taking tasks. Both cohorts demonstrated better knowledge of discrepant desires, level-2 visual perspective-taking, mental representation in pretence, appearance-reality distinction, the false-belief question in appearance-reality distinction task and false-belief explanation in phase III than in phase II. From phases I to III, both cohorts showed significant improvement in all of the tasks that were used in all three phases: understanding pretend transformation, discrepant desires, level-1 visual perspective-taking, level-2 visual perspective-taking, appearance-reality distinction and false-belief question in appearance-reality distinction task. It is worth highlighting that improvement between phases in some tasks could not be seen because these tasks were not administered across all phases. The main effect of phase became non-significant after VMA was treated as a covariate in the ANCOVA for all but the pretend-reality distinction task. This implies that age-related differences in task performance between phases were attributable to the covarying effect of VMA.

The ANCOVA analysis revealed significant cultural differences in children's understanding of four naïve psychology concepts. The UK cohort performed significantly better than the Singapore cohort in terms of the total mean for the level-1 visual perspective-taking task across the three phases and the mental representation in pretence task across the two phases. Conversely, the Singapore cohort scored significantly better than the UK cohort in the total mean for the discrepant desire task across the three phases. Compared to the Singapore cohort, the UK cohort performed significantly better in false-belief prediction in phase III. The UK cohort showed significant improvement in false-belief prediction between phases II and III whereas no improvement in scores was found for the Singapore cohort. It is worthwhile to note that these results provide robust evidence of cultural similarities and differences because VMA and gender were taken into account.

### 6.3.5 Research question 2a: Are there differences between the UK and Singapore cohorts in the performance sequences on various naïve psychology tasks at 3 and 3½ years of age?

In terms of phase II tasks, a two-way 2(culture) x 12(task) mixed-model ANCOVA, with gender and phase I VMA as covariates, indicated no significant main effects of culture, task or culture by task interaction. This shows that the children did not find any of the tasks

significantly more difficult than any other task in this phase. For phase III tasks, a two-way 2(culture) x 11(task) mixed-model ANCOVA, with gender and phase III VMA as covariates, revealed significant main effects of culture ($F(1, 70) = 11.30$, $p = .001$, $\eta_p^2 = .14$), task ($F(10, 700) = 3.82$, $p < .001$, $\eta_p^2 = .05$) but no significant interaction effect of culture by task. The main effect of culture could have arisen from the false-belief prediction task (see earlier analyses in Section 6.3.4). To determine the main effect of task, the mean scores were compared. As shown in Table 6.3, in term of performance sequence, both cohorts found the discrepant desires, level-1 visual perspective-taking, pretend transformation, level-2 visual perspective-taking and mental representation in pretence tasks easiest. With regard to some of the tasks, the UK cohort performed better on false-belief prediction and imaginary-reality distinction tasks than appearance-reality distinction and pretend-reality distinction tasks. By contrast, the Singapore cohort scored better on some of the pretence understanding tasks (imaginary-reality distinction and pretend-reality distinction) than on the false-belief prediction and appearance-reality distinction tasks. Both cohorts demonstrated similar difficulty with the false-belief question in the appearance-reality task and with the false-belief explanation task.

It is notable from the mean scores in phases II and III that children's appreciation of rudimentary naïve psychology concepts such as object substitution, attribution of pretend properties, pretend transformation, discrepant desires and level-1 visual perspective-taking precedes understanding of sophisticated, representational mental-states such as mental representation in pretence, pretend-reality distinction, level-2 visual perspective-taking, appearance-reality distinction, false-belief prediction and false-belief explanation. The evidence from this chapter, together with the results reported in Chapter 5 (Section 5.3.5), indicates that the gap between rudimentary, non-representational and sophisticated, representational understanding of naïve psychology concepts is stable across the three phases.

Table 6.3. Rankings of Phases II and III Naïve Psychology Measures Based on Mean Task Scores[a] for the UK ($N = 36$) and Singapore ($N = 38$) cohorts

| Naïve psychology measure | Phase II Sequence | | Phase III Sequence | |
| --- | --- | --- | --- | --- |
| | UK | Singapore | UK | Singapore |
| Object substitution | 1 | 1 | - | - |
| Attribution of pretend properties | 2 | 2 | - | - |
| Discrepant desires | 4 | 3 | 2 | 1 |
| Level-1 visual perspective-taking | 3 | 4 | 1 | 2 |
| Pretend transformation | 5 | 5 | 3 | 3 |
| Level-2 visual perspective-taking | 8 | 10 | 4 | 4 |
| Mental representation in pretence | 6 | 6 | 5 | 5 |
| False-belief prediction | 9 | 11 | 6 | 8 |
| Imaginary-reality distinction | - | - | 7 | 6 |
| Appearance-reality distinction | 10 | 8 | 8 | 9 |
| Pretend-reality distinction | 7 | 7 | 9 | 7 |
| False-belief question in appearance-reality task | 11 | 9 | 11 | 10 |
| False-belief explanation | 12 | 12 | 10 | 11 |

*Note.* A dashed line indicates that the task was not administered.

[a] see Table 6.2 of this chapter for the mean scores for individual tasks.

In summary, the performance sequence of phase II tasks was statistically similar for both cohorts. On the other hand, there were significant cultural differences in performance sequence for phase III tasks. The discrepant desires, level-1 visual perspective-taking, pretend transformation, level-2 visual perspective-taking and mental representation in pretence were the easiest tasks for both cohorts. By contrast, the false-belief question in the appearance-reality task and false-belief explanation tasks were the most difficult tasks for both cohorts. The position of the false-belief prediction task in the performance sequence differed between the two cohorts, with the Singapore cohort finding this task relatively more difficult than the UK cohort.

**6.3.6    Research question 2b: Are there differences between the UK and Singapore cohorts in terms of the associations between pretence understanding and other naïve psychology concepts?**

Children acquire sophisticated, representational appreciation of many aspects of naïve psychology such as mental representation in pretence, pretend-reality distinction, level-2 visual perspective-taking, appearance-reality distinction, false-belief prediction and false-belief explanation between the ages of 3 and 5 years (see Chapter 1, Section 1.2). As reviewed earlier, children's pretence understanding might be related to their understanding of other naïve psychology concepts. Given the relatively small sample size, correlation rather

than regression analysis was therefore employed to examine the relation between pretence understanding and other sophisticated naïve psychology concepts. This approach has been adopted in previous cross-sectional (e.g. Nielsen & Dissanayake, 2000) and longitudinal (e.g. Charman et al., 2000) studies to investigate the link between pretend play behaviour and naïve psychology development. Regression was not used because with the minimum five predictor variables required (VMA, gender, task, culture and culture by task interaction), Green (1991) recommended a minimum sample size of 90.[27]

The relatively small sample size also limited the number of pretence understanding tasks included into the analysis. Although a number of pretence understanding tasks were used in this study, the longitudinal results reported in Section 6.3.4 of this chapter indicated that the UK cohort scored significantly better than the Singapore cohort specifically in the mental representation in pretence task in phases II and III and in the false-belief prediction task in phase III. In addition, previous research demonstrated that appreciating the mentalistic nature of pretence was related to understanding false-belief and appearance-reality distinction (Rosen et al., 1997). Therefore, the mental representation in pretence task was selected as the best choice to explore the relationships. The partial correlations, controlling for phase I VMA[28] and gender, for the mental representation in pretence, level-2 visual perspective-taking, appearance-reality distinction, false-belief prediction and false-belief explanation tasks are presented in Table 6.4. Although the data presented here included between-task correlations for these naïve psychology measures, only those correlations highlighted in bold for phases II and III mental representational in pretence with other naïve psychology tasks were considered here. The between-task correlations are discussed in relation to conceptual coherence in children's naïve psychology development in Chapter 10 (Section 10.3).

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[27] Green (1991) suggested $N \geq 50 + 8m$, where $m$ is the number of predictors, as a rule of thumb to test the overall fit of regression model.

[28] The results were similar when phase III VMA was partialled out.

Table 6.4. Partial Correlations (Controlling for VMA and Gender) between Pretence Understanding and Other Sophisticated Naïve Psychology Measures for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| Naïve psychology measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Phase II Mental representation in pretence | - | **.24** | **.19** | **.22** | **.18** | .25 | **.13** | **.39** | **.11** | **.41**\*\* |
| 2 Phase II Level-2 visual perspective-taking | **.28**\* | - | .01 | .13 | -.08 | **.16** | .24 | **.50**\*\* | .16 | .29[a] |
| 3 Phase II Appearance-reality distinction | **.14** | .21 | - | .05 | **.62**\*\* | **.10** | .25 | -.14 | -.01 | .09 |
| 4 Phase II False-belief prediction | **.09** | -.03 | -.08 | - | .05 | **.17** | -.03 | **.35**\* | .20 | .27 |
| 5 Phase II False-belief explanation | **-.26** | -.19 | -.07 | .06 | - | **.09** | .17 | -.12 | .05 | .12 |
| 6 Phase III Mental representation in pretence | .12 | **.33** | **.20** | **-.12** | **.06** | - | **.09** | **.17** | **.28**[a] | **.21** |
| 7 Phase III Level-2 visual perspective-taking | **.18** | **.32**\* | .14 | -.11 | .04 | **.39** | - | .19 | .11 | .25 |
| 8 Phase III Appearance-reality distinction | **.33**\* | .27[a] | .24 | -.04 | -.09 | **.21** | .15 | - | **.26**[b] | **.41**\*\* |
| 9 Phase III False-belief prediction | **.39**\*\* | .15 | -.14 | .02 | .03 | **.17** | .14 | .10 | - | **.32**\* |
| 10 Phase III False-belief explanation | **.02** | .23 | -.12 | .24 | -.16 | **.01** | .14 | .10 | -.01 | - |

*Note.* The upper half of the table shows the UK cohort and the lower half the Singapore cohort. It is noted that Bonferroni corrections were not applied due to the increased risk of Type II error in small sample sizes (e.g. Johnson et al., 2010).

[a] Approached significance, $p = .05$. [b] Missed significance, $p = .07$.

\*$p < .05$. \*\* $p < .01$.

As shown in the lower half of Table 6.4, with respect to pretence understanding, significant longitudinal positive correlations were found for understanding mental representation in pretence in phase II with knowledge of appearance-reality distinction and false-belief prediction in phase III for the Singapore cohort. Phase II mental representation in pretence was significantly concurrently (within phase)[29] associated with phase II level-2 visual perspective-taking for the Singapore cohort. These task correlations were not observed in the UK cohort. In contrast, longitudinal positive correlations were found for understanding mental representation in pretence in phase II with false-belief explanation in phase III for the UK cohort. Concurrent correlation between phase III mental representation in pretence and phase III false-belief prediction approached significance for the UK cohort ($p = .05$). According to Field (2005), a correlation coefficient value of ±.3 is a medium effect and ±.5 is a large effect. Here, the results revealed medium correlations between understanding mental representation in pretence and some other sophisticated naïve psychology concepts. There was no evidence of reciprocal relationships. That is, early understanding of other aspects of naïve psychology was not associated with later understanding of mentalistic nature of pretence for either cohort.

To sum up, knowledge of the mental representational nature of pretence was significantly correlated with understanding of some other sophisticated naïve psychology concepts. Concurrent associations between task scores within a single phase of study were found for both cohorts. In addition, longitudinal associations were observed for both cohorts. The results of this study support a longitudinal association between early understanding of the mentalistic nature of pretence and later acquisition of other aspects of naïve psychology for a Western and hybrid culture. There was, however, no evidence of a reverse relationship between early understanding of other aspects of naïve psychology and later knowledge of mentalistic nature of pretence for either cohort.

## 6.4    Discussion

The longitudinal findings have made several contributions to the current literature. First, the results have demonstrated a number of cultural similarities and differences in children's understanding of naïve psychology. The findings confirm that naïve psychology concepts were acquired in a similar broad developmental sequence between a Western and a hybrid culture at 2½ years (phase I), 3 years (phase II) and 3½ years (phase III). At 2½ years of age, some children developed an understanding of rudimentary aspects of pretence

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[29]    Concurrent correlation means that a task score was associated with another task score in the same phase of study. Longitudinal correlation means that a task score of an earlier phase of study correlates with another task score of a later phase.

understanding, discrepant desires and level-1 visual perspective-taking. At 3 years of age, some children acquired knowledge of mentalistic nature of pretence. At 3½ years of age, some children exhibited understanding of level-2 visual perspective-taking, appearance-reality distinction and false-beliefs. These findings corroborate previous Western results showing a gradual pattern in naïve psychology development (e.g. Carlson, Mandell, & Williams, 2004; Hughes & Ensor, 2007; Wellman et al., 2001). The longitudinal similarities and differences in naïve psychology development are central to the current literature and the bulk of the following discussion is therefore devoted to them. Second, the findings reveal cultural similarities and differences in the performance sequence of naïve psychology tasks at 3 and 3½ years of age respectively. Third, the results show patterns of associations between aspects of pretence understanding and other naïve psychology concepts. A final point, linked to baseline findings reported in the previous chapter, relates to the low conceptual coherence of children's naïve psychology concepts at 3 and 3½ years of age, and this will also briefly be discussed.

### 6.4.1 Cross-cultural similarities and differences in longitudinal changes in naïve psychology development

The first research question of this chapter concerned the extent to which developmental changes in children's understanding of pretence, desires, visual perceptions and beliefs differed between the two cultures across the three time points. Comparing the developmental onset of various sophisticated naïve psychology concepts, it can be seen that more cultural similarities than differences were found. Children's performance on the majority of the pretence understanding, level-2 visual perspective-taking, appearance-reality distinction and false-belief explanation tasks were similar at 2½, 3 and 3½ years of age between the two cultures. This finding supports the notion of a universal naïve psychology development (e.g. Wellman et al., 2001). With increasing age, both cohorts showed relatively steady improvement in rudimentary understanding and became more competent in grasping complex, representational mental-states. More specifically, children displayed improvement in knowledge of attribution of pretend properties, object substitution, pretend transformation and level-1 visual perspective-taking between 2½ and 3 years of age. Children continued to show improvement in knowledge of pretend transformation and level-1 visual perspective-taking as well as discrepant desires, level-2 visual perspective-taking, mental representation in pretence, appearance-reality distinction, the false-belief question in the appearance-reality distinction task and false-belief explanation between 3 and 3½ years

of age. Similar improvement in these tasks was observed from 2½ to 3½ years of age for both cohorts.

The pattern of development from rudimentary to sophisticated understanding in the present study fits well with the four dominant models of naïve psychology development reviewed in Chapter 1 (Section 1.3). Modularity theorists postulate that the biological maturation of a specialised innate neurocognitive system in the first two years of life forms the basis for acquiring a naïve psychology (e.g. Leslie, 1987). According to theory theorists, children acquire a simple non-representational understanding of mental-states by 2 to 3 years of age: one's behaviour and actions are driven by desires (e.g. Gopnik & Wellman, 1992). The period between 3 and 4 years of age is characterised by a major cognitive achievement: a representational understanding that behaviour and actions are driven by beliefs. As indicated by representational theory of mind, 2 and 3-year-old children utilise a 'situation theory' whereas 4-year-old children develop an understanding of representational nature of mental-states (Perner, 1991). Simulation theorists propose that by 2 years of age, children are able to attribute mental-states such as desires and emotions to dolls and pretend properties to objects in pretend play (e.g. Harris, 1992). Between 3 and 4 years of age, children can infer other people's mental-states by imagining what the person might do. With advancement in simulation skills, 4-year-old children are able to set aside their current beliefs while imagining a different perspective and belief for another person.

Some of present results replicate those of previous Western studies, and extend them, by showing that these patterns also exist in Singapore, a hybrid culture. For example, the results from both cohorts are consistent with those of Davis et al. (2002) who found that 3-year-old Western children understand the representational nature of pretence. They are also consistent with previous work which reported that 3 and 4-year-old Western children understand pretence as mentalistic (e.g. Bruell & Wolley, 1998; Custer, 1996; Hickling et al., 1997). The finding from the present study that the majority of the children in both cohorts failed both the false-belief prediction and false-belief explanation tasks at the age of 3 years is in line with the findings of Bartsch and Wellman (1989), Robinson and Mitchell (1995), Wimmer and Perner (1983) and Wimmer and Weichbold (1994). The results are also in accordance with Clements and Perner's (1994) and Robinson and Mitchell's (1995) findings that including the temporal marker 'first' in the test question of the false-belief prediction task appears to have a minimal effect on performance at 3 years of age (this is in contrast however, with Western and Iranian studies reporting that the temporally specific question facilitates children's performance on the standard false-belief prediction task, e.g. Joseph, 1998; Siegal & Beattie, 1991; Surian & Leslie, 1995; Yazdi et al., 2006). As no version of

the question was used without this temporal marker, the effects of it, however, cannot be ascertained for certain. Chapter 7 considers these false-belief tasks in further detail.

Subtle cultural differences in naïve psychology, in the action prediction and discrepant desire tasks, were found at 2½ years of age (see chapter 5). Somewhere between 3 and 3½ years of age, however, there was a more distinct divergence in developmental paths, with substantial cross-cultural differences found in this chapter in children's performance on the false-belief prediction task at 3½ years of age (after VMA and gender were included as covariates). Moreover, the UK cohort achieved significantly higher total mean scores in the mental representation in pretence task at 3 and 3½ years of age than the Singapore cohort. Furthermore, a significant improvement in false-belief prediction between 3 and 3½ years of age was observed for the UK cohort whereas no significant change was found for the Singapore cohort. Nevertheless, children are characterised as acquiring a complete false-belief understanding when they can pass the false-belief prediction question and justify the character's action in terms of false-belief. In Chapter 7, further analysis will be conducted to establish whether the cultural differences remain when both conceptual abilities are taken into consideration at 3½ years of age.

In this study, the total mean across the three phases for the discrepant desire task was higher for the Singapore cohort than the UK cohort. Cultures do vary in the degree to which they accentuate understanding others' desires and perspectives. Children in Eastern cultures are often encouraged to be attuned to the desires and feelings of others whereas children in Western cultures are encouraged to focus on their own desires and feelings more than their Eastern counterparts (e.g. Wang, 2001, see Chapter 5, see Section 5.4). It is possible that different cultural emphasis on self versus other's mental-states may have contributed to better performance on the discrepant desire task across the three phases for the Singapore cohort compared to the UK cohort. Similarly, in a study of the effect of culture on perspective-taking, Wu and Keysar (2007) found that American adults who grew up in an individualistic culture that promotes independence and places less emphasis on other-orientation were less able to interpret actions from another person's perspective than Chinese adults who grew up in a collective culture that values interdependence.

The current finding, however, indicating that the UK cohort had higher mean scores than the Singapore cohort across the three phases for the level-1 visual perspective-taking task is difficult to reconcile with these traits of individualist and collectivist cultures. It is worth noting that attributing specific traits based on an individualism-collectivism dimension may fail to account for the many possible factors that could contribute to cross-cultural differences. It is possible that the UK advantage in level-1 visual perspective-taking found in

the present results may be due to cultural-related diversity in early social interactions influencing naïve psychology ability. A considerable amount of literature has reported cross-cultural variations in social competence (e.g. prosocial behaviour, cooperation, conflicts) between Western and Eastern cultures (see review in Rubin & Menzer, 2010). Chapter 9 considers whether naturalistic observations of peer interactions may reveal how behaviours vary cross-culturally and how cultural and social factors interact to influence children's naïve psychology development.

In all, the mixed pattern of cultural similarities and differences in individual task performance indicates that culture must be recognised as an important factor that shapes the developmental onset of various naïve psychology concepts from 2½ to 3½ years of age. The notable cultural differences in naïve psychology suggest that different early socialisation experiences in diverse cultural contexts might affect children's developing understanding of mind.

### 6.4.2 Performance sequences in naïve psychology

The second research question of this chapter was to compare the performance sequences on naïve psychology tasks in phases II and III between the two cohorts. As with the findings in Chapter 5, the present chapter suggests more similarities than differences in the task performance sequences across phases. These results are consistent with previous studies in this field showing universal developmental sequence of naïve psychology concepts (e.g. Wellman et al., 2006). The present results revealed clear developmental changes in rudimentary and sophisticated naïve psychology concepts during the preschool years. Children's understanding of rudimentary mental-states such as object substitution, attribution of pretend properties, pretend transformation, discrepant desires and level-1 visual perspective-taking precedes knowledge of sophisticated, representational mental-states such as mental representation in pretence, pretend-reality distinction, level-2 visual perspective-taking, appearance-reality distinction, false-belief prediction and false-belief explanation. The gap between these two aspects is a stable feature across the three phases. The parallel developmental pattern could be attributed to commonalities between the two cohorts as identified in Chapter 5 (Section 5.4). This lack of differences also coincides with Lillard's (2006b) finding that more Westernised Asian people might develop in a similar pattern to Western people: similarities in developmental pattern can also perhaps be attributed to Western influences on the upbringing and education of Singaporean children.

On the other hand, there was a cohort difference in the task performance sequence in phase III of the present study. Among the battery of tasks, pretence understanding tasks were

found to develop earlier than some of the other naïve psychology tasks for the Singapore cohort. On the contrary, the performance sequence for the UK cohort showed a more varied pattern among different mental-states. Even though Wellman et al. (2006, p. 1077) argue that "when sequences, not ages of attainment or some absolute mean score, are compared, exact (impossible-to-achieve) matching of ages, of socioeconomic status, and so on becomes less relevant", they agree that cultural differences in sequences may be attributed to confounding factors such as differences in languages spoken, family experiences and quality of preschools. As discussed in Chapter 2 (Section 2.4), a range of studies attribute individual differences in naïve psychology development to common and distinct influences such as child characteristics and social environmental factors like presence of siblings and family background. The present results also suggest that contextual variables have to be taken into account in order to understand the impact of culture and the changing social environmental factors on naïve psychology development (see Chapter 8).

It is noted that despite the differences in task performance sequences, the results revealed a similar hierarchical pattern of performance across four tasks that served as measures of children's naïve psychology in previous studies (e.g. Gopnik & Slaughter 1991; McAlister & Peterson, 2007, Naito & Koyama, 2006). The developmental sequence of emergence of these mental-states is reflected in this order: level-2 visual perspective-taking, false-belief prediction, appearance-reality distinction and false-belief explanation.

### 6.4.3 Associations between pretence understanding and other naïve psychology concepts

The third and final research question of this chapter was to investigate the associations between pretence understanding and other aspects of naïve psychology. Understanding the mental representational nature of pretence at 3 years of age was significantly positively associated with appearance-reality distinction and false-belief prediction task performance at 3½ years of age for the Singapore cohort alone. In contrast, understanding the mental representational nature of pretence at 3 years of age was significantly positively related with false-belief explanation at 3½ years of age for the UK cohort alone. It can therefore be assumed that for some Singaporean and UK children who displayed early understanding of mental representational nature of pretence, they acquired better knowledge of mental representation at a later time point. A near significant concurrent positive association between understanding mental representation in pretence and false-belief prediction ability at 3½ years of age was found for the UK cohort alone.

The observed concurrent positive correlation between understanding mental representation in pretence and level-2 visual perspective-taking at 3 years of age for the Singapore cohort alone might be that understanding what another person is pretending or thinking about requires an understanding of perspective. Practice at taking the perspectives of another person might be related to adopting that person's viewpoint and understanding that person's pretend acts and thoughts. Alternatively, once children understand that pretence involves considering alternative perspectives (e.g. pretend-reality distinction: Although Brandon stands closer to a rabbit, he is pretending to hop like a kangaroo), they appreciate that another person may hold different perspectives from themselves.

As noted earlier, children exhibited understanding of the representational nature of pretence at 3 years of age. There was no evidence that early knowledge of appearance-reality distinction, false-belief prediction and false-belief explanation is associated with children's later understanding of the mental representational nature of pretence in either cohort. A possible explanation for this might be that knowledge of appearance-reality distinction, false-belief prediction and false-belief explanation requires higher cognitive skills than understanding mental representational nature of pretence. This view is supported by higher mean scores for the mental representation in pretence task compared to the appearance-reality distinction, false-belief prediction and false-belief explanation tasks for both cohorts at 3 and 3½ years of age. Another possible explanation is that the types of task employed here might have contributed to the null results. The mental representation in pretence task used here was a modified version developed by Davis et al. (2002) to reduce the cognitive complexity in terms of the salience of action and the verbal requirements of the task. It may be possible that the relationships among tasks might be very different if another task format is employed (e.g. Lillard, 1993b; see discussion in Chapter 1, Section 1.2.1).

### 6.4.4 Coherence of naïve psychology concepts at 3 and 3½ years of age

While phase I results provided partial support that children's naïve psychology comprises of a coherent system of interrelated concepts linked together in a single theoretical framework as proposed by theory theory (e.g. Slaughter & Gopnik, 1996), phases II and III analyses suggested that children's understanding of naïve psychology concepts are fragmented (see Section 6.3.2). Interestingly, the internal consistency results indicated low coherence among tasks for both cohorts. These findings differ from some published studies that showed modest internal consistency (e.g. Cutting & Dunn, 1999; Hughes & Ensor, 2007; McAlister & Peterson, 2007) but they are in agreement with other studies that reported poor coherence among standard naïve psychology tasks (e.g. Carlson, Mandell, & Williams,

2004a; Carlson, Moses, & Breton, 2002). It seems possible that among the large battery of rudimentary and sophisticated naïve psychology tasks administered in the present study, each task measures different cognitive constructs and taps varying levels of cognitive skills. It is noted that Cronbach's alpha coefficients and factor analysis provide one metric. Another important point to note is that a clear definition of what constitutes a coherent or a fragmented system of naïve psychology concepts is required. That is, some naïve psychology concepts may be so closely related to one another that learning one concept support the development of another concept. The analyses in the present study were conducted on the battery of non-representational and representational tasks and subsets of pretence, visual perception and belief tasks. Further work needs to be done to establish whether other naïve psychology concepts that measure the same construct are linked logically to form a coherent system of conceptual understanding (e.g. belief understanding and knowledge-ignorance attribution).

## 6.5    Conclusion

This chapter makes three contributions to the current literature. First, the results demonstrate that naïve psychology development is both universal and culture-specific: Both cohorts begin on a fairly similar path at 2½ years of age but development diverges more markedly at 3 and 3½ years of age. The findings are in agreement with a range of Western data which show that children develop an elementary understanding of pretence and desires before visual perceptions, followed by beliefs (discussed in Chapter 1, Section 1.2). The present results also reveal stable and continual developmental changes in these naïve psychology concepts from 2½ to 3½ years of age. Second, the results show similarities in task performance sequences at 2½ and 3 years of age but a divergence at 3½ years of age. One key implication of these results is that the influence of cultural and social factors on naïve psychology development should not be ignored when comparing children from different cultural backgrounds. Finally, the findings support the premise that understanding the representational nature of pretence is linked to the development of knowledge of mental representation. The most interesting finding in this chapter is that while two-thirds of the UK cohort showed an emergence of false-belief prediction understanding at 3½ years of age, less than one-third of the Singapore cohort were able to make correct false-belief prediction at this age. The results indicate that the mean CA of children who passed the false-belief prediction task was slightly younger for the UK cohort than the Singapore cohort. In the following chapter, children's developing understanding of belief and knowledge-ignorance is explored in detail in the two cultures.

# CHAPTER 7

# LONGITUDINAL CHANGES IN UNDERSTANDING BELIEFS

**7.1     Introduction**

This chapter focuses on the developmental changes in children's understanding of knowledge-ignorance and beliefs from 3 to 3½ years of age in the UK and Singapore cohorts (Research Question 3). Children's understanding of beliefs comprises of several conceptual abilities, including true-belief ascription, false-belief prediction and false-belief explanation (see Chapter 1, Section 1.2.4). Similar to belief, understanding knowledge-ignorance requires children to infer whether another person knows or does not know something (Perner & Wimmer, 1988). More specifically, this chapter focuses on these key aspects of naïve psychology in order to investigate cross-cultural differences in depth. Both the unexpected transfer false-belief prediction and the unexpected transfer false-belief explanation tasks form the basis for the analysis of this chapter. The previous chapter indicated that the two cohorts differed significantly in understanding false-belief prediction at 3½ years of age. It is important, however, to consider children's understanding of beliefs across a range of naïve psychology concepts and tasks and not just false-belief prediction. Furthermore, it is crucial to understand the developmental onset of false-belief prediction in relation to the onset of knowledge-ignorance attribution, true-belief ascription and false-belief explanation. This chapter begins with a brief review of the evidence relating to developmental changes in children's understanding of beliefs and knowledge-ignorance covered in Chapter 1. Next, the longitudinal results are presented. Finally, this chapter discusses how cultural and social environmental factors may explain the similarities and differences in the development of knowledge-ignorance and belief understanding that unfold from 3 to 3½ years of age.

A review of current literature showed varied and conflicting findings regarding children's knowledge-ignorance attribution and true-belief ascription in Western cultures (for detailed discussion, see Chapter 1, Section 1.2.4). Some previous studies show that children are able to attribute knowledge-ignorance before belief (e.g. Hogrefe et al., 1986) whereas other research reports no difference in children's ability to attribute knowledge-ignorance and false-belief (e.g. Sullivan & Winner, 1991, 1993). Adding to the confusion, some studies have reported good true-belief performance among 3-year-old children (e.g. Garnham & Ruffman, 2001; Ruffman et al., 2001; Wellman & Bartsch, 1988). Other research, however, has demonstrated that children aged between 36 and 48 months have difficulty ascribing true-belief (e.g. Riggs & Simpson, 2005; Russell, 2005). To date, no

cross-cultural studies have been published that examine children's understanding of true-belief and knowledge-ignorance.

Children acquire an understanding of false-belief when they recognise that others can have beliefs and acts on beliefs that are false. Crediting children with a representational understanding of false-belief should require them to demonstrate not just the ability to *predict* a character's actions based on false-beliefs but to *explain* a character's action in terms of false-beliefs (e.g. Atance & O'Neill, 2004). A few studies have found that 3-year-old children performed better at explaining than predicting false-beliefs (e.g. Robinson & Mitchell, 1995). Bartsch and Wellman's (1989, Experiment 2) data showed that the average age of children who passed the false-belief explanation but failed the prediction task was 3 years 9 months, suggesting that an initial understanding of false-belief emerges during the second half of the third year (although Wellman (1990) has put a different interpretation on the results). Most other research has shown that 3-year-old children and young 4-year-old children do not find explaining an action in terms of false-beliefs easier than predicting false-beliefs (e.g. Wimmer & Mayringer, 1998; Wimmer & Weichbold, 1994). Wellman et al. (2001, p. 672) described the period between 3 years 5 months and 4 years of age as an "intermediate, transitional age". Although there is a gradual improvement in understanding of false-belief prediction during this period, children are unable to express this understanding by providing an explanation of the character's action on the basis of false-beliefs (Flynn, 2006; see also Clement & Perner, 1994). While the findings from Chapter 6 indicated that the UK cohort outperformed the Singapore cohort in the false-belief prediction task, it is unclear whether the children were in this transitional stage: able to correctly predict the character's actions explicitly, without being able to justify their response. Further analysis is needed to examine whether the UK cohort exhibited this pattern of performance in order to discern more subtly the important developmental differences between the two cultures. The analysis presented in this chapter will achieve this by adopting a more stringent scoring criterion to assess children's current level of false-belief understanding at 3½ years of age, assessing not only their ability to make predictions on the basis of their false-belief understanding, but also their ability to provide justifications/explanations.

According to Flynn (2006), children progress through a period in which they tend to give situational answers by describing the current state (e.g. "The marble is in the box") in their false-belief explanations. They are unable to provide correct explanations of a character's behaviour explicitly because they are unable to articulate their understanding verbally. Once children are able to explain behaviour in terms of false-beliefs, the number of situational and don't know/no responses decreases. In the Western contexts, Moses and

Flavell's (1990, Experiment 2) study showed that only 3% of the explanations provided by the 3-year-old children were expressed in terms of the character's false-beliefs and references were more often made to the character's desires (53%), the outcome of the situation (16%) or no explanation provided (28%). Clements et al. (2000) reported that the majority of the 2 to 5-year-old children in their study tended to justify their correct answers in terms of earlier location (e.g. "Because Sally puts it there") rather than belief (e.g. "Because Sally thinks the marble is in the basket"). Wimmer and Mayringer's (1998) results revealed that one-third of the 3 to 6-year-old children's incorrect responses referred to the character's desire. Cross-cultural variations in false-belief explanation have also been reported. Naito and Koyama (2006, Experiment 2) demonstrated that 6 to 8-year-old Japanese children tended to explain a character's action based on situational or behavioural cues rather than mental-states (see Chapter 2, Section 2.3). There is also evidence to suggest cultural variations in the explanation for causes of behaviours between Taiwanese and American children (Lillard, 2006b) and between Indian and American children (Miller, 1984). Analysis of longitudinal changes will allow an investigation of whether there are changes over time in cultural differences in children's ability to justify their predictions in the unexpected transfer false-belief prediction task and in their ability to explain a character's behaviour on the basis of false-beliefs in the unexpected transfer false-belief explanation task.

More importantly, there is no published longitudinal research that explores the developmental patterns of children's knowledge-ignorance attribution and belief understanding between Eastern and Western cultures from 3 to 3½ years of age. Given the confusing picture described above, such cross-cultural investigation is necessary to establish whether the acquisition of knowledge-ignorance attribution and belief understanding constitutes a gradual process like the developmental sequence of other naïve psychology concepts such as the understanding of pretence and desires before visual perception and false-belief prediction. Or alternatively, understanding of knowledge-ignorance and beliefs may form a coherent conceptual system, with children acquiring these different aspects of naïve psychology at the same age.

## 7.2    Research Questions

Based on the reviewed theoretical concepts, existing empirical evidence and the longitudinal results in Chapter 6, this chapter addresses Research Question 3 (stated in Chapter 1) by dividing it into two subsidiary research questions (3a and 3b). This enables more detailed analysis of developmental changes in children's understanding of knowledge-

ignorance and beliefs. As described in Table 7.1 below, the prediction task required children to provide a justification as to why the character has gone to look for the object in the location that the children choose, whereas the explanation task required children to explain why the character had looked for the object in the original location. Given the different nature of the justification/explanation questions, the justification question in the unexpected transfer false-belief prediction task shall hereinafter be referred to as "false-belief justification" in order to differentiate it from the "false-belief explanation" question in the unexpected transfer false-belief explanation task.

3. **Are there longitudinal differences between the UK and Singapore cohorts in the development of knowledge-ignorance and beliefs from 3 to 3½ years of age?**

   a. **Are there longitudinal differences between the UK and Singapore cohorts in children's:**

      i. **knowledge-ignorance attribution ability from 3 to 3½ years of age?**

      ii. **true-belief ascription ability from 3 to 3½ years of age?**

      iii. **false-belief prediction and justification abilities in the unexpected transfer false-belief prediction task from 3 to 3½ years of age?**

      iv. **false-belief justification and false-belief explanation abilities from 3 to 3½ years of age?**

   b. **Do the performance sequences of knowledge-ignorance attribution and belief understanding at 3 to 3½ years of age differ between the UK and Singapore cohorts?**

## 7.3 Results

Before the results for these research questions are presented, there will be preliminary analysis of the false-belief tasks to allow for comparison with existing literature in the discussion (see Section 7.4).

### 7.3.1 False-belief tasks, comparable scale, gender differences, descriptive statistics and analysis steps

Table 7.1 lists the questions administered, along with the scoring criteria, for both the unexpected transfer false-belief prediction and explanation tasks (for full descriptions, see Chapter 4, Section 4.7.1).

Table 7.1. Mean[a] (Standard Deviation) Scores of Naïve Psychology False-belief Measures for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| Measure | Questions[b] | Scoring[b] | Phase II (3 years of age) | | Phase III (3½ years of age) | |
|---|---|---|---|---|---|---|
| | | | UK | Singapore | UK | Singapore |
| **Unexpected transfer false-belief prediction task** | | | | | | |
| False-belief prediction | **False-belief:** "Where will Sally look for the marble first?" **Reality:** "Where is the marble now?" **Memory:** "Before Sally left the house, where did she place the marble?" | Children received a score of 1 if they passed the false-belief question and answered both the reality and the memory questions correctly. | .44 (.84) | .21 (.62) | 1.33 (.96) | .58 (.92) |
| False-belief justification | "Why will Sally look there?" | Children received a score of 1 for answering the justification question correctly. | .17 (.56) | 0 | .33 (.76) | .26 (.69) |
| True-belief ascription | "When Sally left the house, where did she think her marble was?" | Children received a score of 1 for correct response to the true-belief question. | .39 (.80) | .47 (.86) | 1.33 (.96) | .26 (.69) |
| Knowledge-ignorance attribution | **Ignorance:** "Did Sally know that Anne moved the marble?" **Seeing:** "Did Sally see Anne moved the marble?" | Children received a score of 1 for answering both ignorance and seeing questions correctly. | .44 (.84) | .32 (.74) | 1.06 (1.01) | .32 (.74) |

*table continue*

Table 7.1 (cont.)

| Measure | Questions[b] | Scoring[b] | Phase II (3 years of age) | | Phase III (3½ years of age) | |
|---|---|---|---|---|---|---|
| | | | UK | Singapore | UK | Singapore |
| **Unexpected transfer false-belief explanation task** | | | | | | |
| False-belief explanation | **Reality:** "Where is the baby really?" **Explanation to False-belief:** "Why do you think Mummy is looking for the baby in the cot?" **Memory:** "Before Mummy left the room, where did she place the baby?" | Children received a score of 1 if they passed the false-belief explanation question and answered both the reality and memory questions correctly. | .17 (.56) | .16 (.55) | .72 (.97) | .47 (.86) |
| True-belief ascription | "When Mummy left the room, where did she think the baby was?" | Children received a score of 1 for correct response to the true-belief question. | .83 (1.00) | .58 (.92) | 1.33 (.96) | .58 (.92) |
| Knowledge-ignorance attribution | **Ignorance:** "Did Mummy know that Daddy moved the baby?" **Seeing:** "Did Mummy see Daddy moved the baby?" | Children received a score of 1 for answering both ignorance and seeing questions correctly. | .56 (.91) | .26 (.69) | 1.28 (.97) | .47 (.86) |

*Note.* [a] Range of scores: 0 to 2. [b] The same scoring were used in phases II and III. Questions changed only in relation to character names and objects.

The same procedure that was employed in previous two results chapters of this thesis was used to create a comparable scale on all the measures. The knowledge-ignorance attribution, true-belief ascription and false-belief justification scores were transformed by multiplying each score by 2. This resulted in a minimum possible score of 0 and a maximum possible score of 2 for all questions.

As noted in Chapter 6, there was a near significant gender difference between the two cohorts. Gender differences were revealed for the UK cohort in phase II true-belief question for the false-belief explanation task ($t(34) = 2.38$, $p < .05$, $r = .38$), phase III true-belief question for the false-belief transfer task ($t(34) = 2.82$, $p < .01$, $r = .44$), phase III knowledge-ignorance question in the false-belief transfer task ($t(34) = 2.44$, $p < .05$, $r = .39$) and phase III knowledge-ignorance questions in the false-belief explanation task ($t(34) = 2.36$, $p < .05$, $r = .38$). For the Singapore cohort, significant gender differences in phase III true-belief question in the false-belief explanation task ($t(36) = 2.59$, $p < .05$, $r = .40$) were found. The results showed that girls performed significantly better than boys in these aspects of naïve psychology for both cohorts. Given the overrepresentation of boys in the Singapore cohort and gender differences in some naïve psychology measures, all subsequent major analyses presented in this chapter include gender as a covariate.

The descriptive statistics for each naïve psychology measure across phases II and III are also presented in Table 7.1. The analysis carried out in this chapter was based on the final sample of children. Note that any overlap in the analysis for the false-belief prediction and explanation questions between the previous and current chapters will be indicated.

### 7.3.2 Research question 3a(i): Are there longitudinal differences between the UK and Singapore cohorts in children's knowledge-ignorance attribution ability from 3 to 3½ years of age?

As reviewed in Chapter 2, the influence of VMA and gender in naïve psychology development is well-documented in the literature. Therefore, only ANCOVA results are presented in this chapter to give a more conservative analysis of differences between the two cultures. To compare whether there were cohort differences in children's knowledge-ignorance attribution for the false-belief prediction task across the two phases, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with phase I VMA[30] and gender as covariates, was computed. This analysis only revealed a significant main effect of culture ($F(1, 70) = 7.85$, $p < .01$, $\eta_p^2 = .10$). The total mean across the two phases for the

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[30] The findings reported in this chapter were similar when the analyses were rerun with phase III VMA as covariate.

knowledge-ignorance attribution question for the false-belief prediction task was higher for the UK cohort ($M$ = .75, $SD$ = .65) compared to the Singapore cohort ($M$ = .32, $SD$ = .57). There was no significant main effect of phase or culture by phase interaction.

Table 7.2 presents the number and mean age of children who passed or failed the knowledge-ignorance and belief measures for the false-belief prediction task. The number of children who passed the knowledge-ignorance question for the Singapore cohort was too small to permit statistical analysis. Therefore, descriptive statistics are reported. Children in the UK cohort passed phases II and III knowledge-ignorance question at approximately 1½ and 3 months respectively earlier in mean CA compared to the Singapore cohort, although the cohorts did not differ in phase III VMA. [31] Regarding children who failed phases II and III knowledge-ignorance question, independent t-tests showed no significant cultural differences in mean CA and VMA.

To examine whether there were cohort differences in children's knowledge-ignorance attribution for the false-belief explanation task across the two phases, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with VMA and gender as covariates, was computed. This analysis only showed a significant main effect of culture ($F$(1, 70) = 11.97, $p$ = .001, $\eta_p^2$ = .15). The total mean across the two phases for the knowledge-ignorance attribution question for the false-belief explanation task was higher for the UK cohort ($M$ = .92, $SD$ = .69) than the Singapore cohort ($M$ = .37, $SD$ = .54). There was no significant main effect of phase or culture by phase interaction.

The number and mean age of children who passed or failed the knowledge-ignorance and belief measures for the false-belief explanation task are shown in Table 7.3. Since the number of children who passed the knowledge-ignorance question for the Singapore cohort was too small to permit statistical analysis, descriptive statistics are reported. There were no cultural differences in mean CA for phase II knowledge-ignorance question. Even though the UK cohort passed phase III knowledge-ignorance question at approximately 2½ months earlier in CA compared to the Singapore cohort, the cohorts did not differ in phase III VMA. With regard to children who failed phases II and III knowledge-ignorance question, independent t-tests revealed no significant cultural differences in mean CA and VMA.

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[31]   When the ANCOVAs were rerun with CA as covariate, rather than VMA, the main effect of culture was similar, except that the $F$ values and effect sizes were relatively larger. Similar to the results reported above, there was no significant main effect of phase or culture by phase interaction.

Table 7.2. Children Who Passed and Failed the Unexpected Transfer False-belief Prediction Task for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| | Phase II | | | | | | Phase III | | | | | | | |
| | UK | | | Singapore | | | UK | | | | Singapore | | | |
| Measure | N | CA M (SD)[a] | CA Range[b] | N | CA M (SD) | CA Range | N | CA M (SD) | CA Range | VMA[c] M (SD) | N | CA M (SD) | CA Range | VMA M (SD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Children who passed the task** | | | | | | | | | | | | | | |
| False-belief prediction | 8 | 35.88 (1.81) | 33 - 38 | 4 | 36.50 (3.32) | 33 - 41 | 24 | 43.17 (1.66) | 40 - 47 | 49.46 (6.20) | 11 | 45.36 (2.46) | 41 - 48 | 51.73 (8.09) |
| False-belief justification | 3 | 35.67 (1.53) | 34 - 37 | 0 | - | - | 6 | 44.00 (1.27) | 43 - 46 | 53.50 (4.97) | 5 | 46.00 (2.92) | 41 - 48 | 53.80 (8.67) |
| True-belief ascription | 7 | 36.86 (.90) | 36 - 38 | 9 | 38.33 (2.00) | 36 - 41 | 24 | 42.58 (1.74) | 40 - 46 | 47.83 (5.35) | 5 | 46.00 (1.58) | 44 - 48 | 48.40 (6.23) |
| Knowledge-ignorance attribution | 8 | 35.88 (2.03) | 32 - 38 | 6 | 37.67 (3.45) | 33 - 41 | 19 | 43.11 (1.70) | 40 - 46 | 48.58 (5.38) | 6 | 46.00 (2.90) | 41 - 48 | 48.33 (6.12) |
| **Children who failed the task** | | | | | | | | | | | | | | |
| False-belief prediction | 28 | 35.71 (1.88) | 32 - 40 | 34 | 36.71 (2.78) | 32 - 41 | 12 | 41.92 (1.98) | 39 - 45 | 44.58 (4.32) | 27 | 43.00 (2.66) | 39 - 48 | 44.96 (4.47) |
| False-belief justification | 33 | 35.76 (1.89) | 32 - 40 | 38 | 36.68 (2.79) | 32 - 41 | 30 | 42.50 (1.85) | 39 - 47 | 46.70 (5.65) | 33 | 43.33 (2.64) | 39 - 48 | 45.88 (5.47) |
| True-belief ascription | 29 | 35.48 (1.92) | 32 - 40 | 29 | 36.17 (2.83) | 32 - 41 | 12 | 43.08 (2.07) | 39 - 47 | 47.93 (7.52) | 33 | 43.33 (2.78) | 39 - 48 | 46.70 (6.53) |
| Knowledge-ignorance attribution | 28 | 35.71 (1.82) | 33 - 40 | 32 | 36.50 (2.68) | 32 - 41 | 17 | 42.35 (1.97) | 39 - 47 | 47.00 (6.78) | 32 | 43.25 (2.59) | 39 - 48 | 46.66 (6.55) |

*Note.* [a] $M$ ($SD$) = Mean chronological age (standard deviation). [b] CA Range (in months of age). [c] BPVS (Dunn et al., 1997) was administered in phases I and III.

Table 7.3. Children Who Passed and Failed the Unexpected Transfer False-belief Explanation Task for the UK (N = 36) and Singapore (N = 38) Cohorts

| | Phase II | | | | | | Phase III | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UK | | | Singapore | | | UK | | | | Singapore | | | |
| Measure | N | CA M (SD)[a] | CA Range[b] | N | CA M (SD) | CA Range | N | CA M (SD) | CA Range | VMA[c] M (SD) | N | CA M (SD) | CA Range | VMA M (SD) |
| **Children who passed the task** | | | | | | | | | | | | | | |
| False-belief explanation | 3 | 36.67 (.58) | 36 - 37 | 3 | 39.00 (1.73) | 37 - 40 | 13 | 43.08 (1.50) | 39 - 45 | 49.00 (6.03) | 9 | 43.44 (3.05) | 40 - 48 | 50.78 (9.85) |
| True-belief ascription | 15 | 36.20 (1.97) | 32 - 40 | 11 | 35.36 (2.80) | 32 - 41 | 24 | 42.54 (1.72) | 40 - 46 | 47.00 (4.78) | 11 | 44.18 (2.64) | 40 - 48 | 47.82 (6.05) |
| Knowledge-ignorance attribution | 10 | 35.80 (2.10) | 32 - 38 | 5 | 35.80 (3.27) | 32 - 41 | 23 | 42.96 (1.69) | 40 - 46 | 48.65 (5.15) | 9 | 45.56 (2.83) | 41 - 48 | 49.44 (7.09) |
| **Children who failed the task** | | | | | | | | | | | | | | |
| False-belief explanation | 33 | 35.67 (1.90) | 32 - 40 | 35 | 36.49 (2.79) | 32 - 41 | 23 | 42.57 (2.02) | 40 - 47 | 47.17 (6.09) | 29 | 43.76 (2.76) | 39 - 48 | 45.72 (4.55) |
| True-belief ascription | 21 | 35.43 (1.72) | 33 - 39 | 27 | 37.22 (2.65) | 32 - 41 | 12 | 43.17 (2.08) | 39 - 47 | 49.50 (7.99) | 27 | 43.48 (2.87) | 39 - 48 | 46.56 (6.66) |
| Knowledge-ignorance attribution | 26 | 35.73 (1.78) | 33 - 40 | 33 | 36.82 (2.74) | 33 - 41 | 13 | 42.38 (2.10) | 39 - 47 | 46.38 (7.38) | 29 | 43.10 (2.55) | 39 - 48 | 46.14 (6.13) |

*Note.* [a] *M (SD)* = Mean chronological age (standard deviation). [b] CA Range (in months of age). [c] BPVS (Dunn et al., 1997) was administered in phases I and III.

In summary, the UK cohort performed significantly better than the Singapore cohort on the knowledge-ignorance attribution questions in both the false-belief prediction and the false-belief explanation tasks across the two phases. Both cohorts did not show significant improvement in knowledge-ignorance attribution for both tasks across phases, after VMA and gender were included as covariates. Among children who passed the knowledge-ignorance questions for the false-belief prediction and the false-belief explanation tasks, there was a slight cultural difference in mean CA. While the UK cohort passed the knowledge-ignorance questions for both tasks at approximately 1½ to 3 months earlier in term of mean CA than the Singapore cohort, there were no cultural differences with regard to mean VMA. Among children who failed the knowledge-ignorance questions for both tasks, there were no significant cultural differences in mean CA and VMA.

### 7.3.3 Research question 3a(ii): Are there longitudinal differences between the UK and Singapore cohorts in children's true-belief ascription ability from 3 to 3½ years of age?

To examine whether there were cultural variations in true-belief ascription for the false-belief prediction task across the two phases, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with VMA and gender as covariates, was conducted. The findings revealed a significant main effect of culture ($F(1, 70) = 13.91$, $p < .001$, $\eta_p^2 = .17$) and culture by phase interaction ($F(1, 70) = 12.40$, $p = .001$, $\eta_p^2 = .15$) but no main effect of phase. With regard to the main effect of culture, the total mean across the two phases for the true-belief ascription question for the false-belief prediction task was higher for the UK cohort ($M = .86$, $SD = .59$) compared to the Singapore cohort ($M = .37$, $SD = .54$). To explore the interaction effect, separate one-way between cultures ANCOVAs, rather than t-tests, were conducted for each phase to take into account the effects of VMA and gender. The results indicated no cultural differences in phase II true-belief question. However, the UK cohort ($M = 1.33$, $SD = .96$) scored significantly better for phase III true-belief ascription question than the Singapore cohort ($M = .26$, $SD = .69$, $F(1, 70) = 26.05$, $p < .001$, $\eta_p^2 = .27$).

As can be seen in Table 7.2, children in the UK cohort passed phases II and III true-belief ascription questions for the false-belief prediction task at approximately 1½ and 3½ months respectively earlier in mean CA compared to the Singapore cohort, although the cohorts did not differ in phase III VMA. Among children who failed phase III true-belief ascription question, independent t-tests indicated no significant cultural differences in mean CA or VMA.

To explore whether there were cultural differences in true-belief ascription for the false-belief explanation task across the two phases, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with VMA and gender as covariates, was computed. Results indicated a significant main effect of culture ($F(1, 70) = 9.70$, $p < .01$, $\eta_p^2 = .12$). The total mean across the two phases for the true-belief ascription question for the false-belief explanation task was higher for the UK cohort ($M = 1.08$, $SD = .60$) compared to the Singapore cohort ($M = .58$, $SD = .68$). There was no significant main effect of phase or culture by phase interaction.

As shown in Table 7.3, there were no cultural differences in mean CA among children who passed phase II true-belief question for the false-belief explanation task. Even though the UK cohort passed phase III true-belief question at approximately 1½ months earlier in CA compared to the Singapore cohort, there were no cultural differences in phase III VMA. Likewise, independent t-tests revealed no cultural differences in either mean CA or VMA for children who failed phase III true-belief question.

Similar to the results obtained for children's knowledge-ignorance attribution, the UK cohort performed significantly better than the Singapore cohort on the true-belief ascription questions in the false-belief explanation task for phases II and III, after VMA and gender were included as covariates. In addition, the UK cohort scored significantly better than the Singapore cohort in the true-belief question in phase III false-belief prediction task. Among children who passed the true-belief questions for the false-belief prediction and the false-belief explanation tasks, there was a slight cultural difference in mean CA. Although the UK cohort passed the true-belief questions for both tasks at approximately 1½ to 3½ months earlier in term of mean CA than the Singapore cohort, there were no cultural differences with regards to mean VMA. Among children who failed the true-belief questions for both tasks, there were no significant cultural differences in mean CA and VMA.

**7.3.4 Research question 3a(iii): Are there longitudinal differences between the UK and Singapore cohorts in children's false-belief prediction and justification abilities in the unexpected transfer false-belief prediction task from 3 to 3½ years of age?**

The analyses for this research question in each phase consisted of descriptive statistics and ANCOVA analysis comparing performance between the false-belief prediction and justification questions. For phase II false-belief prediction task, eight children from the UK cohort and four children from the Singapore cohort passed the prediction question (see Table 7.2). When asked to justify their predictions, only two children from the UK cohort

were able to correctly justify their choice by referring either to the epistemic-state of the character or to an earlier location (see Figures 7.1a and 7.1b and descriptive statistics in Appendix E2, Table E2.1). One child from the UK cohort failed the false-belief prediction question but provided a correct justification. None of the children in the Singapore cohort answered correctly for both the false-belief prediction and the justification questions. The majority of the children in both cohorts failed both questions. There were no cultural differences in mean CA among children who passed phase II false-belief prediction or justification questions. Independent t-tests revealed no significant cultural differences in mean CA among children who failed phase II false-belief prediction or justification questions.
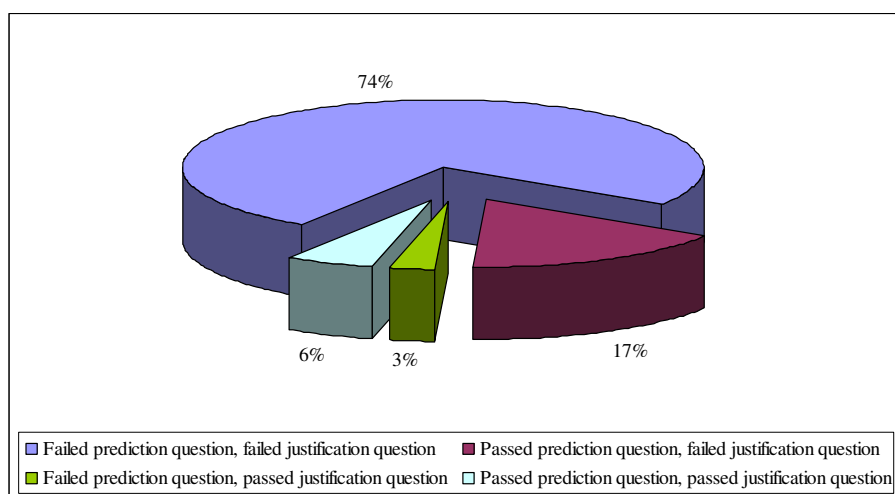


*Figure 7.1a.* Children's performance on prediction and justification questions for phase II false-belief prediction task among the UK cohort ($N = 36$).
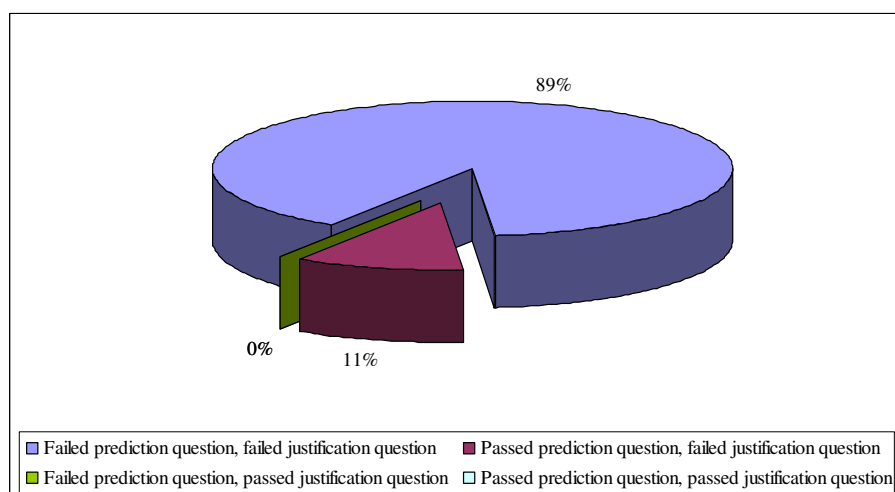


*Figure 7.1b.* Children's performance on prediction and justification questions for phase II false-belief prediction task among the Singapore cohort ($N = 38$).

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For phase III false-belief prediction task, 24 children from the UK cohort and 11 children from the Singapore cohort passed the prediction question (see Table 7.2). When asked to justify their predictions, only six UK children (16.67%) and five Singaporean children (13.16%) were able to correctly justify their choice by referring to an earlier location. The findings suggest that the UK cohort demonstrated an early understanding of false-belief prediction in phase III. As shown in Figure 7.2a, the majority of the children in the UK cohort passed the prediction question but failed to provide correct justifications for phase III false-belief prediction task. In contrast, the majority of the children in the Singapore cohort failed both questions (see Figure 7.2b). None of the children from either cohort were able to provide correct justifications but failed the prediction question. Although many children in both cohorts failed the prediction question, it is noteworthy that some of them tried to transfer the marble/ball back to the original location before they answered the question. Given the small number of children who passed the prediction question for the Singapore cohort and the justification question for both cohorts, descriptive statistics are reported. As can be seen in Table 7.2, children passed phase III false-belief prediction and justification questions approximately 2 months earlier in the UK cohort compared to the Singapore cohort. Nevertheless, there were no cultural differences in VMA among children who passed the false-belief prediction and justification questions. Independent t-tests indicated no significant cultural differences in CA and VMA among children who failed the false-belief prediction and justification questions.
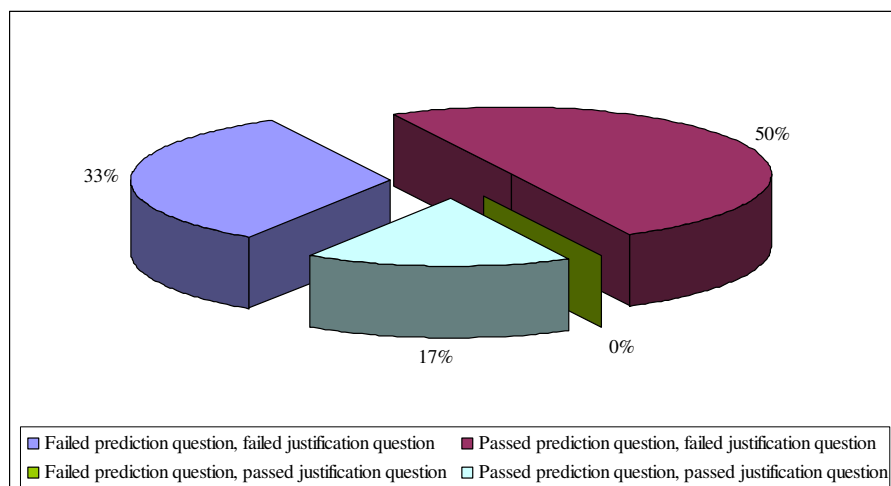


*Figure 7.2a.* Children's performance on prediction and justification questions for phase III false-belief prediction task among the UK cohort (*N* = 36).
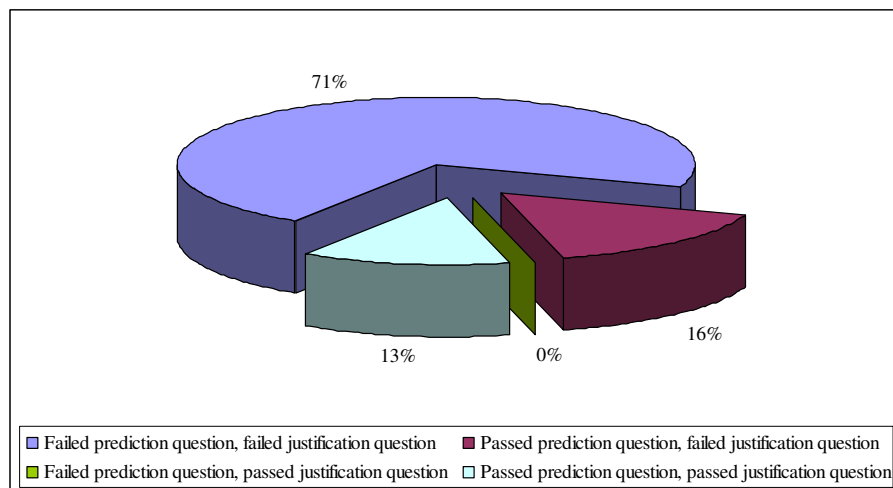
*Figure 7.2b.* Children's performance on prediction and justification questions for phase III false-belief prediction task among the Singapore cohort (*N* = 38).

The next analysis assessed whether there were cohort differences in performance on the false-belief prediction and justification questions for the false-belief prediction task. Two-way 2(culture) x 2(question) mixed-model repeated-measures ANCOVAs, with VMA and gender as covariates, were conducted for each phase. The results revealed no significant main or interaction effects for phase II. However, significant main effects of culture (*F*(1, 70) = 8.85, *p* < .01, $\eta_p^2$ = .11) and question (*F*(1, 70) = 4.76, *p* < .05, $\eta_p^2$ = .06) and culture by question interaction (*F*(1, 70) = 17.00, *p* < .001, $\eta_p^2$ = .20) were found for phase III. To explore the interaction effect, two-way 2(culture) x 1(question) ANCOVAs indicated that, as previously reported in Chapter 6, the UK cohort (*M* = 1.33, *SD* = .96) performed better on false-belief prediction than the Singapore cohort (*M* = .58, *SD* = .92, *F*(1, 70) = 18.81, *p* < .001, $\eta_p^2$ = .21). There were no significant cultural differences in the justification question. To examine performance between the false-belief prediction and justification questions, paired-samples t-tests were conducted. The results indicated that the UK cohort scored significantly better on false-belief prediction than justification (*M* = .33, *SD* = .76, *t*(35) = 5.92, *p* < .001, *r* = .71). Interestingly, the results also revealed that the Singapore cohort scored significantly better on false-belief prediction than justification (*M* = .26, *SD* = .69, *t*(37) = 2.63, *p* < .05, *r* = .40). These results suggest that at 3½ years of age, some children were entering the transitional period when they had begun to make correct predictions but generally failed to provide correct justifications.

Taken together, no significant cross-cultural differences were observed in phase II. While the UK cohort performed better than the Singapore cohort on false-belief prediction in phase III, there were no cultural differences when a more stringent scoring criterion (i.e.

counting only children who had passed both the prediction and justification questions in the false-belief prediction task) was employed. Among children who passed phase III prediction question, there was a slight cultural difference in mean CA. Although the UK cohort passed the prediction question at approximately 2 months earlier in term of mean CA than the Singapore cohort, there were no cultural differences with regards to mean VMA. Among children who failed the prediction question, there were no significant cultural differences in mean CA and VMA. Both cohorts showed significantly better performance in predicting false-beliefs than justifying their answers in phase III.

### 7.3.5 Research question 3a(iv): Are there longitudinal differences between the UK and Singapore cohorts in children's false-belief justification and false-belief explanation abilities from 3 to 3½ years of age?

This analysis focuses on the justification question for the false-belief prediction task and the explanation question for the false-belief explanation task. The number and mean age of children who passed these questions across phases are presented in Tables 7.2 and 7.3. Children's performance on the false-belief justification and explanation questions was compared between phases II and III (see Table 7.4).

To explore whether there were cultural differences in performance on the false-belief justification question across the two phases, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with VMA and gender as covariates, was carried out. The analysis only revealed a significant main effect of phase ($F(1, 70) = 6.22$, $p < .05$, $\eta_p^2 = .08$). Paired-samples t-tests indicated that children in both cohorts were more likely to pass in phase III than phase II ($t(73) = 2.38$, $p < .05$, $r = .27$). There was no significant main effect of culture or a culture by phase interaction.

Although children passed phase III false-belief justification question approximately 2 months earlier in the UK cohort compared to the Singapore cohort, there were no cultural differences with regards to mean VMA. Independent t-tests indicated no significant cultural differences in mean CA and VMA among children who failed phases II and III justification question.

As previously reported in Chapter 6, a 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with VMA and gender as covariates, showed no significant main effects of culture or phase and no interaction effect of culture by phase in the explanation question for the false-belief explanation task.

Table 7.4. Children's False-belief Justifications and Explanations[a] for Phases II and III for the UK (*N* = 36) and Singapore (*N* = 38) Cohorts

| Measure | Failed both phases | | Passed phase II, failed phase III | | Failed phase II, passed phase III | | Passed both phases | |
|---|---|---|---|---|---|---|---|---|
| | UK | Singapore | UK | Singapore | UK | Singapore | UK | Singapore |
| False-belief justification | 28 (77.8) | 33 (86.8) | 2 (5.6) | - | 5 (13.9) | 5 (13.2) | 1 (2.8) | - |
| False-belief explanation | 22 (61.1) | 26 (68.4) | 1 (2.8) | 3 (7.9) | 11 (30.6) | 9 (23.7) | 2 (5.6) | - |

*Note.* [a]Number of children (Percentages are shown in parentheses).

Children passed phase II false-belief explanation question approximately 2½ months earlier in the UK cohort compared to the Singapore cohort. There were, however, no cultural differences in mean CA and VMA among children who passed phase III false-belief explanation question. Independent t-tests revealed no significant cultural differences in mean CA and VMA among children who failed the phase III false-belief explanation question.

The contents of children's justification/explanation answers for both the prediction and explanation tasks were coded based on previous research (e.g. Clements & Perner, 1994; Naito & Koyama, 2006; Wimmer & Mayringer, 1998). The descriptive statistics are presented in Appendix E2 (Table E2.2). As reviewed in Chapter 2, cultural differences were observed in that non-Western children tended to incorrectly justify action based on behavioural cues rather than provide explanations based on epistemic-states to account for the character's false-beliefs (e.g. Naito & Koyama, 2006). Therefore, chi-square tests were conducted to reveal associations between culture (UK versus Singapore) and the justification/explanation questions response categories (behaviour of the second character, mental-states and 'others'). In each phase, separate 2(culture) x 2(category) chi-square tests were computed comparing children's answers in the respective category (e.g. reference to mental-states) with those answers that belonged to other categories.[32] For these analyses, the answers for the false-belief justification and explanation questions were recoded and combined due to the low frequency counts of some categories of answers. As explained in Chapter 4 (Section 4.7.1) references to epistemic-state and earlier location were coded as correct justifications. The remaining categories were coded as incorrect responses.

Figures 7.3a and 7.3b show the children's responses in phase II to the false-belief justification question in the prediction task and to the false-belief explanation question in the explanation task respectively. This illustrates that the majority of incorrect responses in both cohorts referred to the current location of the marble/baby (e.g. "Because it's in the box") or to the actual state of affairs (e.g. "Because it's not in the basket"). Considering children's responses to the two tasks together, there was a significant association between culture and whether or not children made reference to mental-states (epistemic-state and desires/goals), ($\chi^2(1, N = 148) = 7.43$, $p < .01$). A greater number of justifications/explanations in the UK cohort (22.3%) referred to the mental-states of the character compared to the Singapore cohort (6.6%), although of these, only those referring to epistemic-states were correct. Although the UK cohort (8.4%) provided more correct justification/explanation answers compared to the Singapore cohort (3.9%), the difference was not statistically significant as shown in the earlier analysis.

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[32]  None of the cells have an expected count of less than 5.

| | Epistemic | Earlier location | Irrelevant/No explanation | Current location/ Actual state of affairs | Desires/Goal | Behaviour of second character |
|---|---|---|---|---|---|---|
| ■ UK | 1 | 2 | 5 | 19 | 6 | 3 |
| ■ Singapore | 0 | 0 | 14 | 14 | 2 | 8 |
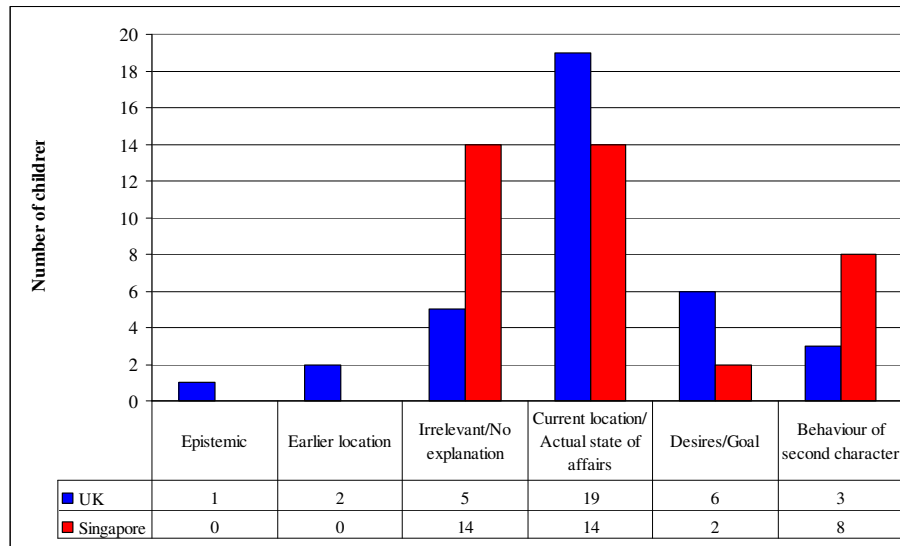
*Figure 7.3a.* Children's performance on false-belief justification question for the UK (*N* = 36) and Singapore (*N* = 36) cohorts in phase II.



| | Epistemic | Earlier location | Irrelevant/No explanation | Current location/ Actual state of affairs | Desires/Goal | Behaviour of second character |
|---|---|---|---|---|---|---|
| ■ UK | 2 | 1 | 3 | 17 | 7 | 6 |
| ■ Singapore | 1 | 2 | 12 | 18 | 2 | 3 |
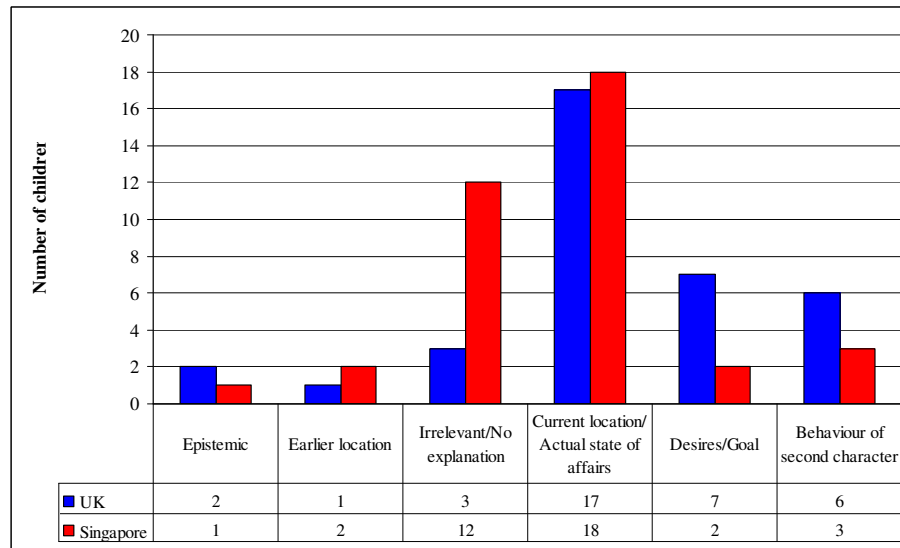
*Figure 7.3b.* Children's performance on false-belief explanation question for the UK (*N* = 36) and Singapore (*N* = 36) cohorts in phase II.

In contrast to the UK cohort (11.1%), far more children from the Singapore cohort (34.2%) provided no explanation or gave irrelevant answers (e.g. "The flower girl brings home"). The number of children who made reference to the behaviour of the second character was similar for the UK (12.5%) and Singapore (14.5%) cohorts. Given the cohort differences in the number of children who gave no explanation or provided irrelevant answers, further analysis was conducted to determine association between culture and whether or not children made reference to behavioural cues and provided no explanation or

gave irrelevant answers. The results revealed a significant association, ($\chi^2(1, N = 148) = 10.03, p < .01$).

Figures 7.4a and 7.4b show the children's responses in phase III to the false-belief justification question in the prediction task and to the false-belief explanation question in the explanation task respectively. Compared with phase II, only one-third of the UK cohort's total responses were incorrectly justified/explained in terms of the current location/actual state of affairs in phase III. By contrast, the majority of the justifications/explanations from the Singapore cohort referred to the behaviour of the second character (e.g. "Because he moved the ball from the box to the bag"). In contrast to phase II, there was no significant association between culture and whether or not children made reference to mental-states (epistemic-state and desires/goals), ($\chi^2(1, N = 148) = .14$, n.s.). The total references made to the mental-states of the character in children's justifications/explanations were similar for the UK (23.6%) and Singapore (21.0%) cohorts. The same number of children from the UK (9.7%) and Singapore (9.2%) cohorts explained their correct answer in terms of epistemic-states for the false-belief explanation task. However, none of the children in either cohort justified their correct answer specifically with references to epistemic-states for the false-belief prediction task. More correct justifications/explanations were given by the UK cohort (26.4%) compared to the Singapore cohort (19.7%), but these differences were not statistically significant as shown in earlier analysis.



| | Earlier location | Irrelevant/No explanation | Current location/ Actual state of affairs | Desires/Goal | Behaviour of second character |
|---|---|---|---|---|---|
| UK | 6 | 5 | 10 | 6 | 9 |
| Singapore | 5 | 8 | 6 | 4 | 15 |
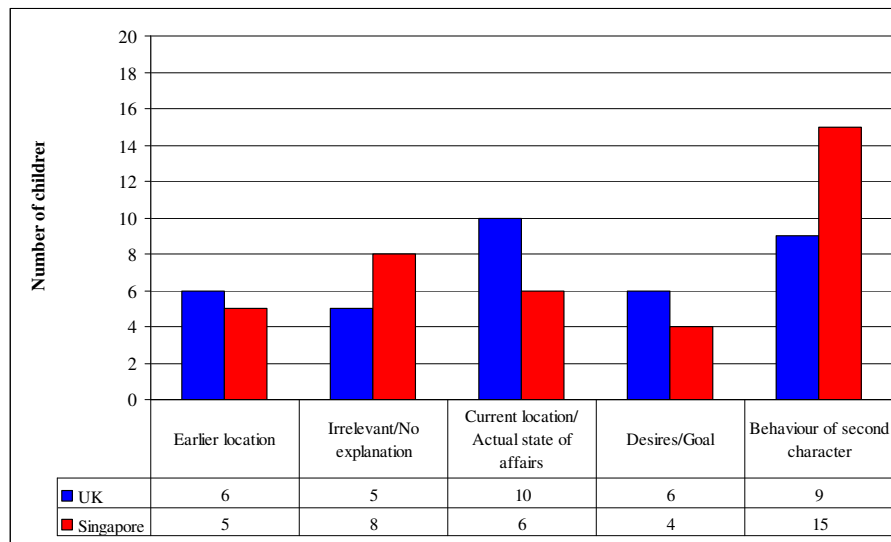
*Figure 7.4a.* Children's performance on false-belief justification question for the UK ($N = 36$) and Singapore ($N = 36$) cohorts in phase III.

| | Epistemic | Earlier location | Irrelevant/No explanation | Current location/ Actual state of affairs | Desires/Goal | Behaviour of second character |
|---|---|---|---|---|---|---|
| UK | 7 | 6 | 2 | 15 | 4 | 2 |
| Singapore | 7 | 2 | 5 | 13 | 5 | 6 |
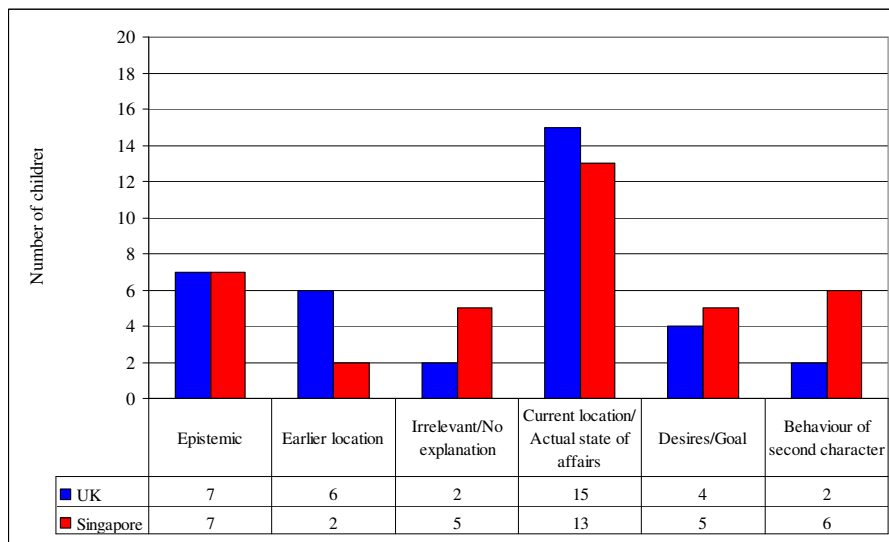
*Figure 7.4b.* Children's performance on false-belief explanation question for the UK (*N* = 36) and Singapore (*N* = 36) cohorts in phase III.

Again, more children in the Singapore cohort (17.1%) gave no explanation or irrelevant answers compared to the UK cohort (9.7%) for both questions. There were more children in the Singapore cohort (27.6%) who referred to the behaviour of the second character than the UK cohort (15.3%). There was a significant association between culture and whether or not children referred to the behaviour of the second character, gave no explanation or provided irrelevant answers, $(\chi^2(1, N = 148) = 6.32, p < .05)$.

In all, there were no cultural differences in false-belief justification and explanation scores in phases II and III. While both cohorts demonstrated a significant increase in false-belief justification scores between phases, they did not show improvement in false-belief explanation scores between phases. Both cohorts tended to refer to the current location of the object or actual state of affairs in justifying/explaining false-beliefs in phase II. There was no association between culture and total references made to the mental-states of the character in phase III. On the other hand, the results suggest some associations between cultures and types of response provided for the false-belief justification and explanation questions. The Singapore cohort tended to justify their prediction and explain a naïve character's action by attributing it to behavioural cues or giving irrelevant/no explanation in both phases. Despite being the same CA and VMA as the Singapore cohort, the UK cohort referred significantly more frequently to mental-states in phase II.

**7.3.6    Research question 3b: Do the performance sequences of knowledge-ignorance attribution and belief understanding at 3 to 3½ years of age differ between the UK and Singapore cohorts?**

The analyses for this final research question in each phase consisted of two sets of comparisons. As shown below, the first set of comparisons evaluated the performance sequence of the individual test questions within the false-belief prediction and false-belief explanation tasks. The second set of comparisons involves cross-task evaluation of test questions: false-belief prediction with false-belief explanation and false-belief justification with false-belief explanation. For the following analyses, separate two-way 2(culture) x 2(question) mixed-model repeated-measures ANCOVAs, with phase III VMA and gender as covariates, were computed for each phase. The statistical results are not presented here for reasons of space. The detailed results can be found in Appendix E2 (Table E2.3). The review of existing Western cross-sectional research regarding the onset of children's understanding of knowledge-ignorance and beliefs revealed a confusing picture (see Section 7.1). Therefore, the purposes of these analyses were to clarify the developmental sequence of these aspects of naïve psychology and compare patterns between two cultures.

For the false-belief prediction task, analyses compared the performance of:

(a)  true-belief ascription with knowledge-ignorance attribution

(b)  false-belief prediction with true-belief ascription

(c)  false-belief prediction with knowledge-ignorance attribution

(d)  false-belief justification with true-belief ascription

(e)  false-belief justification with knowledge-ignorance attribution

For the false-belief explanation task, analyses contrasted the performance of:

(f)  true-belief ascription with knowledge-ignorance attribution

(g)  false-belief explanation with true-belief ascription

(h)  false-belief explanation with knowledge-ignorance attribution

As shown in Appendix E2 (Table E2.3), the findings revealed within each cohort, children performed similarly in knowledge-ignorance attribution, true-belief ascription, false-belief prediction and false-belief explanation in phase II. Within each cohort, children showed similarity in the age of onset of knowledge-ignorance attribution, true-belief ascription and false-belief prediction in phase III, after VMA and gender were included as covariates. In other words, there were no significant cultural differences in the sequence of

acquisition of these aspects of naïve psychology even though the Singapore cohort performed more poorly than the UK cohort. On the other hand, the two sets of comparisons showed that cultural differences were observed in the performance sequence of false-belief justification and explanation compared to knowledge-ignorance attribution, true-belief ascription and false-belief prediction. The UK cohort performed significantly better on knowledge-ignorance attribution, true-belief ascription and false-belief prediction compared to false-belief justification and explanation in phase III. There was no significant difference between false-belief justification and explanation for the UK cohort. The Singapore cohort performed significantly better on false-belief prediction compared to false-belief justification, but their performance on false-belief explanation was not significantly different from any of the other questions.

In sum, the developmental data suggests that knowledge-ignorance attribution, true-belief ascription and false-belief prediction are likely to be acquired at the same age within each cohort. Although there were no cultural differences in the developmental onset of these various aspects of naïve psychology, cultural variations in the performance sequence of knowledge-ignorance attribution, true-belief ascription and false-belief prediction, justification and explanation emerged in phase III. Even though the Singapore cohort performed more poorly on false-belief justification than prediction, a consistent level of understanding of knowledge-ignorance and all other aspects of belief were found. In contrast, for the UK cohort, children performed more poorly on both false-belief justification and explanation than knowledge-ignorance and all other aspects of belief.

## 7.4    Discussion

Research questions 3a of this chapter focused on the extent to which developmental changes in children's understanding of knowledge-ignorance and beliefs differ between the two cultures. Research question 3b concerned the degree to which the performance sequence of knowledge-ignorance attribution and belief understanding differ between the two cultures. The most interesting finding of the current analyses is that even though there were marked cultural variations in false-belief prediction reported in the previous chapter, there were no substantial cohort differences in children's abilities to make correct false-belief justifications and explanations. At 3 years (phase II) and 3½ years (phase III), the majority of children from both cohorts failed to correctly justify their predictions or explain the character's behaviour in the unexpected transfer false-belief tasks. The results highlight the importance of studying the transition period between 3 and 4 years of age when children begin to show an explicit ability to predict representational mental-states without concurrent capability to

provide explanations based on false-beliefs. The results of the longitudinal analyses also reveal that the developmental onset of false-belief prediction coincides with knowledge-ignorance attribution and true-belief ascription in both cultures. Together, these results reveal how various aspects of naïve psychology unfold from 3 to 3½ years of age. These findings are discussed in detail below. Subsequently, the impact of cultural and social environmental factors on children's belief understanding is addressed.

### 7.4.1 Cross-cultural similarities and differences in children's understanding of knowledge-ignorance and beliefs

The findings from the present study support the idea that 3-year-old children in both the UK and Singapore had difficulty ascribing true-belief and predicting false-belief (e.g. Riggs & Simpson, 2005; Russell, 2005). In addition, both cohorts exhibited difficulty attributing knowledge-ignorance at 3 years of age. These cross-cultural similarities may be explained by the fact that the cognitive abilities involved in understanding knowledge-ignorance and beliefs emerge at a later age in both cohorts. However, marked cultural differences were observed in the longitudinal analysis of children's knowledge-ignorance attribution and true-belief ascription. As reported in the previous chapter, cultural differences in false-belief predictions were observed at 3½ years of age. The findings in this chapter reveal that the UK cohort had an advantage in understanding knowledge-ignorance attribution in the false-belief prediction and false-belief explanation tasks and true-belief ascription in the false-belief explanation task across 3 and 3½ years of age compared to the Singapore cohort. With respect to the false-belief prediction task, the UK cohort scored significantly better than the Singapore cohort in true-belief ascription at 3½ years of age.

With regard to children's developing abilities to make predictions and justifications, the findings showed that children's success on the false-belief prediction task does not necessarily mean that they have reached the stage when they can provide correct justifications. Among the 24 children who passed the false-belief prediction questions in the UK cohort at 3½ years of age, three-quarters of them did not provide correct justifications. For the Singapore cohort, half of the eleven children did not provide correct justification even though they made a correct false-belief prediction. The current evidence suggests that even though children of this age may report false-belief predictions correctly, they may not provide correct justifications because they do not possess a complete understanding of false-beliefs.

It has been argued that children's knowledge progresses from implicit to explicit in development (e.g. Clark & Karmiloff-Smith, 1993; Clements & Perner, 1994; Dienes &

Perner 1999; Karmiloff-Smith, 1992). Does children's false-belief understanding become explicit when they are able to make correct prediction or explanation? In Karmiloff-Smith's (1986) RR model, knowledge is explicitly represented in levels E2/3 when children are able to distinguish between propositional content (i.e. correct or incorrect description of the current states of the world) and propositional attitudes (i.e. mental-state that do not necessarily reflect the true state of affairs) from 4 years of age. As Clements et al. (2000) have argued, Karmiloff's (1986) model fails to consider the developmental lag between prediction and justification. Clements et al. (2000) suggest a further level-E4 as a phase when children are able to explicitly justify/explain another person's false-belief based action.

While the present study did not directly assess implicit knowledge using nonverbal methods, it could be argued that implicit awareness is evidenced by children's ability to make false-belief predictions. The current results show that some children in both cohorts revealed an implicit appreciation of false-beliefs at 3½ years of age as shown by their ability to predict a character's action on the basis of mistaken beliefs. As noted earlier, although the UK cohort demonstrated better understanding of false-belief prediction compared to the Singapore cohort, this advantage was not found when considering children's abilities to predict and justify a character's action based on false-beliefs. Even when presented with a scenario in which the character acted on the basis of a false-belief in the explanation task, both cohorts still experienced difficulty in explaining the character's behaviour. These findings showed that explicit false-belief justification/explanation ability developed later than prediction. As suggested by Ruffman et al. (2001), the transition to a full understanding of false-belief is marked by periods of implicit knowledge with low confidence. Rather than drawing a dichotomy between implicit and explicit knowledge acquisition, the present results suggest a gradual change in children's understanding of various naïve psychology concepts over time. Cultural and social experiences are likely reflected in the developmental shift from implicit knowledge to explicit ability to make correct *prediction* and finally to explicit ability to provide *explanation* based on false-beliefs.

The present results show not only similar development in that both cohorts demonstrate an equivalent difficulty in justifying/explaining false-belief, but also cultural variations in that an explicit ability to predict actions on the basis of false-beliefs might be evidenced far more in the UK cohort than the Singapore cohort at around 3½ years of age. The data highlight the importance of including a justification question both as a means of accurately ascertaining children's current level of understanding and as a means of examining variations (if any) in the transition stage in development between cultures. Interestingly, both cohorts improved in justification but not explanation scores between

phases. This finding further highlights the importance of establishing a detailed profile, in order to understand the subtleties in children's development during the transition stage.

The present results reveal that the majority of children from both cohorts have difficulty justifying their predictions or explaining the character's actions at 3 and 3½ years of age. Children from both cohorts tended to justify their prediction or explain the character's actions based on current states of affairs. This finding is consistent with those of previous research (e.g. Flynn, 2006; Wimmer & Mayringer, 1998). The majority of the children either referred to the actual location of the object or replied that there was no object in the original location. One child from the UK cohort in phase II and none from either cohort in phase III correctly justified their answers with reference to epistemic-states. These results are consistent with the findings of Clements and Perner (1994) and Clements et al. (2000) who showed that few children ages 2 to 5 years gave correct justifications in terms of beliefs. Less than one-third of the children in either the UK cohort or Singapore cohort gave desire-based answers when justifying their prediction or explaining a character's false-beliefs in both phases. This is in contrast to Austrian children's frequent references to desires (Wimmer & Mayringer, 1998) but in line with Japanese children's infrequent references (Naito & Koyama, 2006).

Direct comparison of the mean CA among children who passed phase III knowledge-ignorance, true-belief and false-belief prediction questions revealed that the UK cohort passed at an earlier mean CA than the Singapore cohort. CA has been shown to be a robust predictor of false-belief understanding (e.g. Happé, 1995; Jenkins & Astington, 1996). Successful performance on the false-belief prediction and explanation tasks is related to level of language ability. It could be argued that for some children in the Singapore cohort, language competence may have influenced their task performance because English might not be their main language spoken at home. Nonetheless, there were no cultural differences in mean VMA among children who passed these questions. There were also no significant cultural differences in mean CA and VMA among children who failed these questions. Chapter 8 considers the relationships between VMA and cultural differences in naïve psychology in further detail.

### 7.4.2 Developmental sequences of children's understanding of knowledge-ignorance and beliefs

The current results add a cross-cultural dimension to existing literature showing that within each cohort, children achieved similar performance in knowledge-ignorance attribution, true-belief ascription, false-belief prediction, false-belief justification and false-

belief explanation at 3 years of age. A similar performance sequence for knowledge-ignorance attribution, true-belief ascription and false-belief prediction was again observed within each cohort at 3½ years of age. It is important to note that in contrast to the UK cohort, the Singapore cohort showed poor performance on these aspects of naïve psychology at 3½ years of age, despite these similarities in performance sequence. The longitudinal data contribute additional evidence that true-belief ascription emerges at a similar age to knowledge-ignorance attribution. This developmental sequence has not previously been compared in cross-cultural research.

The developmental data from the Singapore cohort extends previous Western research by suggesting that non-Western children's competence in attributing knowledge-ignorance and predicting false-beliefs is similar. Although the findings differ from some published studies (e.g. Hogrefe et al., 1986), they are in agreement with Sullivan and Winner's (1991, 1993) results that showed no difference in children's understanding of knowledge-ignorance attribution and false-belief prediction. Sullivan and Winner (1993) suggested that a child must be able to mentally represent two conflicting states in order to understand both knowledge-ignorance and false-belief. For example, in the case of knowledge-ignorance, the child must understand that the 'ball is in the box' and 'Sally doesn't know the ball is in the box'. In the case of false-belief, the child must understand that the 'ball is in the box' and 'Sally thinks the ball is in the basket'. At 3 years of age, both cohorts in the present study performed poorly in false-belief prediction and knowledge-ignorance attribution. At 3½ years of age, it was evident in the case of the UK cohort that once children are able to understand conflicting mental-states, they can understand both knowledge-ignorance and false-belief.

An interesting pattern found in this study was that with respect to phase III performance sequence, the UK cohort showed a pattern similar to that reported in previous Western studies: true-belief ascription develops on par with false-belief prediction (e.g. Riggs & Simpson, 2005), false-belief prediction develops on par with knowledge-ignorance attribution (e.g. Sullivan & Winner, 1991), and false-belief prediction develops before false-belief explanation (e.g. Clement & Perner, 1994; Moses & Flavell, 1990; Wimmer & Mayringer, 1998; Wimmer & Weichbold, 1994). This latter finding contrasted markedly with Robinson & Mitchell's (1995) results that Western children's false-belief explanation develops before prediction abilities. Compared to the UK cohort, the Singapore cohort demonstrated an advantage of false-belief prediction over justification even though children's understanding of knowledge-ignorance attribution and other aspects of belief was similar.

It is possible that the UK cohort's advantage of prediction over justification/explanation is simply an artefact of task demands. As Bartsch (1998) pointed out, the task demand placed on children to construct verbal responses on the explanation task compared to the prediction forced-choice task highlights the importance of considering the methodological issues concerning effects of task format before reaching conclusions about performance sequence (see further discussion in Chapter 10, Section 10.6). Nonetheless, there is evidence demonstrating that children's poor performance on explaining action based on false-beliefs was unlikely to be due to a general difficulty in answering *why* questions (Atance & O'Neill, 2004, Experiment 3). The findings discussed thus far have important implications for theories of naïve psychology development. These issues will be discussed further in Chapter 10 (Section 10.3). It is likely that the cohort differences observed in this chapter can be attributed to cultural and social experiences.

### 7.4.3    Cultural and social influences on children's understanding of beliefs

The within-cohort similarities in the age of onset of knowledge-ignorance attribution, true-belief ascription and false-belief prediction and cross-cultural variations in performance at 3½ years of age merit clarifying the culturally-specific social process in which children acquire their naïve psychology. The findings from previous chapters and this chapter show that the UK cohort demonstrated an advantage in false-belief prediction, knowledge-ignorance attribution and true-belief ascription compared to the Singapore cohort. The UK cohort also employed significantly more mental-states terms in their false-belief justification/explanation at 3 years of age than the Singapore cohort. There are several possible explanations for these findings. These differences might be due to different child-rearing and socialisation practices. Western parents speak frequently about mental and internal states to their children (Bartsch & Wellman, 1995). A range of Western studies have demonstrated that maternal internal state discourse is related to children's naïve psychology development (e.g. Dunn et al. 1991a; Jenkins et al., 2003; Ruffman et al., 2002; Symons, Fossum, & Collins, 2006). There are also a number of studies that suggest that parenting style is linked to false-belief understanding (e.g. Ruffman et al., 1999). Asian Chinese parents engaged in less emotion, affective and mental-states discourse with their children than Western parents (e.g. Chen et al., 1998; Doan & Wang, 2010; Lin & Fu, 1990; Wang, 2001). Although there are no published studies that specifically examine the discourse of Singaporean parents in children's naïve psychology development, it is possible that such differences in pattern of interactions between parents and children could have explained the cultural variations observed in children's understanding of knowledge-ignorance and beliefs.

The Singapore cohort rarely referred to the desires and epistemic-states of the characters in explaining action for both the prediction and the explanation tasks compared to the UK cohort at 3 years of age. Another possible explanation for this difference, although it was not tested within the present analyses, relates to the fact that the majority of the Singaporean children were bilingual, whereas the majority of the UK children were monolingual. Shatz et al.'s (2003) study of false-belief among 3 and 4-year-old children, found that children who speak languages with explicit false-belief terms gave fewer epistemic-based explanations compared to children who speak languages without explicit terms. Shatz et al. (2003) have suggested that bilingual children's willingness to offer explanations to an adult experimenter is affected by cultural conditions. In the present study, attempts were made to put the children at ease so that they were able to provide justifications/explanations if they knew the answers. As reported in Chapters 5 and 6, the Singapore cohort showed an advantage in understanding discrepant desires at 2½ years of age and across the three phases compared to the UK cohort. It is possible that having an advantage in understanding discrepant desires did not encourage Singaporean children to give desire-based responses for explanations of behaviour. There is, however, no clear explanation for this finding. It is noteworthy that there were no cultural differences in number of references made to desires and epistemic-states at 3½ years of age in the current study.

The findings on children's false-belief justifications and explanations for the Singapore cohort might also be related to different expression styles between Asian and Western children. The majority of the children in the Singapore cohort either gave no response or incorrectly justified/explained their incorrect answers based on story facts at 3 and 3½ years of age. The UK cohort in contrast referred to mental-states more frequently at 3 years of age. The current results converge with Naito and Koyama's (2006, Experiment 2) findings showing that Asian children paid more attention to behavioural cues rather than to people's internal mental-states. Recent research by Okanda and Itakura (2008) showed that Japanese children tended to avoid answering or gave "I don't know" answers in response to an interviewer's question. While the tendency to give definitive answers is a norm in Western culture which emphasises self-confidence and self-esteem in children (Lee, Xu, Fu, Cameron, & Chen, 2001), the inclination to give "I don't know" responses is a norm in Asian culture which emphasises modesty (Fritzley & Lee, 2003). These findings corroborate the current results which demonstrated cross-cultural variations in the ways children answered questions seeking explanations/justifications. The importance of the cultural

environment on children's task performance should not be ignored, as it may be that Asian children feel unable to express answers, despite knowing them (see Okanda & Itakura, 2008).

One can speculate that the Singapore cohort's difficulty in knowledge-ignornace questions at 3 and 3½ years of age stems from cultural influences on children's behaviour during interactions with adults and on their responses to closed questions. Rather than a true cross-cultural difference in knowledge-ignorance attribution, the variations in performance between the two cohorts may have signified culturally-based differences in expression. In response to the yes-no question ('Did Sally know that Anne moved the marble?'), the Singapore cohort tended to incorrectly reply 'yes'. The pattern of results parallels Okanda and Itakura's (2008, 2010) findings that 2 to 4-year-old Asian children show a yes bias to yes-no questions, with the bias diminishing by 5 years of age. This developmental pattern fits well with the present findings indicating no significant difference in Singaporean children's knowledge-ignorance attribution between phases. On the other hand, Fritzley and Lee's (2003) study in North America revealed that Western 2-year-old children displayed a yes bias, 4 and 5-year-old children exhibited no response bias and 3-year-old children showed mixed results, suggesting that Western children transit towards a correct response at 3 years of age. Again, the present findings showing that the UK cohort provided more correct answers to a yes-no question at 3 and 3½ years of age than the Singapore cohort are remarkably consistent with this Western developmental pattern.

It is likely that the pattern of responses exhibited by the Singapore cohort and some children in the UK cohort appears to simply reflect that 'yes' bias is a common phenomenon among young children as suggested by Okanda and Itakura (2008, 2010). Nonetheless, it is noteworthy that children received a score of 1 if they answered both the ignorance and seeing questions correctly (see Table 7.1 and Chapter 4, Section 4.7.1). Among children who failed the knowledge-ignorance questions for the false-belief prediction and false-belief explanation tasks, there were some children who did not exhibit 'yes' bias (i.e. they answered 'yes' to the ignorance question but not the seeing question or vice versa). For example, the percentage of children who did not exhibit 'yes' bias for the false-belief prediction task increased between phase II (UK: 38.5% and Singapore: 12.1%) and phase III (UK: 76.5% and Singapore: 28.1%).

## 7.5    Conclusion

The cross-cultural similarities and differences reported in this chapter provide additional evidence with respect to children's belief understanding. Together with the cultural variations in false-belief prediction at 3½ years of age reported in the previous

chapter, substantial cultural differences in performance on knowledge-ignorance attribution and true-belief ascription (for the false-belief explanation task only) were found across 3 and 3½ years of age. With a stringent scoring criterion, the same, relatively small number of children in both cohorts was considered as having acquired a complete understanding of false-belief at 3½ years of age. The results also indicated associations between culture and children's justification/explanation for a character's actions. While the UK cohort passed the knowledge-ignorance, true-belief and false-belief prediction questions at an earlier mean CA in phase III than the Singapore cohort, there were no cultural differences in mean VMA among children who acquired an understanding of these aspects of naïve psychology. With respect to performance sequence, a similar order of developmental onset of knowledge-ignorance attribution, true-belief ascription and false-belief prediction was observed within each cohort. An advantage in knowledge-ignorance attribution, true-belief ascription and false-belief prediction over false-belief justification and explanation was observed in the UK cohort at 3½ years of age. In contrast, even though the Singapore cohort showed an advantage of false-belief prediction over justification, the performance sequence of knowledge-ignorance attribution and other aspects of beliefs was similar.

Several factors might have contributed to the UK cohort showing an advanced understanding of false-beliefs at 3½ years of age. Contextual factors such as individual (e.g. language) and social (e.g. presence of siblings) variables which could influence the differences observed are rarely included in cross-cultural studies and lead to problems in interpreting the results. The variations in the standard deviations of the task scores presented in the three empirical chapters highlight that within each cohort, there were children who for various reasons differed in terms of age of onset of various aspects of naïve psychology. These apparent individual differences raise the possibility that within-culture variations in individual and social variables might contribute to cross-cultural differences in naïve psychology development. The next chapter narrows the focus from group level differences to consider individual differences such as how individual and social variables shape naïve psychology development.

# CHAPTER 8

# INDIVIDUAL DIFFERENCES IN
# NAÏVE PSYCHOLOGY DEVELOPMENT

## 8.1 Introduction

The previous three empirical chapters have demonstrated that although children acquire an understanding of most aspects of naïve psychology at broadly comparable ages in the UK and Singapore, the spread of task scores indicates variability among children within cultures. In a large longitudinal study of 1,116 pairs of twins in the UK, Hughes et al. (2005) demonstrated that sibling similarities (shared environment and common genetic influences) and differences (non-shared environment) accounted for individual differences in naïve psychology development. This research points to significant environmental influences on individual differences in naïve psychology development. Although some non-Western studies have reported individual variations in naïve psychology development, there is very little empirical evidence on the extent to which individual and social variables contribute to differences between cultures. This chapter will examine the roles of within-cultural factors in explaining the observed cross-cultural differences in action prediction, level-1 visual perspective-taking, discrepant desires, mental representation in pretence and false-belief prediction task performance reported in Chapters 5 and 6 (Research Question 4).

This chapter briefly summarises the literature on the role of individual and social variables in naïve psychology development discussed in depth in Chapter 2 (Sections 2.4.2 and 2.4.3). This is followed by the presentation of the analysis of results. The chapter proceeds with a discussion of the main findings in light of how the wider cultural context plays a pivotal role in the influence of social environmental factors on children's naïve psychology development.

An area that has received attention in the existing literature is the influence of siblings on the acquisition of various naïve psychology concepts. Some studies suggest that having a child-aged sibling is a major determinant of children's naïve psychology development (e.g. Perner et al., 1994b). A longitudinal Western study has demonstrated that having more child siblings predicted higher task scores at mean age of 5 years 4 months, after CA, verbal intelligence and task scores at 4 years 2 months were taken into account (McAlister & Peterson, 2006). During joint play activities, siblings participate as active partners and the ensuing cooperation, negotiation, conflict and rivalry provides discourse on mental-states. Evidence has suggested that having an older sibling facilitates the acquisition of an understanding of mind at a relatively early age (e.g. Dunn et al., 1991b; Howe et al.,

2005; Ruffman et al., 1998). This finding is supported by recent non-Western research in Iran (Farhadian et al., 2010). Conversely, other researchers have reported no relationship between number of siblings or birth order and acquisition of naïve psychology concepts in the Western contexts (e.g. Cole & Mitchell, 2000, Peterson & Slaughter, 2003; Wright Cassidy et al., 2005). Empirical research in non-Western contexts remains sparse.

It is important to note, however, that child-rearing practices vary across cultures. Parenting practices shape children's socialisation experiences that would, in turn, influence learning and development. Within a cultural group, there are great differences in socialisation patterns. For example, research has demonstrated that frequency of contact with non-sibling older children and adult relatives explained variance in false-belief task performance over and above number of older siblings (Lewis et al., 1996). In China's single child generation, children with classmates of different ages performed better on false-belief tasks than children with classmates of a similar age (Wang & Su, 2009). These findings make clear the extent to which cultural and social environmental factors are interrelated. The UK and Singapore cohorts in the present study were similar in terms of birth order and number of siblings. The presence of siblings might impact differently on naïve psychology development in the two contexts. For example, patterns of sibling interactions may differ due to variation in the duration of preschool attendance even though this was not tested within the present analyses.

Another important area explored by researchers in individual differences in naïve psychology development is that of language. As discussed in Chapter 2, children's naïve psychology development has been shown to be associated with language ability (e.g. Astington, 2001; Astington & Baird, 2005) and bilingualism (e.g. Bialystok & Senman, 2004). A considerable amount of literature has demonstrated the reciprocal relationships between verbal skills and naïve psychology development. Several longitudinal studies have shown that early verbal skills play a fundamental role in facilitating children's acquisition of later naïve psychology concepts (e.g. Astington & Jenkins, 1999; Lockl & Schneider, 2007; Ruffman et al., 2002). Other longitudinal studies have found that early naïve psychology development contributed to later language ability (e.g. Ruffman, Slade, Rowlandson, Rumsey, & Granham, 2003; Slade & Ruffman, 2005). Only a few cross-sectional studies conducted in Eastern settings have related language to children's acquisition of naïve psychology concepts (e.g. Lee et al., 1999; Tardif et al., 2007), but none have followed children's development from 2 to 4 years of age. VMA was included as a covariate in all the analyses in previous three results chapters of this thesis. The findings in Chapter 7 indicated cultural differences in mean CA but no variations in mean VMA among children who passed

phase III knowledge-ignorance, true-belief and false-belief prediction questions. There were also no significant cultural differences in CA and VMA among children who failed these questions. Children may have failed the false-belief tasks because they have not reached a certain level of language skills. A more detailed consideration of VMA as a variable of interest is required to discern the extent to which naïve psychology development is related to language competency (VMA).

Recent studies have found that bilingual children have an advantage over monolingual children in certain naïve psychology measures (e.g. Bialystok & Senman, 2004; Goetz, 2003; Kovács, 2009). This is possibly mediated by bilingual children's more advanced level of executive function in inhibiting attention to competing cues (e.g. Bialystok, 1999; Carlson & Meltzoff, 2008). Both the UK and Singapore cohorts in the present study speak English as their first language. There are marked differences, however, in the number of languages spoken (see Chapter 4, Table 4.2b). Consequently, it is important to examine the extent to which bilingualism influences naïve psychology development and inhibitory control ability.

Taken together, the literature on individual differences in naïve psychology development confirms the importance of considering the influences of individual and social variables. Given that the majority of the research on individual differences has been conducted in Western cultures, the neglect of this topic in cross-cultural research warrants further investigation. As Figure 8.1 shows, individual (VMA and number of languages spoken) and a range of social (siblings, parental education, parental working status, family structure and preschool attendance scheme) variables have been identified as factors that might influence naïve psychology development. These individual and social variables have been largely ignored in non-Western studies. Some of these social variables have, in previous Western research, been shown to influence naïve psychology development (see Chapter 2, Sections 2.4.2 and 2.4.3). Exploratory analysis within the present study, however, indicated that parental education, parental working status, family structure and preschool attendance scheme were neither associated with naïve psychology development nor accounted for between-cohort differences and hence are not considered further in this chapter (see further discussion in Chapter 10, Section 10.6). The sample size was too small to permit detailed statistical analysis of number of siblings or other sibling configurations (sibling gender). This chapter focuses on presence of sibling(s) and birth order, as well as VMA and bilingualism to examine whether within-cultural variations explain the cross-cultural differences in children's naïve psychology development (depicted in **green**).
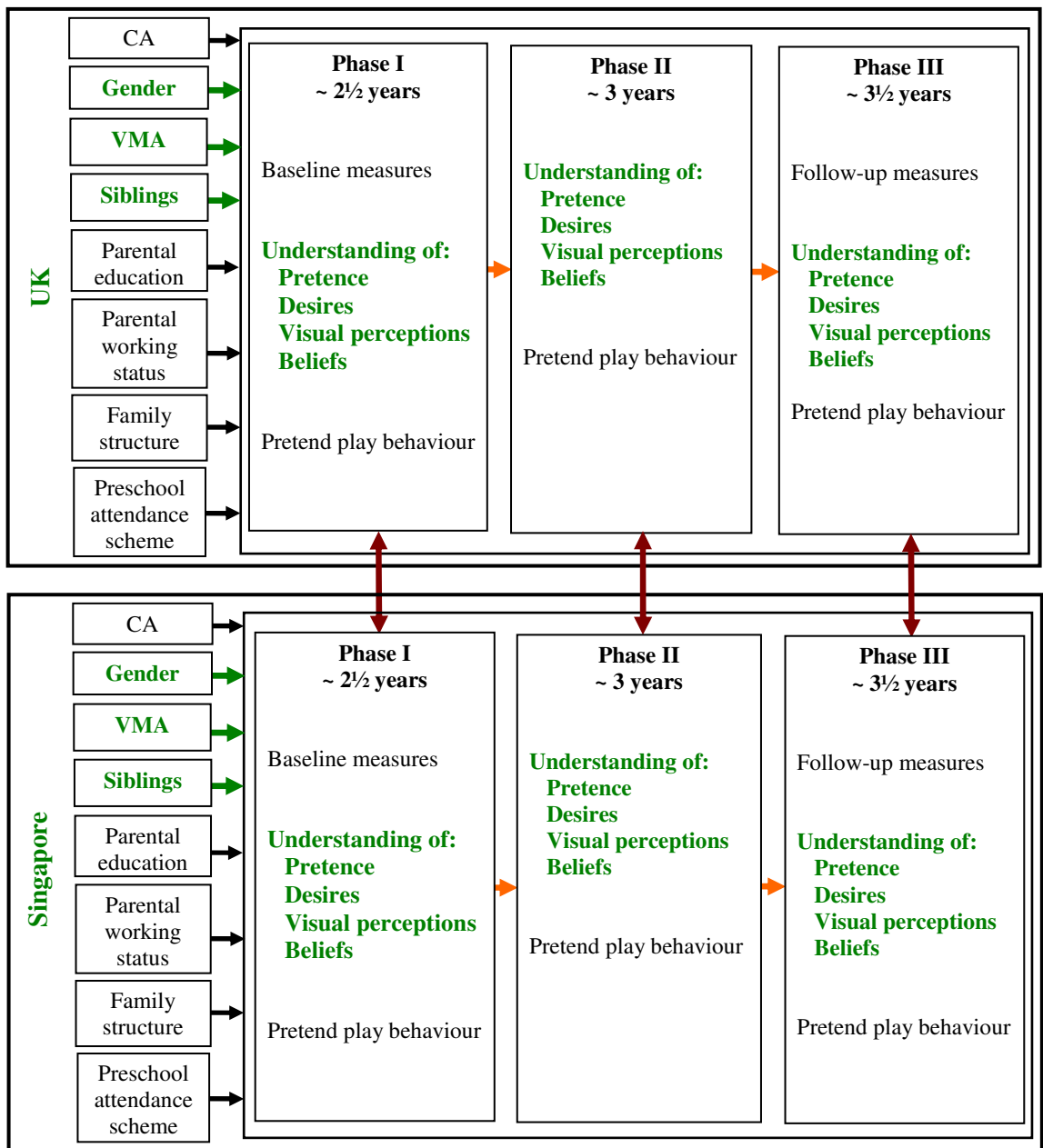
*Note.* CA = chronological age, VMA = verbal mental age.

This chapter will compare the influences of social environmental factors on children's performance in the action prediction, the level-1 visual perspective-taking, the discrepant desires, the mental representation in pretence and the false-belief prediction tasks between the two cultures.

*Figure 8.1.* A longitudinal cross-cultural comparison of influences of social environmental factors on children's naïve psychology development.

**8.2    Research Questions**

Based on existing empirical evidence and the results reported in previous chapters, this chapter addresses Research Question 4 (stated in Chapter 1) in depth by dividing it into three subsidiary research questions (4a to 4c). This enables more detailed analysis of the influence of each individual and social variable in naïve psychology development.

4. **Does the presence of sibling(s), birth order, verbal mental age, or bilingualism contribute to individual differences in naïve psychology development?**

   a. **Are there differences between the UK and Singapore cohorts in the impact of**

      i. **the presence of sibling(s) on naïve psychology task performance?**

      ii. **birth order on naïve psychology task performance?**

   b. **Are there differences between the UK and Singapore cohorts in the association between language ability (VMA) and naïve psychology task performance?**

   c. **Are there differences between the UK monolingual and UK/Singaporean bilingual children in naïve psychology task performance and inhibition control ability?**

**8.3    Results**

Before the results are presented, children were categorised into groups on the basis of number of siblings, birth order and number of languages spoken.

**8.3.1    Data coding and treatment of sibling data**

In the present longitudinal study, sibling configurations (i.e. number of siblings) changed over time. Since the two cohorts differed substantially in false-belief prediction task performance in phase III, sibling configurations in this phase were considered. As shown in Table 8.1 (see also Chapter 4, Table 4.2a), among the 36 children in the UK cohort, there were 12 only-children, 21 children with one sibling, two with two siblings and one with three or more siblings. Due to small sample size for children with two siblings and children with three or more siblings, children with sibling(s) were collapsed into a single group. Among the 24 children with sibling(s) in the UK cohort, there were four child participants with an infant sibling and one child participant with two young adult siblings. Among the 38 children in the Singapore cohort, there were 15 only-children, 16 with one sibling, five with two siblings and two with three or more siblings. Among the 23 children with sibling(s) in the

Singapore cohort, there was one child participant with an infant sibling and another child participant with a teenage sibling.

Table 8.1. Phase III Sibling Grouping by Cohorts

| Sibling configuration | UK (N = 36) | Singapore (N = 38) | Peterson's (2000) classification[a] | |
|---|---|---|---|---|
| | | | UK | Singapore |
| Number of Siblings | | | | |
| None | 12 | 15 | 17 | 17 |
| One or more | 24 | 23 | 19 | 21 |

*Note.* [a] Children with infant, teenage and adult siblings were classified as only-children.

In terms of birth order, 21 children each from the UK and Singapore cohorts were firstborn (including only-children) and 12 from each cohort were second-born. Two children from the UK cohort were third-born and one child was fourth-born children. By contrast, there were three third-born children and two fourth-born children in the Singapore cohort. Second-born, third-born and fourth-born children were collapsed into a single group due to small sample size.

Previous research has reported that children with siblings less than 12 months of age or older than 14 years of age score the same as 'only children' on false-belief tasks (Peterson, 2000), suggesting that these children should be considered as 'only-children' in sibling analyses in naïve psychology research. The analyses for the sibling data in the present study used Peterson's (2000) classification scheme. According to this, among the 36 children in the UK cohort, there were 17 only-children and 19 children with child sibling(s) in phase III (see Table 8.1). Among the 38 children in the Singapore cohort, there were 17 only-children and 21 children with child sibling(s). However, the mean CA of Peterson's (2000, Experiment 2, see Table 2, p. 446) sample of children with sibling less than 12 months of age was 55.28 (*SD* = 6.18). In contrast, the children in the present study were closer in CA with their infant sibling for the UK (*M* = 42.75, *SD* = 1.84) and Singapore (*M* = 43.68, *SD* = 2.79) cohorts than those in Peterson's (2000) study. Since children and their infant siblings were closer in age, it is likely that the presence of infant siblings might have encouraged their older siblings to discuss about mental-states. Age gap may not be a particularly important factor affecting the older sibling's interest in the new baby or quality of relationship between siblings (Dunn, 1984). This chapter will therefore also rerun the analysis including the presence of all siblings (infants, teenagers and adults) in the analysis.

### 8.3.2 Monolingual and bilingual grouping and comparable scale for inhibition control tasks

For the purpose of Research Qestion 4b of this chapter only, the children in both cohorts were re-divided into two groups: UK monolingual and UK/Singaporean bilingual children. As shown in Table 4.2b (Chapter 4), there were three bilingual children in the UK cohort. The number of Singaporean children who spoke a third language was too small to permit meaningful statistical analysis.[33] All children in the Singapore cohort were therefore classified as bilingual children. There were 33 and 41 children in the UK monolingual and UK/Singapore bilingual groups respectively. There was no significant difference in phase I VMA between the UK monolingual children ($M = 34.12$, $SD = 3.00$) and the UK/Singaporean bilingual children ($M = 34.88$, $SD = 3.42$, $t(72) = 1.00$, n.s.). Likewise, no significant difference was found between the UK monolingual children ($M = 48.03$, $SD = 6.06$) and the UK/Singaporean bilingual children ($M = 46.83$, $SD = 6.37$) in phase III VMA ($t(72) = .82$, n.s.). However, the UK/Singaporean bilingual children ($M = 43.73$, $SD = 2.70$) were significantly older than the UK monolingual children ($M = 42.61$, $SD = 1.84$, $t(70) = 2.13$, $p = .04$, $r = .25$) at phase III. Similar age differences were observed at phases I and II.

Prior studies attributed bilingual children's superior performance on naïve psychology tasks to their enhanced inhibitory control ability (see review in Chapter 2, Section 2.4.2). The analyses in this chapter explored inhibitory task performance to determine whether bilingual children exhibit an advantage in inhibitory control. Twelve and 16 trials were administered for the baby (verbal) and cartoon (non-verbal) Stroop inhibition control tasks respectively. To create a comparable scale on both measures, the baby Stroop scores were transformed by multiplying each score by $\frac{1}{6}$ and the cartoon Stroop scores by $\frac{1}{8}$. This resulted in the inhibition control tasks having a minimum possible score of 0 and a maximum possible score of 2.

### 8.3.3 Research question 4a(i): Are there differences between the UK and Singapore cohorts in the impact of the presence of sibling(s) on naïve psychology task performance?

Presence of sibling(s) was not related to action prediction, discrepant desires, level-1 visual perspective-taking and phase II mental representation in pretence task scores and so will not be considered further here. To examine whether having at least one child sibling in

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[33] It should be noted that the figures presented in Table 4.2b (Chapter 4) are based on the number of official languages (English, Chinese (Mandarin), Malay and Tamil) spoken in Singapore. Some Singaporean Chinese children also speak in dialects (e.g. Hokkien or Teochew) to their grandparents or parents at home.

the family was associated with more advanced false-belief prediction and mental representation in pretence understanding in phase III than children without siblings, the children were divided into two groups: 'only-children' and 'children with sibling(s)' (see Table 8.1). Independent t-tests showed no significant differences in CA, phase III VMA and gender between only-children and children with sibling(s) for either cohort. This remained the case when Peterson's (2000) classification system was used.

Phase III false-belief prediction task scores by sibling groups by cohorts are plotted in Figure 8.2. The significant main effect of culture in the mixed-model ANCOVA for phase III false-belief prediction task was reported in Chapter 6. Here, separate one-way ANCOVAs, with phase III VMA and gender as covariates, were conducted for each cohort. The results revealed a significant main effect of sibling group for the Singapore cohort ($F(1, 34) = 5.61$, $p < .05$, $\eta_p^2 = .14$). Independent t-test indicated that only-children ($M = 1.07$, $SD = 1.03$) performed better than children with sibling(s) ($M = .26$, $SD = .69$, $t(36) = 2.89$, $p < .05$, $r = .43$) for the Singapore cohort. Sibling group was not significant as a main effect for the UK cohort. Given the lack of significant differences between only-children and children with sibling(s) in CA, phase III VMA and gender, it is unlikely that these variables contributed to this only-children advantage for the Singapore cohort. It is worth noting that the results were similar when the analyses were rerun with ANOVA. Employing Peterson's (2000) classification scheme, the main effect of sibling group was not significant for the Singapore ($F(1, 34) = 4.06$, n.s.) or the UK ($F(1, 32) = 1.07$, n.s.) cohorts, with phase III VMA and gender as covariates.
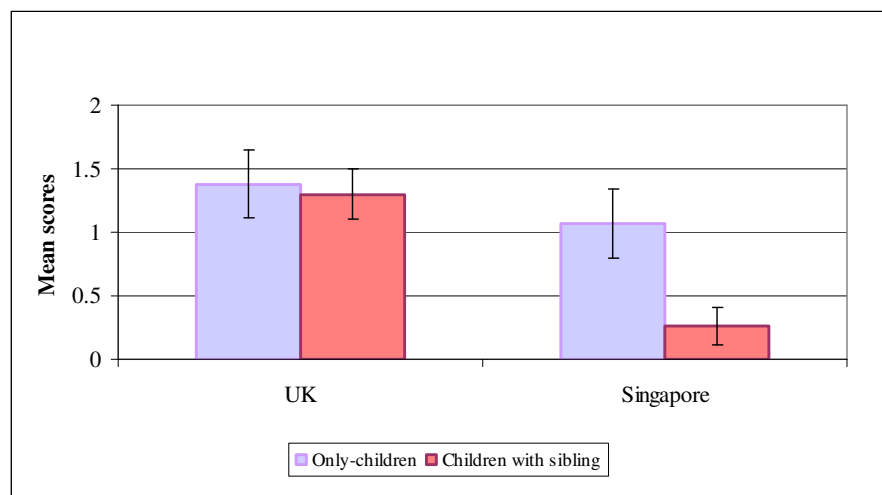


*Figure 8.2.* Performance on phase III false-belief prediction task by sibling groups by cohorts.

Phase III mental representation in pretence task scores by sibling groups by cohorts are illustrated in Figure 8.3. The significant main effect of culture in the mixed-model ANCOVA for phase III mental representation in pretence task was reported in Chapter 6. Here, separate one-way ANCOVAs, with phase III VMA and gender as covariates, were conducted for each cohort. The results showed a significant main effect of sibling group for phase III mental representation in pretence scores for the Singapore cohort alone ($F(1, 34) = 6.18$, $p < .05$, $\eta_p^2 = .15$). Independent t-test indicated that only-children ($M = 1.53$, $SD = .74$) performed better than children with sibling(s) ($M = .87$, $SD = .63$, $t(36) = 2.97$, $p < .01$, $r = .44$) for the Singapore cohort. In contrast, sibling group was not significant as a main effect for the UK cohort. As mentioned earlier, there were no significant differences between only-children and children with sibling(s) in CA, phase III VMA and gender for either cohort, again suggesting that these variables do not contribute to this only-child advantage in the Singapore cohort. It is noted that the results were similar when the analyses were rerun with ANOVA. With Peterson's (2000) classification scheme, the main effect of sibling group for phase III mental representation in pretence was not significant for the Singapore ($F(1, 34) = 3.56$, n.s.) or the UK ($F(1, 32) = .25$, n.s.) cohorts, with VMA and gender as covariates.
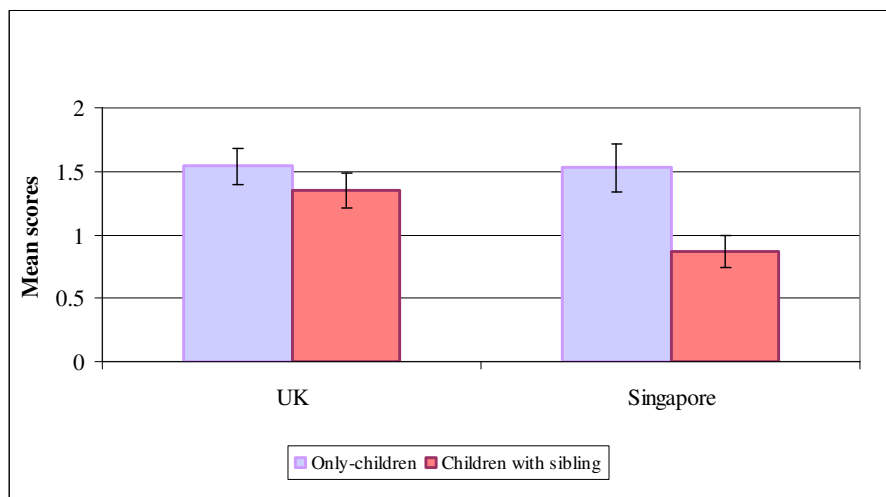


*Figure 8.3.* Performance on phase III mental representation in pretence task by sibling groups by cohorts.

### 8.3.4 Research question 4a(ii): Are there differences between the UK and Singapore cohorts in the impact of birth order on naïve psychology task performance?

Birth order was not related to action prediction, discrepant desires, level-1 visual perspective-taking and phase II mental representation in pretence task scores and so will not be considered further here. To examine the effect of birth order on false-belief prediction and mental representation in pretence task performance in phase III, children were divided into

two groups: 'firstborn' and 'later-born'. As noted earlier, 21 children each from the UK and Singapore cohorts were firstborn children. There were 15 and 17 later-born children from the UK and Singapore cohorts respectively. Independent t-tests indicated no significant differences in CA and gender between firstborn and later-born children for either cohort. There were also no significant differences between firstborn and later-born children in phases I and III VMA for the UK cohort. By contrast, firstborn children ($M = 49.29$, $SD = 7.34$) were significantly higher in VMA in phase III than later-born children ($M = 44.00$, $SD = 3.46$, $t(36) = 2.73$, $p = .01$, $r = .41$) for the Singapore cohort.

Figure 8.4 illustrates phase III false-belief prediction task mean scores by birth order. The significant main effect of culture in the mixed-model ANCOVA for phase III false-belief prediction task was reported in Chapter 6. Here, separate one-way ANCOVAs, with phase III VMA and gender as covariates, were computed for each cohort. Given that there were significant differences between firstborn and later-born children in phase III VMA for the Singapore cohort, this language advantage might be related to firstborn children achieving higher mean scores for phase III false-belief prediction task than later-born children. The ANCOVA analysis revealed no significant main effect of birth order for either cohort.
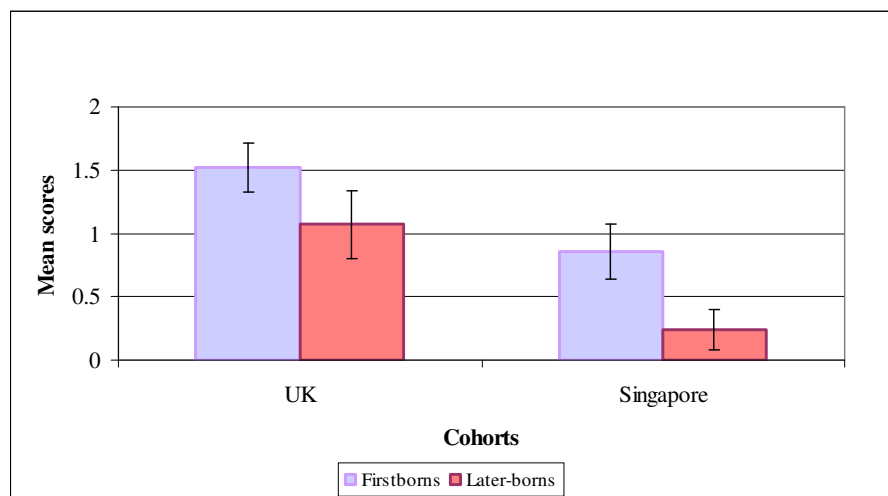


*Figure 8.4.* Performance on phase III false-belief prediction task by birth order by cohorts.

Figure 8.5 shows phase III mental representation in pretence task mean scores by birth order. The significant main effect of culture in the mixed-model ANCOVA for phase III mental representation in pretence task was reported in Chapter 6. Here, separate one-way ANCOVAs, with phase III VMA and gender as covariates, were computed for each cohort. Given that there were significant differences between firstborn and later-born children in phase III VMA for the Singapore cohort, this language advantage might be related to

firstborn children achieving higher mean scores for phase III mental representation in pretence task than later-born children. The ANCOVA analysis indicated no significant main effect of birth order for either cohort.
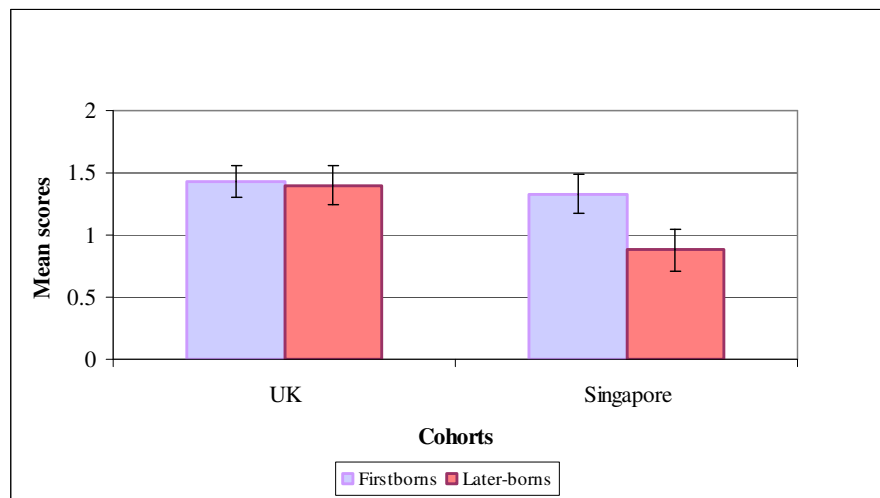


*Figure 8.5.* Performance on phase III mental representation in pretence task by birth order by cohorts.

In sum, the sibling data showed some cross-cultural similarities in the relationships between sibling(s) and naïve psychology task performance. Presence of sibling(s) was not associated with advantage in performance on false-belief prediction and mental representation in pretence tasks for either cohort. The results, however, indicated that only-children performed better than children with sibling(s) in false-belief prediction and mental representation in pretence understanding at 3½ years of age for the Singapore cohort alone. With Peterson's (2000) classification scheme, the differences between only-children and children with sibling(s) in the false-belief prediction and mental representation in pretence tasks were not significant for either cohort, when phase III VMA and gender were considered as covariates. Interestingly, firstborn children scored better compared to later-born children in phase III VMA for the Singapore cohort alone. This language advantage could have aided their understanding of false-beliefs and mentalistic nature of pretence. There was no advantage found for Singaporean firstborn children when phase III VMA was entered as a covariate. Similarly, no differences were observed between first-born and later-born children for the UK cohort.

### 8.3.5 Research question 4b: Are there differences between the UK and Singapore cohorts in the associations between language ability (VMA) and naïve psychology task performance?

As noted earlier, the results reported in Chapter 7 revealed cultural differences in mean CA but no variations in mean VMA among children who passed the knowledge-ignorance attribution, true-belief ascription and false-belief prediction questions. Further analysis is required to determine whether VMA is associated with naïve psychology development. Partial correlation analysis, with gender partialed out, was conducted to examine the relation between phases I and III VMA and task scores where variations between cultures have been reported in Chapters 5 and 6. It is important to consider language measures at the two time points because of the parallel development of language and naïve psychology. As explained in Chapter 6, gender was partialed out because of the overrepresentation of boys in the Singapore cohort and the associations between gender and naïve psychology measures for both cohorts. There were no significant associations between VMA and performance on action prediction, discrepant desires and phase II mental representation in pretence tasks in either cohort so these will not be considered further here. The correlation results are presented in Table 8.2. Although the data presented here included between-task correlations, only those correlations highlighted in bold for phases I and III VMA with naïve psychology tasks were considered. The between-task correlations are discussed in relation to the conceptual coherence in children's naïve psychology development in Chapter 10 (Section 10.3).

With respect to phase I VMA, significant concurrent (within phase) association was found for understanding level-1 visual perspective-taking in phase I for both cohorts. Phase I VMA was significantly longitudinally related to phase III false-belief prediction scores for both cohorts. As shown in the lower half of Table 8.2, there were significant longitudinal associations for phase I VMA with understanding level-1 visual perspective-taking in phase II and mental representation in pretence in phase III for the Singapore cohort alone.

With regard to phase III VMA, significant concurrent association was found for level-1 visual perspective-taking and understanding false-belief prediction in phase III for both cohorts. Phase III VMA was significantly longitudinally related to phase I level-1 visual perspective-taking for both cohorts. There were significant longitudinal associations between phase III VMA and understanding level-1 visual perspective-taking in phase II for the Singapore cohort alone. Furthermore, concurrent association between phase III VMA and phase III mental representation in pretence was observed for the Singapore cohort alone. Longitudinal association between the two language measures in phases I and III was

observed for the Singapore cohort alone. Overall, the results of the correlation analysis showed medium to strong positive correlations between language measures and naïve psychology concepts for both cohorts.

Table 8.2. Partial Correlations (Controlling for Gender) between VMA and Naïve Psychology Measures for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| | Naïve psychology measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Phase I VMA | - | .25 | .32* | .03 | .09 | .11 | .58*** |
| 2 | Phase III VMA | .45** | - | .31* | -.08 | .30* | .08 | .41* |
| 3 | Phase I Level-1 visual perspective-taking | .49*** | .33* | - | -.19 | .22 | .12 | .09 |
| 4 | Phase II Level-1 visual perspective-taking | .33* | .40** | .29* | - | .11 | .21 | .12 |
| 5 | Phase III Level-1 visual perspective-taking | .25 | .36* | -.01 | .28* | - | .09 | .23 |
| 6 | Phase III Mental representation in pretence | .41** | .35* | .29* | .38* | .23 | - | .29 |
| 7 | Phase III False-belief prediction | .29* | .47** | .50** | .25 | .16 | .26 | - |

*Note.* The upper half of the table shows the UK cohort and the lower half the Singapore cohort. As explained in Chapter 6, Bonferroni corrections were not applied due to the increased risk of Type II error in small sample sizes.

*$p < .05$. ** $p < .01$. *** $p < .001$.

In summary, several cross-cultural similarities emerge from the correlation analysis of language data. For both cohorts, there were significant concurrent (within phase) positive correlations between VMA and level-1 visual perspective-taking in phase I, between VMA and level-1 visual perspective-taking in phase III and between VMA and false-belief prediction in phase III. In addition, longitudinal positive correlations between phase I VMA and phase III false-belief prediction were found for both cohorts. Early level-1 visual perspective-taking (phase I) was positively correlated with phase III VMA for both cohorts. There were no significant associations among VMA, action prediction, discrepant desires and phase II mental representation in pretence task scores in either cohort. Given the mixed findings, it is difficult to establish a clear reciprocal relationship between VMA and naïve psychology in the present study.

More correlations, however, were observed for the Singapore cohort than the UK cohort. For the Singapore cohort alone, there were longitudinal positive associations for early VMA (phase I) with later level-1 visual perspective-taking (phase II) and mental representation in pretence (phase III). Longitudinal positive correlation between phase II

level-1 visual perspective-taking and phase III VMA was also found. Moreover, there were concurrent positive association between VMA and mental representation in pretence in phase III. Furthermore, there was a fairly strong positive correlation between phases I and III VMA. It was notable that these correlations were not found for the UK cohort.

### 8.3.6 Research question 4c: Are there differences between the UK monolingual and UK/Singaporean bilingual children in naïve psychology task performance and inhibition control ability?

As discussed earlier, existing studies have reported a bilingual advantage in some naïve psychology concepts that is related to bilingual children's inhibition control ability. The purpose of these analyses is therefore to compare the performance of UK monolingual and UK/Singaporean bilingual children in the false-belief prediction and inhibition control tasks. Bilingualism (number of languages spoken) was not related to performance in discrepant desire task in phases II and III, level-1 visual perspective-taking task in phases I, III and III and mental representation in pretence task in phases II and III and will not be considered further here.

For phase I action prediction task, a one-way between language groups ANCOVA, phase I VMA and gender as covariates, showed a significant main effect of language group ($F(1, 70) = 6.70$, $p < .05$, $\eta_p^2 = .09$). Independent t-tests indicated that the UK monolingual children ($M = 1.31$, $SD = .63$) performed better than the UK/Singaporean bilingual children in action prediction ($M = .98$, $SD = .58$, $t(72) = 2.39$, $p < .05$, $r = .27$). For phase I discrepant desire task, a one-way between language groups ANCOVA, with phase I VMA and gender as covariates, revealed a significant main effect of language group ($F(1, 70) = 4.91$, $p < .05$, $\eta_p^2 = .07$). Independent t-tests showed that the UK/Singaporean bilingual children ($M = 1.56$, $SD = .74$) performed better than the UK monolingual children in discrepant desires ($M = 1.18$, $SD = .85$, $t(72) = 2.05$, $p < .05$, $r = .23$). For phase III false-belief prediction task, a one-way between language groups ANCOVA, with phase III VMA and gender as covariates, indicated a significant main effect of language group ($F(1, 70) = 18.35$, $p < .001$, $\eta_p^2 = .21$). Independent t-tests showed that the UK monolingual children ($M = 1.45$, $SD = .91$) performed better than the UK/Singaporean bilingual children in false-belief prediction ($M = .54$, $SD = .90$, $t(72) = 4.36$, $p < .001$, $r = .46$).

For phase III baby Stroop task (verbal inhibition control), a one-way between language groups ANCOVA, with phase III VMA and gender as covariates, revealed a

significant main effect of language group ($F(1, 70) = 7.68$, $p < .01$, $\eta_p^2 = .10$).[34] Independent t-tests revealed that the UK/Singaporean bilingual children ($M = 1.20$, $SD = .48$) scored significantly better in phase III baby Stroop task compared to the UK monolingual children ($M = .86$, $SD = .54$, $t(72) = 2.87$, $p < .01$, $r = .32$). There were no significant differences between the two language groups in the baby Stroop task in phase I or in the cartoon Stroop task in phases I and III. Given the small but significant differences in CA between the two language groups (see Section 8.3.2), analyses were rerun with CA as covariate and the patterns of results remained the same as reported above.

In sum, at phase I, the UK monolingual children performed better in the action prediction task whereas the UK/Singaporean bilingual children achieved higher scores for the discrepant desire task. At phase III, the UK/Singaporean bilingual children showed somewhat more advanced ability than the UK monolingual children in suppressing attention to irrelevant aspects of a stimulus while attending to appropriate cues and providing appropriate answers. However, this advantage did not translate into a false-belief prediction advantage: in fact the monolingual group obtained higher scores on this task. The results also revealed no bilingual advantage in the baby Stroop task in phase I or in the non-verbal cartoon Stroop tasks in phases I and III. Due to the possible interactions among cultural, language and other factors, it is important to note that differences between monolingual and bilingual children in naïve psychology task performance could not be fully assessed here.

## 8.4 Discussion

The present study extends prior non-Western research by exploring within-cultural individual differences in naïve psychology in tasks where cultural variations were found in previous results chapters of this thesis. The analyses of individual differences reveal a surprising degree of cross-cultural similarity in the influences of family environmental factors and language in naïve psychology development. While the most important results were those concerning whether children's family background and language make contributions to the development of their naïve psychology, interesting results were obtained regarding the different patterns of influence of these variables within each culture. The discussion will consider each research question in turn by first focusing on presence of sibling(s) and birth order in children's naïve psychology development. The discussion then

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[34] The same pattern of results also emerged when comparing between monolingual UK and bilingual Singaporean children (i.e. excluding the three UK bilingual children) and between the UK and Singapore cohorts.

turns to the role of language in children's developing understanding of naïve psychology concepts.

### 8.4.1 Influence of the presence of sibling(s) and birth order on naïve psychology development

The sibling data showed that presence of sibling(s) did not facilitate understanding of action prediction, discrepant desires, level-1 visual perspective-taking, mental representation in pretence and false-belief prediction for either cohort, when VMA and gender were included as covariates. These results differ from previous cross-sectional studies conducted in the UK (e.g. Perner et al., 1994b), Canada (e.g. Jenkins & Astington, 1996) and Japan (e.g. Ruffman et al., 1998) and a longitudinal study carried out in Australia (McAliser & Peterson, 2006). They are consistent, however, with several studies that reported no association between number of siblings and naïve psychology task performance in Western cultures (e.g. Cole & Mitchell 2000, Cutting & Dunn, 1999; Peterson & Slaughter, 2003; Taylor & Carlson, 1997; Wright Cassidy et al., 2005). It has been suggested that the link between presence of sibling(s) and naïve psychology development may be mediated by executive control ability (Cole & Mitchell, 2000) or quality of sibling relationship (Cutting & Dunn, 1999). The present findings draw our attention to the need to take cultural frame of reference into account when considering sibling influences on children's acquisition of naïve psychology concepts. In other words, it is necessary to consider how culture shapes the influence of social elements in children's care and development. The difference in parental work patterns between the UK and Singapore cohorts leads to variations in the preschool hours attended per week (see Chapter 4, Section 4.4 and Table 4.2b). This cultural difference in childcare might lead to differing sibling interactions that may, in turn, affect naïve psychology development. Although only-children in both cohorts lacked siblings to interact with socially, children in the current study (both only-children and children with siblings) were exposed to other children of the same and different ages in preschools. Most parents in Singapore work full-time and the majority of the children attend full-time preschools or are placed in the care of their grandparents and live-in foreign domestic workers (see Chapter 4, Table 4.2b). Hence, Singaporean children spend more time interacting with friends and other adults in preschools than they do with siblings at home. In cultures where siblings spend less time together on a daily basis, siblings' influence on naïve psychology development might be less strong. Considered in this light, one promising avenue for research into children's acquisition of naïve psychology concepts is social pretend play with peers (see Chapter 9).

It is more difficult to explain the lack of relationship between the presence of sibling(s) and naïve psychology task performance for the UK cohort. The majority of the mothers in the UK cohort work part-time and parents did not report that children were placed in the care of non-parental caregivers. It seems possible that the non-significant differences in naïve psychology development between only-children and children with siblings for the UK cohort support the premise that mother-child mental-state discourse is related to naïve psychology development, an account verified by several Western studies (e.g. Dunn et al., 1991a; Peterson & Slaughter, 2003; Ruffman et al., 2002; Ruffman et al., 2006). It is possible that UK parents of only-children spend additional time with their children, providing the scaffolding to help them develop a sophisticated understanding of mind. In one-child families, the high quality parent-child interactions in terms of individual attention and dialogue and fewer distractions and competition from siblings might have facilitated only-children's socio-cognitive achievement (e.g. Mancillas, 2006; Polit & Falbo, 1988). Likewise, firstborn children who are only-children for a limited time might have similar early experiences as only-children (Polit & Falbo, 1988). In families where the children have siblings, this input may be provided by the siblings. However, this does not explain the discrepancy with the earlier studies which have shown a sibling effect.

It is somewhat surprising that only-children outperformed children with siblings for the Singapore cohort alone and this result has not previously been found. Due to the small sample size, the results must be treated with caution. There are several possible explanations for this only-child advantage reported in this chapter. The observed relationship between presence of sibling(s) and task performance in the present study support the idea of Downey (2001) who suggested that the allocation of parental resources has an important effect on educational success. Blake (1981) proposed the Resource Dilution Model which explains how finite parental resources such as settings (home, cultural objects like books), opportunities (engagement with the outside world) and treatments (personal attention, intervention and teaching) are divided per child in the family. A recent Singaporean newspaper article in an English language paper (Tan, 2010) estimated the cost of bringing up a child in Singapore to be between SGD190,000 and SGD700,000[35] (approximately £94,176 and £346,964).[36] The fertility rate[37] in Singapore fell to an all-time low of 1.16 in year 2010 (Li, 2011), down from 1.47 in year 1999 (Singapore Department of Statistics, 2010b). It seems possible that the high cost of raising a child and low fertility rate in Singapore suggest

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[35] Figures include the costs of pregnancy and delivery, infant care, childcare and primary to university education.

[36] The figures were calculated based on an exchange of £1 = SGD2.0175.

[37] Fertility rate refers to the average number of babies that would be born per female.

that in only-children families, resources are invested in their singletons. The present findings and explanations given here corroborate the meta-analyses of 115 and 141 studies comprising of samples from the U.S. and other non-U.S. English-speaking and non-English-speaking samples which demonstrate that singletons achieves better scholastic performance than non-singletons (e.g. Falbo & Polit, 1986; Polit & Falbo, 1987 respectively). Studies of only-children in China have reported similar results, showing that singletons perform better than children with siblings in cognitive abilities involving memory processes, language skills and mathematics (Jiao, Ji, & Jing, 1996) and on academic measures but score similarly on personality ratings (e.g. Falbo & Poston, 1993; Poston & Falbo, 1990a, 1990b). Another possible explanation for this is that within-cultural differences in child-rearing practices might have explained the variations in results obtained between the current study and other Western and non-Western studies.

The present results show that presence of sibling(s) was not associated with advantage in performance on false-belief prediction and mental representation in pretence tasks for either cohort. This suggests that rather than looking at absolute number of sibling or amount of time spent together, relationships and interactions between siblings are more likely to play a more important role. This is consistent with empirical evidence showing that quality of sibling interaction rather than number of siblings is closely related to the development of understanding other people's feelings and thoughts (e.g. Hughes & Ensor, 2005). Further research should examine sibling relationship quality and interaction to delineate cross-cultural similarities and differences in sibling effect on naïve psychology development. Similarly, even though the present results reveal no significant differences in task performance between children who attended full-time or part-time preschool programmes, it is argued that quality rather than quantity of time children spend interacting with peers and adults in the preschools is important, and that in some cases it may provide an equivalent context to sibling interactions and a rich environment which may contribute to children's developing understanding of mind.

### 8.4.2 Role of language (VMA and bilingualism) in children's naïve psychology development

Findings in the present research provide partial support for the claim that language ability plays an influential role in children's developing understanding of naïve psychology concepts (e.g. Astington, 2001; Astington & Baird, 2005; Milligan et al., 2007). In particular, four sets of similar cross-cultural findings emerged from the analyses of language data. First, not all naïve psychology concepts and VMA were related. Second, concurrent (within phase)

associations were found for VMA and level-1 visual perspective-taking at 2½ years of age (phase I) for both cohorts. There were also concurrent associations for VMA with level-1 visual perspective-taking and false-belief prediction at 3½ years of age (phase III) for both cohorts. These concurrent associations support those of previous cross-sectional studies demonstrating some associations between language and performance on naïve psychology tasks (e.g. Cutting & Dunn, 1999; Happé, 1995; Jenkins & Astington, 1996). Third, identical results were found for both cohorts in that VMA at 2½ years of age was associated with false-belief prediction ability at 3½ years of age. This relation accords with previous longitudinal studies which demonstrated that early verbal skills play a fundamental role in facilitating children's acquisition of later naïve psychology concepts (e.g. Carlson et al., 2004a; Lockl & Schneider, 2007). The association from early language ability to later false-belief understanding also supports the idea that children's competence in passing the standard false-belief transfer task depends on a certain level of linguistic ability to comprehend the narratives of the story in order to make correct predictions and judgements (Astington & Jenkins, 1999). Finally, longitudinal associations between level-1 visual perspective-taking at 2½ years of age and VMA at 3½ years of age were observed for both cohorts. This result must be interpreted with caution because early understanding of other aspects of naïve psychology such as action prediction and discrepant desires at 2½ years was not significantly associated with VMA at 3½ years of age for both cohorts. Furthermore, level-1 visual perspective-taking at 3 years was longitudinally related to VMA at 3½ years for the Singapore cohort alone.

With regard to the association between early naïve psychology development and later language ability, similar results have been obtained in other longitudinal studies (e.g. Ruffman et al., 2003). Slade and Ruffman (2005) cited Sabbagh and Baldwin's (2001) findings that a shift in appreciation of information relating to epistemic mental-states (knowledge or ignorance) between 3 and 4 years of age aided word learning. This supports Baldwin and Moses' (2001) premise that early naïve psychology promotes language learning. Many studies have shown that children take the perspective of others when learning new words (e.g. Akhtar, Carpenter, & Tomasello, 1996, Study 2; Nurmsoo & Bloom, 2008, Experiment 1). It is possible that once children are capable of level-1 perspective-taking by 2½ years of age (Flavell et al., 1981; see also present results in Chapter 5), they are able to visualise the perspectives held by others and differentiate them from their own viewpoints. With an early acquisition of visual perspective-taking skills, children are more likely to consider the viewpoints of partners and thus master the rules of conversation such as taking turns and engage in language-rich interactions.

The similar relationships between VMA and naïve psychology concepts for the UK and Singapore cohorts might be attributed to the same first-language background and the non-significant cultural differences in language measures at the two time points. The relationships highlight that "language and social understanding are so intertwined that it is somewhat artificial to separate human activity into parts and call one part language and the other social understanding" (Carpendale & Lewis, 2004, p. 89). Hence, we should look beyond children's language as an individual characteristic or a cognitive skill to reflect the social interaction process in naïve psychology development (Dunn & Brophy, 2005). More importantly, the influence of cultural and linguistic diversity on children's socialisation experiences should be recognised. A further comparison of the developmental pattern of children's social interactions, taking into account language ability, can be informative for understanding naïve psychology development in the two cultures.

Surprisingly, the current study revealed that the UK monolinguals performed significantly better than the UK/Singaporean bilinguals in false-belief prediction at 3½ years of age. This finding may be related to number of languages spoken or cultural differences unrelated to language. The present result is in agreement with Goetz's (2003) findings that showed no bilingual advantage in the false-belief unexpected transfer task. However, Goetz (2003) demonstrated that bilingual children performed significantly better than monolingual children in appearance-reality distinction, level-2 visual perspective-taking and false-belief unexpected content tasks. Bilingualism has also previously been found to have a positive effect on children's naïve psychology development in other studies (e.g. Bialystok & Senman, 2004), that is related to the superiority of bilingual over monolingual children in inhibition control ability (e.g. Bialystok & Craik, 2010). Employing an appearance-reality paradigm, Bialystok and Senman (2004) found that bilingual children performed better than monolingual children on the reality question but no group differences on the appearance question, after language ability was taken into account. In explaining their results, Bialystok and Senman (2004, p. 577) have noted that "we have no reason to believe that bilingual children are more advanced than monolinguals in the conceptual basis of ToM that is captured by the theory theory".

On the other hand, the UK/Singaporean bilingual children's advantage in verbal inhibition control task at 3½ years of age corroborates earlier findings (e.g. Bialystok & Shapero, 2005; Bialystok & Viswanathan, 2009). It is noted that this advantage did not enhance UK/Singaporean bilingual children's performance on false-belief prediction. The bilingual advantage in verbal but not non-verbal inhibition control task might be related to bilingual children's daily experience in conversing and controlling attention in their two

languages. Given that this difference remained significant even after excluding the three UK bilingual children, it might also be related not to bilingualism per se, but to the fact that Asian cultural values and practices promote self-regulation, thus providing opportunities for children to develop early executive function abilities (e.g. Chen et al., 1998; Oh & Lewis, 2008).

Contrary to existing evidence that bilingual children have lower language proficiency than monolingual children (e.g. Bialystok & Senman, 2004; Martin-Rhee & Bialystok, 2008;[38] see further discussion in Bialystok, 2008 and Bialystok & Craik, 2010), this study did not find a significant difference between the two language groups in VMA at either 2½ or 3½ years of age. This could be attributed to the same first language spoken for both language groups.

There are several possible explanations for the lack of bilingual advantage in some aspects of naïve psychology in this study. Bilingual children who experience verbal limitations in both languages during the process of language shifting may negatively affect their task performance temporarily (Diaz & Klingler, 1991). Moreover, speaking two related languages (e.g. Spanish and Italian) versus two unrelated languages (e.g. English and Chinese) may have a different effect on cognitive ability (Bialystok, 2009; Bialystok & Craik, 2010). Furthermore, the influence of bilingualism on children's cognitive abilities should be considered within the socio-cultural context. For example, differences in naïve psychology could be attributed to bilingual children's level of proficiency in the two languages which in turn depends on cultural and social experiences. The variations in task performance in the current study may also be related to factors other than bilingualism.

### 8.5    Conclusion

The major findings from the sibling data revealed cross-cultural similarities in the non-significant 'sibling effect' on naïve psychology development. Compared with previous studies, it is possible that cultural variations in child-rearing practices lead to differences in sibling effects. An implication of this is that when examining social environmental influences on children's naïve psychology development, researchers must consider how cultural norms and values contribute to differences in child-rearing practices (see further discussion in Chapter 10, Section 10.2.2). The most obvious finding to emerge from the language data is the cross-cultural similarities in how language is associated with some

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[38]    It should be noted that the samples of monolingual and bilingual children in some of Bialystok and colleagues' studies were recruited from the same country. Different cultural backgrounds of the children and methodological differences might have yielded different patterns of results in the present study.

aspects of naïve psychology. The larger number of significant correlations in the Singapore cohort demonstrates that language may play a more important role in Singaporean bilingual children's naïve psychology development. Together, the results suggest that cross-cultural work needs to take into account the role of language when comparing children with different linguistic backgrounds. In conclusion, the results presented in this chapter underscore the importance of distinguishing which cultural factors influence the social environmental factors and their subsequent effects on naïve psychology development. The different contexts of early social experiences that contribute to children's naïve psychology development must be recognised.

The next chapter provides another cross-cultural angle from which to view children's naïve psychology development. The analysis focuses on the developmental aspects of pretend play behaviour in order to explore whether early social experiences in pretend play paves the way for children's subsequent developing understanding of mind as well as considering the reverse pathway from early naïve psychology to later complex pretend play behaviour.

# CHAPTER 9

# CULTURAL AND SOCIAL DIFFERENCES IN

# CHILDREN'S PRETEND PLAY BEHAVIOUR

# AND LINKS WITH NAÏVE PSYCHOLOGY DEVELOPMENT

## 9.1 Introduction

This chapter initially explores cultural similarities and differences in pretend play behaviour (Research Question 5). The results reported in Chapters 5 to 7 revealed cross-cultural differences in some aspects of naïve psychology. Additionally, the presence of sibling(s) did not facilitate children's understanding of action prediction, discrepant desires, level-1 visual perspective-taking, mental representation of pretence and false-belief prediction for both cohorts (see Chapter 8). This may be due to variations in children's socialisation contexts. Social pretend play with peers has been identified as a promising platform for children to acquire an understanding of mind (see Chapter 3). The relations between social pretend play behaviour and naïve psychology concepts will then be investigated to determine whether developmental changes in one area are associated with development in another area.

This chapter first summarises the empirical evidence reviewed in Chapter 3, thus providing the rationale for the research questions. The results of the cross-cultural comparison of pretend play behaviour and exploration of the proposed relations between pretend play behaviour and naïve psychology are then presented. Finally, the chapter discusses the main findings in relation to how culture and play-enriched settings shape the development of children's pretend play behaviour and how culturally similar and different pretend play behaviours are associated with naïve psychology development.

As reviewed in Chapter 3, children acquire a rich repertoire of pretend play behaviour from 2 to 4 years of age, including social pretend play behaviour, social bids, pretend themes, types of pretend role-play and modes of pretend transformation. Research conducted in Western contexts has shown that children's pretend play behaviour develops through various stages. By 20 to 24 months of age, children display simple social pretend play behaviour (Howes et al., 1989). By 30 to 35 months of age, children engage in cooperative social pretend play behaviour (Howes, 1985; Howes & Matheson, 1992; Howes et al., 1989). Complex social pretend play behaviour emerges by 42 to 47 months of age (Dunn & Dale, 1984; Howes & Matheson, 1992). The developmental change from individual pretend play behaviour to complex forms of shared pretend play behaviour mirrors

children's gradual transition from non-metarepresentational to metarepresentational ability (Jarrold et al., 1994). It is worth noting that children's play differs from culture to culture. Cross-cultural comparative study has demonstrated that Korean-American children engaged in a lower proportion of social pretend play behaviour compared to Anglo-American children at 4 years of age (Farver & Shin, 1997), demonstrating the influence of culture on children's social skills and play behaviours. Although children in the UK and Singapore both live in urban cities and are exposed to similar popular toys and cartoons through the media, the adults in both cultures may place different importance and value on the role of play in children's learning and development. A comparison of development of pretend play behaviour between the two cultures is therefore warranted.

As noted in Chapter 3, cultural differences might emerge in the types of social bids exhibited in children's pretend play because culture influences the way people interact with one another (Section 3.3.2). Furthermore, little attention has been given to comparison of the developmental patterns of pretend transformation skills between children from diverse cultural groups (Section 3.3.5). In terms of the content of pretend play, numerous studies have demonstrated that pretend play themes tend to reflect the values, practices and norms that are important to the particular culture (e.g. Farver et al., 1995, Farver et al., 2000; Farver & Shin, 1997; Göncü et al., 2000; Haight et al., 1999). While pretend play themes might not have a direct influence on children's naïve psychology development, it is nonetheless important to examine the play themes in the current comparative study. Children's pretend play themes may provide useful cross-cultural information of how people think about each other and how people relate and interact socially in their culture. Does the content of children's play portray and reflect the norms, values and family practices of their culture?

Children's use of metacommunication emerges by 3 years of age. In order to engage in joint pretend play, children use metacommunication to discuss and negotiate roles, define rules and attribute pretend properties to objects (see Chapter 3, Section 3.3.4). Thus, metacommunication functions as a support for the development of an understanding of the mental-states of self, playmates and pretend roles adopted. Extensive research has explored the development of metacommunication in Western contexts. However, no single longitudinal study that examines whether children's use of verbal metacommunication differs between the Western and Eastern cultures has been published. Taking these points together, the first issue considered in this chapter is the identification of cross-cultural similarities and differences in the developmental patterns of children's various pretend play behaviour between 2½, 3 and 3½ years of age.

The role of pretend play behaviour on children's naïve psychology development also

merits careful attention. There is a considerable research indicating a reciprocal relationship between pretend play behaviour and naïve psychology (see Chapter 3, Section 3.6.1). Early social pretend play is important because it may serve as a bridge for the development of social competence skills. Peer interaction during pretend play presents a rich context for attainment of social and role-taking skills (Doyle & Connolly, 1989; Rubin & Maioni, 1975). Similarly, a longitudinal study in the U.S. demonstrated that children who had engaged in more role-enactment at 33 months of age performed better in false-belief task at 40 months of age, after language ability was accounted for (Dunn et al., 1991b).

It is important to note that not all forms of pretend play behaviour and not all aspects of naïve psychology are related. For example, a host of Western studies have demonstrated that certain components (e.g. role assignment and role-enactment) and not pretend play behaviour in general supports children's understanding of mental representations (e.g. Nielsen & Dissanayake, 2000; Taylor & Carlson, 1997; Youngblade & Dunn, 1995). Harris (2000, 2005) suggests that children's ability to engage in role-play, which involves setting aside their own identity, is associated with acquisition of naïve psychology concepts. If verbal metacommunication is the main feature to distinguish between non-representational solitary pretend play behaviour and representational social pretend play behaviour as suggested by Jarrold et al. (1994), it is also important to consider whether early engagement in verbal metacommunication in social pretend play contributes to later representational understanding of naïve psychology (reviewed in Chapter 3, Section 3.6.3). Schwebel et al. (1999) have reported non-significant results between pretend play measures and false-belief understanding. This later finding supports the proposition that false-belief understanding should not be depicted as a single measure of knowledge of mental representation. Evidence indicates that children who engaged in more jointly constructed pretend play and rated high on transformation skills performed better on the appearance-reality distinction task (Schwebel et al., 1999). As explained in Chapter 1 (Section 1.2.1), pretend play behaviour and pretence understanding are not mutually exclusive. Most existing Western studies have focused on the effects of pretend play behaviour or pretence understanding in acquisition of other naïve psychology concepts separately and no non-Western study examining the association between pretend play behaviour and pretence understanding has been published. The second issue considered in this chapter is the cultural similarities and differences in the associations between early pretend play behaviour and children's later competence in false-belief prediction, appearance-reality distinction and mental representation nature of pretence.

As children become more socially competent, they acquire greater ability to predict others' preferences and desires and display more complex play interactions with peers. The

reverse relationship, showing early naïve psychology concepts promoting children's ability to engage in complex forms of pretend play behaviour such as joint planning and role assignment, has been illuminated through longitudinal research (e.g. Jenkins & Astington, 2000). The final issue examined in this chapter is the cultural similarities and differences in the relationships between early naïve psychology concepts (pretend transformation and visual perspective-taking) and later engagement in complex forms of social pretend play behaviour. Children's performance on the pretend transformation task demonstrates their ability to interpret other people's intended pretence action and make pretend-reality distinction. These abilities may provide a springboard for the development of sophisticated social pretend play behaviour in which various roles and themes could be negotiated and adopted. Likewise, level-1 and level-2 visual perspective-taking tasks assess children's appreciation that own perspective may differ from others' perspective. This ability may assist children's later capability to engage in complex forms of shared pretend play behaviour in which pretend plots are jointly adopted and coordinated and conflicts are resolved.

To sum up, there have been relatively few longitudinal studies comparing the development of children's pretend play behaviour between a Western and a hybrid culture. The notion of reciprocal, longitudinal associations between pretend play behaviour and naïve psychology development has rarely been addressed in published cross-cultural research. The analyses to be reported in this chapter will begin to fill this gap in the literature.

## 9.2    Research Questions

Based on the review of existing evidence in Chapter 3, the results reported in previous chapters and the gaps in the literature highlighted above, this chapter considers the empirical analysis of one main Research Question 5 (stated in Chapter 1) and two subsidiary research questions. The analysis in this chapter considers a selected sub-sample of children from each cohort (see explanations in Section 9.3.2). The children in the sub-sample will henceforth be referred to as the "UK children" and "Singaporean children" in this chapter.

5. **Are there longitudinal differences between the UK and Singaporean children in terms of engagement in different categories of pretend play behaviour (peer play scale, social bids, types of pretend role-play, pretend themes, transformation skills and Test of Pretend Play) between 2½, 3 and 3½ years of age?**

a) **Are there differences between the UK and Singaporean children in terms of the relationships between early social pretend play behaviour and later acquisition of naïve psychology concepts?**

b) **Are there differences between the UK and Singaporean children in terms of the relationships between early naïve psychology concepts and later ability to engage in complex forms of pretend play behaviour?**

## 9.3    Results

Before the empirical findings are presented, a general description and analysis of the observational data is presented.

### 9.3.1    Data coding and treatment of observational data

This preliminary section is divided into two parts. First, the approach taken to select a sub-sample of the longitudinal data for the observation analysis in this chapter is described. Second, gender differences in pretend play behaviour are reported, thus providing the rationale for the covariate employed in this chapter.

### 9.3.2    Matched-pair design

As explained in Chapter 4 (Section 4.8), the large volume of observational data (222 fifteen-minute video recordings of play sessions for the final sample of this study) across the three phases could not be fully analysed in this thesis. Differences in pretend play behaviour attributed to individual characteristics such as gender, CA and VMA have been well documented (see Chapter 3, Section 3.5). A matched-pair design was therefore chosen in consideration of the overrepresentation of boys in the Singapore cohort and the need to control for potential gender differences in play behaviour to ensure equal number of boys and girls within each cohort. This matched-pair design also reduced the likelihood that potential within-cultural individual differences in pretend play behaviour related to these factors might contribute to findings of cross-cultural variations, and these variations may be associated with differences in naïve psychology development. Based on the maximum number of girls in the Singapore cohort in phase III ($N = 13$), a subset of children from each cohort was selected and matched by gender, CA and VMA: 13 boys and 13 girls in each cohort. The total children in the sub-sample ($N = 52$) represented 70.3% of the total sample.

For the sub-sample, there were no significant cultural differences in CA ($t(50) = .89$, n.s.), phase I VMA ($t(50) = .26$, n.s.) and phase III VMA ($t(50) = 1.26$, n.s.). There were also

no significant differences between the UK and Singaporean children with regards to CA for boys ($t(24) = .62$, n.s.) and girls ($t(24) = .63$, n.s.). Both the UK and Singaporean children did not differ significantly in terms of phase I VMA for boys ($t(24) = .26$, n.s.) and girls ($t(24) = .09$, n.s.) and phase III VMA for boys ($t(24) = .49$, n.s.) and girls ($t(24) = 1.43$, n.s.). Results of independent t-tests revealed that children who were included in the analyses presented in this chapter ($N = 52$) and children who were excluded ($N = 22$) did not differ significantly in individual task performance across all phases. There were also no significant differences between children who were included in the analyses in this chapter and children who were excluded with regards to CA, VMA, gender, paternal education level, maternal education level, preschool attendance scheme and number of languages used across phases. These results indicated that the sub-sample was representative of the sample as a whole. Given that the UK and Singaporean children were matched by CA and language ability, CA and VMA were not included as covariates in the comparative analysis of pretend play behaviour.

### 9.3.3 Gender differences in pretend play behaviour

Although the UK and Singaporean children were gender-matched, independent t-tests were conducted to test for gender differences in play behaviour. In terms of peer play scale, significant gender differences in phase I parallel pretend ($t(24) = 2.40$, $p < .05$, $r = .44$) were found for the Singaporean children. In terms of pretend role-play, there were significant gender differences in phase II metacommunication ($t(24) = 2.75$, $p < .05$, $r = .49$) for the UK children and phase II role-enactment ($t(24) = 2.34$, $p < .05$, $r = .43$) for the Singaporean children. In terms of social bids during pretend play, gender differences were found for phase I negative conflicts ($t(13) = 2.85$, $p < .05$, $r = .50$) and phase II recruitment ($t(24) = 3.16$, $p < .01$, $r = .54$) for the UK children and phase III recruitment ($t(19) = 2.27$, $p < .05$, $r = .42$) for the Singaporean children. In terms of pretend themes, significant gender differences were found for phase II daily activities ($t(24) = 2.24$, $p < .05$, $r = .42$) for the Singaporean children. For the UK children, gender variations were found for phase I outings, holidays and weather theme ($t(24) = 2.23$, $p < .05$, $r = .41$) and phase II family-related theme ($t(24) = 2.15$, $p < .05$, $r = .40$). In sum, gender-based differences in a number of the measures of pretend play behaviour were observed.

Prior research findings have also shown gender-based disparities in pretend play behaviour (see Chapter 3, Section 3.5.1) and it has been found that gender-based differences in play behaviour may underlie variations in naïve psychology development (e.g. Hughes, Fujisawa, Ensor, Lecce, & Marfleet, 2006). In light of this possibility, gender is treated as a

covariate in all subsequent analyses in this chapter. Overall, the matched group design and the control of gender effect reduce the likelihood that any significant cultural differences found in pretend play behaviour might be attributed to child-specific characteristics.

**9.3.4    Research question 5: Are there longitudinal differences between the UK and Singaporean children in terms of engagement in different categories of pretend play behaviour (peer play scale, social bids, types of pretend role-play, pretend themes, transformation skills and Test of Pretend Play) between 2½, 3 and 3½ years of age?**

The descriptive statistics for the pretend play behavioural measures at each developmental time point are presented in Appendix E3 (Table E3.1). To assess cultural differences and developmental changes in children's pretend play behaviour, two-way 2(culture) x 3(phase) mixed-model repeated-measures ANCOVAs, with gender as a covariate, were computed for each category of pretend play behaviour. While no significant cultural differences were found in modes of transformation, there were differences in some of the categories of the pretend play behaviour measured within: the peer play scale; social bids; pretend themes; pretend role-play; and Test of Pretend Play (ToPP) between the two cultures. These are discussed in further detail below.

*Cultural differences and developmental changes in the peer play scale*

As described in Appendix D, the peer play scale measures the extent to which play involved pretence and the social interaction between peers. Given the short duration of some behaviours within the peer play categories, the play behaviours were merged into four main groups: (1) uninvolved in play; (2) non-pretend play (non-pretend solitary, non-pretend parallel, non-pretend simple and non-pretend cooperative); (3) non-social pretend play (solitary pretend and parallel pretend) and (4) social pretend play (simple social pretend, cooperative social pretend and complex social pretend). Among these four categories of the peer play scale, ANCOVA analysis revealed cultural differences in non-pretend play, non-social pretend play and social pretend play. Figures 9.1a to 9.1c present the mean duration of engagement in these categories of the peer play scale across phases. These results are discussed below.

For non-pretend play, the results of the ANCOVA revealed significant main effects of culture ($F(1, 49) = 6.59$, $p < .05$, $\eta_p^2 = .12$), phase ($F(2, 98) = 11.21$, $p < .001$, $\eta_p^2 = .19$) and a significant culture by phase interaction ($F(2, 98) = 8.96$, $p < .001$, $\eta_p^2 = .16$). With regard to the main effect of culture, the Singaporean children ($M = 216.65$, $SD = 152.24$)

spent significantly more time engaged in non-pretend play across the three phases than the UK children ($M = 122.58$, $SD = 143.48$). To examine the interaction effect, separate one-way between cultures ANCOVAs, rather than t-tests, were conducted for each phase to take into account the effect of gender. The results indicated that the Singaporean children ($M = 164.92$, $SD = 112.71$) spent significantly more time engaged in non-pretend play than the UK children ($M = 63.62$, $SD = 94.70$, $F(1, 51) = 14.30$, $p < .001$, $\eta_p^2 = .23$) in phase I. There were no significant cultural differences in phases II and III. To determine cross-cultural differences in developmental changes between phases, paired-samples t-tests were computed. The results revealed a significant decline in non-pretend play episodes from phase I ($M = 88.04$, $SD = 98.70$) to phase III ($M = 23.50$, $SD = 52.21$, $t(25) = 2.70$, $p < .05$, $r = .48$) for the Singaporean children. There were no significant differences between phases I and II and between phases II and III. For the UK children, there were no significant changes in non-pretend play between phases.
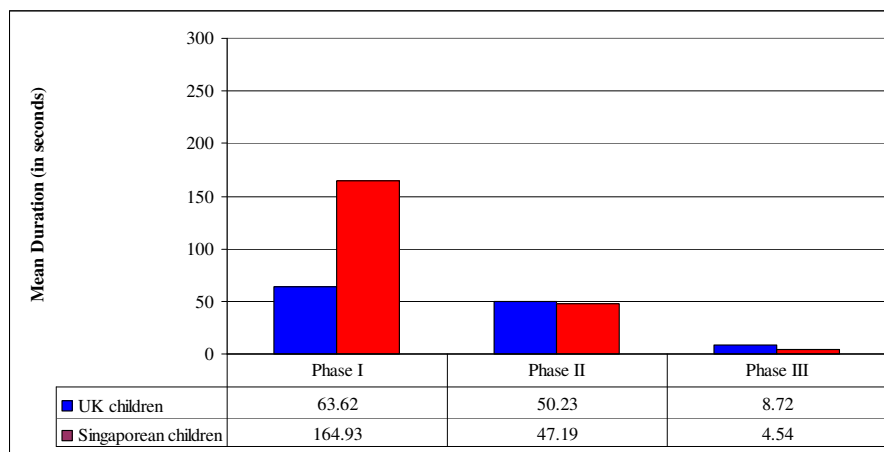


*Figure 9.1a.* Mean duration of non-pretend play across phases for the UK ($N = 26$) and Singaporean ($N = 26$) children.

For non-social pretend play, there was a significant main effect of culture ($F(1, 49) = 6.37$, $p < .05$, $\eta_p^2 = .12$). The Singaporean children ($M = 177.27$, $SD = 148.51$) spent significantly more time engaged in non-social pretend play across the three phases than the UK children ($M = 87.81$, $SD = 103.74$). There was no significant main effect of phase or culture by phase interaction.

| | Phase I | Phase II | Phase III |
|---|---|---|---|
| ■ UK children | 40.34 | 26.11 | 21.35 |
| ■ Singaporean children | 88.04 | 65.73 | 23.5 |

*Figure 9.1b.* Mean duration of non-social pretend play across phases for the UK ($N = 26$) and Singaporean ($N = 26$) children.

For social pretend play, the analyses indicated significant main effects of culture ($F(1, 49) = 13.09$, $p = .001$, $\eta_p^2 = .21$), phase ($F(2, 98) = 6.23$, $p < .01$, $\eta_p^2 = .12$) and a significant culture by phase interaction ($F(2, 98) = 11.77$, $p < .001$, $\eta_p^2 = .19$). With regard to the main effect of culture, the UK children ($M = 763.23$, $SD = 232.66$) spent significantly more time engaged in social pretend play across the three phases than the Singaporean children ($M = 568.31$, $SD = 193.84$). To examine the interaction effect, separate one-way between cultures ANCOVAs revealed that the UK children ($M = 220.50$, $SD = 129.44$) spent significantly more time engaged in social pretend play than the Singaporean children ($M = 61.38$, $SD = 89.30$, $F(1, 51) = 29.21$, $p < .001$, $\eta_p^2 = .37$) in phase I. There were no significant cultural differences in phases II and III. With respect to the cross-cultural differences in developmental changes between phases, paired-samples t-tests indicated a significant increase in social pretend play episodes from phase I ($M = 61.38$, $SD = 89.30$) to phase II ($M = 210.35$, $SD = 133.24$, $t(25) = 4.97$, $p < .001$, $r = .70$), from phases II to III ($M = 296.58$, $SD = 52.34$, $t(25) = 3.80$, $p = .001$, $r = .61$) and from phases I to III ($t(25) = 11.38$, $p < .001$, $r = .92$) for the Singaporean children. For the UK children, a significant increase in social pretend play episodes was found from phase II ($M = 247.04$, $SD = 107.17$) to phase III ($M = 295.69$, $SD = 66.67$, $t(25) = 2.36$, $p < .05$, $r = .43$) and from phase I ($M = 220.50$, $SD = 129.44$) to phase III ($t(25) = 3.23$, $p < .01$, $r = .54$). There were no significant changes between phases I and II.

| | Phase I | Phase II | Phase III |
|---|---|---|---|
| UK children | 220.5 | 247.04 | 295.69 |
| Singaporean children | 61.38 | 210.34 | 296.58 |
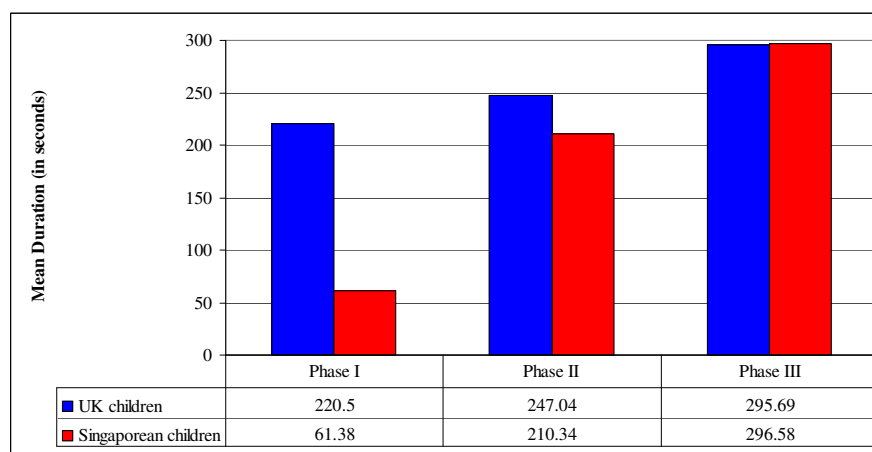
*Figure 9.1c.* Mean duration of social pretend play across phases for the UK (*N* = 26) and Singaporean (*N* = 26) children.

*Cultural differences in social bids in pretend play*

In order to recruit other children, join in a pretend play episode or integrate pretence in their social pretend play, children use a number of strategies. These include neutral, recruitment, positive imitative, positive complementary and negative conflicts. Among these five categories of social bids observed in children's pretend play, cultural differences were observed in duration of engagement in neutral bids, positive complementary social bids and negative conflicts. It is noted that the similar results were obtained when the analyses were rerun using total play duration (i.e. non-pretend play in addition to pretend play).

For neutral bids during pretend play, the ANCOVA results revealed a significant main effect of culture ($F(1, 49) = 5.66$, $p < .05$, $\eta_p^2 = .10$). The Singaporean children ($M = 64.69$, $SD = 50.26$) spent significantly more time engaged in neutral bids during pretend play across the three phases than the UK children ($M = 38.60$, $SD = 24.13$). There was no significant main effect of phase or interaction between culture and phase.

For positive complementary social bids during pretend play, there was a significant main effect of culture ($F(1, 49) = 5.81$, $p < .05$, $\eta_p^2 = .11$) and a significant culture by phase interaction ($F(2, 98) = 4.00$, $p < .05$, $\eta_p^2 = .08$). However, there was no significant main effect of phase. With regard to the main effect of culture, the UK children ($M = 393.19$, $SD = 164.87$) spent significantly more time engaged in positive complementary social bids across the three phases than the Singaporean children ($M = 294.77$, $SD = 135.13$). Subsequent one-way between cultures ANCOVAs, with gender as covariate, were conducted for each phase to examine the interaction effect. The results indicated that the UK children ($M = 117.58$, $SD = 93.73$) spent significantly more time engaged in positive complementary social bids during

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pretend play in phase I compared to the Singaporean children ($M$ = 33.54, $SD$ = 62.03, $F$(1, 49) = 14.84, $p$ < .001, $\eta_p^2$ = .23). There were no significant cultural differences in phases II and III. To determine cross-cultural differences in developmental changes between phases, paired-samples t-tests were computed. There were significant increases in the duration of engagement in positive complementary social bids during pretend play from phase I ($M$ = 33.54, $SD$ = 62.03) to phase II ($M$ = 123.88, $SD$ = 97.84, $t$(25) = 3.75, $p$ = .001, $r$ = .60) and from phase I to phase III ($M$ = 137.35, $SD$ = 60.95, $t$(25) = 5.71, $p$ < .001, $r$ = .75) for the Singaporean children. No significant differences were observed between phases II and III. For the UK children, there were no significant changes between phases.

For negative conflicts during pretend play, the results showed a significant main effect of culture ($F$(1, 49) = 7.91, $p$ < .01, $\eta_p^2$ = .14). The UK children ($M$ = 29.83, $SD$ = 23.23) spent significantly more time engaged in negative conflicts during pretend play across the three phases than the Singaporean children ($M$ = 16.09, $SD$ = 13.49). There was no significant main effect of phase or culture by phase interaction.

*Cultural differences and developmental changes in pretend play themes*

In pretend play, children portray themes that reflect their cultural and social experiences. Among the eight categories of pretend play themes, cultural differences were observed in just one play theme: 'outings, holiday and weather'. There were no cultural differences for the remaining categories of pretend play themes. Developmental changes but no cultural differences were found for the play theme of adult occupation for the UK and Singaporean children. Figures 9.2a and 9.2b present the mean duration of engagement in the pretend play themes of adult occupation and outings, holiday and weather across the three phases. The mean duration of engagement in the eight categories of pretend play themes for the three phases are displayed in Appendix E (Figures E3.2a to E3.2c).

For adult occupation theme, the analyses showed significant main effect of phase ($F$(1, 98) = 4.35, $p$ < .05, $\eta_p^2$ = .08). Paired-samples t-tests revealed that the UK and Singaporean children spent significantly more time engaged in the pretend play theme of adult occupations in phase II ($M$ = 16.60, $SD$ = 54.71) compared to phase I ($M$ = .81, $SD$ = 5.82, $t$(51) = 2.06, $p$ < .05, $r$ = .28). The UK and Singaporean children also spent significantly more time engaged in the pretend play theme of adult occupations in phase III ($M$ = 19.52, $SD$ = 52.91) than in phase I ($t$(51) = 2.52, $p$ < .05, $r$ = .33). There were no significant changes between phases II and III. There was no significant main effect of culture or culture by phase interaction.

| | Phase I | Phase II | Phase III |
|---|---|---|---|
| ■ UK children | 0 | 4.08 | 14.88 |
| ■ Singaporean children | 1.62 | 29.12 | 24.15 |

*Figure 9.2a.* Mean duration of engagement in the pretend play theme of adult occupation across phases for the UK ($N = 26$) and Singaporean ($N = 26$) children.[39]

For outings, holiday and weather theme, ANCOVA analysis indicated a significant main effect of culture ($F(1, 49) = 10.77$, $p < .01$, $\eta_p^2 = .18$). The UK children ($M = 58.28$, $SD = 62.77$) spent significantly more time engaged in this pretend play theme across the three phases compared to the Singaporean children ($M = 14.12$, $SD = 28.72$). There was no significant main effect of phase or culture by phase interaction.
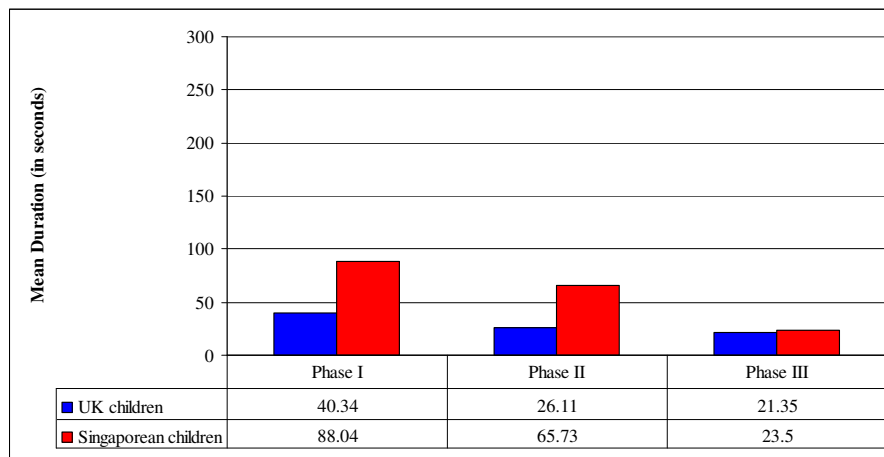


| | Phase I | Phase II | Phase III |
|---|---|---|---|
| ■ UK children | 31.01 | 78.69 | 64.85 |
| ■ Singaporean children | 0 | 7.19 | 35.15 |
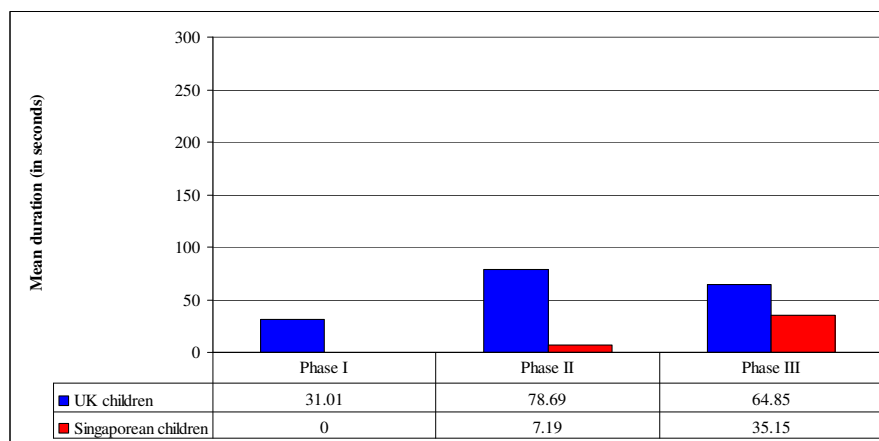
*Figure 9.2b.* Mean duration of engagement in the pretend play theme of outing, holiday and weather across phases for the UK ($N = 26$) and Singaporean ($N = 26$) children.

*Cultural differences and developmental changes in pretend role-play*

Children who are involved in pretend play may engage in a variety of pretend role-playing. Among the four categories of pretend role-play, cultural differences were observed for duration of engagement in other forms of pretence and metacommunication. On the other

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[39]  Given that some pretend play themes were not frequent in children's play, the bars were low as shown in Figures 9.2a and 9.2b.

hand, developmental changes but no cultural differences were found for role-enactment for the UK and Singaporean children. There were also no cultural differences for role-play.

For other forms of pretence, ANCOVA analysis revealed a significant main effect of culture ($F(1, 49) = 7.33$, $p < .01$, $\eta_p^2 = .13$) and a significant culture by phase interaction ($F(2, 98) = 6.01$, $p < .01$, $\eta_p^2 = .11$). However, there was no significant main effect of phase. With regard to the main effect of culture, the UK children ($M = 74.06$, $SD = 39.68$) spent significantly more time engaged in other forms of pretence across the three phases compared to the Singaporean children ($M = 43.41$, $SD = 41.15$). Subsequent one-way between cultures ANCOVAs, with gender as covariate, were conducted for each phase to examine the interaction effect. The results showed that the UK children ($M = 188.04$, $SD = 106.74$) spent significantly more time engaged in other forms of pretence in phase I compared to the Singaporean children ($M = 97.92$, $SD = 108.09$, $F(1, 49) = 9.27$, $p < .01$, $\eta_p^2 = .16$). There were no significant cultural differences in phases II and III. To determine cross-cultural differences in developmental changes between phases, paired-samples t-tests were computed. There was significant decline in other form of pretence from phase I ($M = 188.04$, $SD = 106.74$) to phase II ($M = 29.54$, $SD = 71.20$, $t(25) = 6.08$, $p < .001$, $r = .77$) and from phases I to III ($M = 4.62$, $SD = 17.17$, $t(25) = 8.26$, $p < .001$, $r = .86$) for the UK children. There were no significant changes between phases II and III for the UK children. For the Singaporean children, significant decline in other forms of pretence occurred from phase I ($M = 97.92$, $SD = 108.09$) to phase II ($M = 30.92$, $SD = 71.70$, $t(25) = 2.51$, $p < .05$, $r = .45$), from phases II to III ($M = 1.38$, $SD = 6.48$, $t(25) = 2.07$, $p < .05$, $r = .38$) and from phases I to III ($t(25) = 4.59$, $p < .001$, $r = .68$).

For metacommunication, the analyses revealed significant main effects of culture ($F(1, 49) = 13.83$, $p = .001$, $\eta_p^2 = .22$) and phase ($F(2, 98) = 5.03$, $p = .01$, $\eta_p^2 = .09$). However, there was no significant culture by phase interaction. The main effect of culture can be explained by the fact that the UK children ($M = 48.37$, $SD = 20.91$) spent significantly more time engaged in metacommunication than the Singaporean children ($M = 29.40$, $SD = 16.58$) across the three phases. To explore the main effect of phase, paired-samples t-tests were conducted. The UK and Singaporean children spent significantly more time engaged in metacommunication in phase II ($M = 47.02$, $SD = 36.97$) compared to phase I ($M = 16.38$, $SD = 22.25$, $t(51) = 6.67$, $p < .001$, $r = .68$). The UK and Singaporean children also spent significantly more time engaged in metacommunication in phase III ($M = 53.25$, $SD = 27.02$, $t(51) = 8.55$, $p < .001$, $r = .77$) than in phase I. There were no significant changes between phases II and III.

For role-enactment, the results showed a significant main effect of phase ($F(1, 98) =$ 10.12, $p = .001$, $\eta_p^2 = .17$). Paired-samples t-tests indicated that the UK and Singaporean children spent significantly more time engaged in role-enactment in phase II ($M = 172.88$, $SD = 110.82$) compared to phase I ($M = 44.27$, $SD = 86.30$, $t(51) = 6.74$, $p < .001$, $r = .69$). In addition, the UK and Singaporean children spent significantly more time engaged in role-enactment in phase III ($M = 194.94$, $SD = 101.69$, $t(51) = 7.28$, $p < .001$, $r = .71$) than in phase I. There were no significant changes between phases II and III. There was no significant main effect of culture or culture by phase interaction.
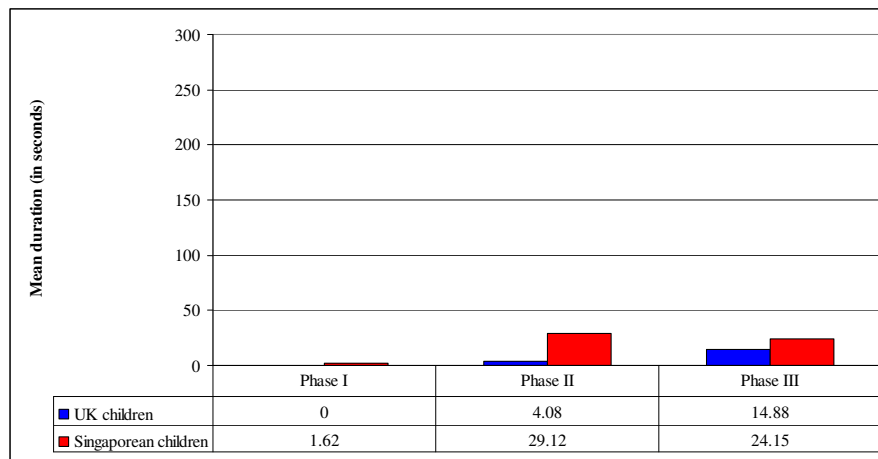
*Cultural similarities and differences in the Test of Pretend Play (ToPP)*

A complete assessment of pretend play behaviour should examine children's behaviour and interaction both in the context of everyday experiences and through standardised measures. A comparison between the sub-sample of children's ToPP performance and naturalistic play behaviour might reveal cross-cultural differences between this norm-referenced standardised measure and naturalistic observations (see discussion in Section 9.4). The ToPP assesses three types of symbolic play: (1) object substitution; (2) attribution of an imagined property; and (3) reference to an absent object, person or substance (see Chapter 4, Section 4.6.3). The following analysis was conducted based on the total scores for these three types of symbolic play.

To evaluate cultural similarities and differences in the ToPP measure in phases I and III, a two-way 2(culture) x 2(phase) mixed-model repeated-measures ANCOVA, with gender as covariate, was conducted. The results revealed a significant main effect of phase ($F(1, 49) = 14.50$, $p < .001$, $\eta_p^2 = .23$) and a significant culture by phase interaction ($F(1, 49) = 6.07$, $p < .05$, $\eta_p^2 = .11$). There was no significant main effect of culture. To explore the interaction effect, separate one-way between cultures ANCOVAs, with gender as a covariate, were conducted for each phase. These indicated no significant main effect of culture in phase I. However, the UK children ($M = 61.61$, SD = 8.09) achieved better phase III ToPP scores compared to the Singaporean children ($M = 55.22$, SD = 12.92, $F(1, 49) = 4.50$, $p < .05$, $\eta_p^2 = .08$). To explore cross-cultural differences in developmental changes between phases, paired-samples t-tests were conducted. There was significant improvement in ToPP scores from phase I ($M = 40.45$, SD = 9.45) to phase III ($M = 61.61$, SD = 8.09, $t(25) = 10.28$, $p < .001$, $r = .90$) for the UK children. Similarly, the Singaporean children achieved better scores in phase III ($M = 55.22$, SD = 12.92) compared to phase I ($M = 41.69$, SD = 6.12, $t(25) = 5.97$, $p < .001$, $r = .77$).

In summary, several cross-cultural similarities and differences in the developmental changes in children's play behaviour were observed. For the peer play scale, the Singaporean children spent significantly more time engaged in non-pretend play and non-social pretend play across phases compared to the UK children. In contrast, the UK children spent significantly more time engaged in social pretend play across phases than the Singaporean children. More specifically, the Singaporean children spent significantly more time engaged in non-pretend play in phase I whereas the UK children spent significantly more time engaged in social pretend play. Cultural similarities in non-pretend play and social pretend play were observed in subsequent phases. Both cultures spent similar amount of time in play across phases, as shown by the non-significant differences in the peer play category 'uninvolved in play'.

The comparative analyses revealed that the mean duration of non-pretend play declined significantly from phases I to III for the Singaporean children while no differences were found for the UK children. In conjunction with the decline in non-pretend play for the Singaporean children, an increase in social pretend play was observed between phases. Similar increase in social pretend play was found between phases II and III and between phases I and III for the UK children. There were no significant differences in non-pretend play and non-social pretend play between phases for the UK children. Furthermore, early signs of cooperative social pretend play were observed for some UK children in phase I but not for the Singaporean children (see Appendix E3, Table E3.1).

In term of social bids during pretend play, the UK children spent significantly more time involved in positive complementary social bids and negative conflicts across the three phases whereas the Singaporean children spent significantly more time involved in neutral bids across phases. Positive complementary social bids increased significantly from phase I and reached a plateau in phase II for the Singaporean children but no phase differences were observed for the UK children. It is noted that the greater duration of engagement in social bids for the UK children compared with the Singaporean children was in line with the fact that the UK children were more social in their pretend play.

For pretend play content, cultural differences were minimal. Both the UK and Singaporean children spent similar amount of time engaged in the pretend play themes of family-related activities, daily activities, violence/aggression, animals, transportation and fantasy/adventure across the three phases. The UK and Singaporean children spent significantly more time engaged in the pretend play theme of adult occupation in phases II and III than in phase I. Nonetheless, the UK children spent significantly more time engaged

in the pretend play theme of outings, holidays and weather across the three phases than the Singaporean children.

With regard to pretend role-play, apparent cultural differences were observed in other forms of pretence and metacommunication. Compared with the Singaporean children, the UK children spent significantly more time engaged in metacommunication across the three phases. It is important to note that the UK children spent more time engaged in pretend play in general and metacommunication occurred within pretend play episodes. Hence, even though the UK children spent significantly more time engaged in metacommunication, their pretend play behaviour might not be considered more sophisticated than the Singaporean children. There was significant decline in duration of other forms of pretence between phases I to II and from phases I to III for the UK children whereas similar decline was observed between all phases for the Singaporean children. The UK and Singaporean children spent significantly more time engaged in role-enactment in phases II and III than in phase I. More cultural similarities were found for role-play and modes of transformation. As discussed in Chapter 6, the present study showed small to large effect sizes in cultural differences in naïve psychology task performance. Here, the range of small to large effect sizes also indicates variations in the degree of cultural differences in pretend play behaviour along a continuum.

### 9.3.5 Research question 5a: Are there differences between the UK and Singaporean children in terms of the relationships between early social pretend play behaviour and later acquisition of naïve psychology concepts?

As briefly reviewed earlier, early engagement in social pretend play behaviour and types of pretend role-play (role-enactment, role-play and metacommunication) might be associated with children's later competence in predicting false-belief, distinguishing appearance and reality and understanding the mental representational nature of pretence.[40] With regard to social pretend play behaviour, the cooperative social pretend play behavioural and complex social pretend play behavioural categories of the peer play scale were analysed because these two dimensions of peer play involve reciprocal exchanges of roles and discussion, negotiation and sharing of scripts (see Chapter 3, Section 3.3.3 and Appendix D). Given the small sample size, partial correlations, controlling for the effect of phase III

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[40] It is noteworthy that no significant correlations were found between early non-social (solitary and parallel) pretend play and later naïve psychology concepts, except for a significant negative association between phase I parallel pretend play and phase II mental representation in pretence task for the UK children alone.

VMA[41] and gender, were employed to examine the relation between early social pretend play behaviour and later acquisition of naïve psychology concepts. Prior cross-sectional and longitudinal studies have used correlation analysis to investigate the links between pretend play behaviour and naïve psychology concepts (e.g. Charman et al., 2000; Nielsen & Dissanayake, 2000). The analyses carried out here and in the next research question are based on the sub-sample of children. As explained in Chapter 2 (Section 2.4.2), it is important to control for the effect of VMA because of the parallel development of language, pretend play behaviour and naïve psychology.

The results of the 12 correlations between early social pretend play behaviour and later naïve psychology concepts for each group are presented in Table 9.1. Although the data presented here included between-task correlations and between pretend play behavioural measures correlations, only those correlations highlighted in bold between early social pretend play behaviour and later naïve psychology concepts were considered here. There were three significant longitudinal correlations for the UK children. Phase I cooperative social pretend play behaviour was significantly longitudinally positively correlated with phase II false-belief prediction ($r(22) = .66$, $p < .01$). Longitudinal associations were also found for phase II complex social pretend play with phase III mental representation in pretence ($r(22) = .38$, $p < .05$) and phase III appearance-reality distinction ($r(22) = .36$, $p < .05$). For the Singaporean children, there was only one significant finding. Phase II complex social pretend play behaviour was longitudinally associated with phase III appearance-reality distinction ($r(22) = .48$, $p < .01$). There were no significant correlations for early social pretend play behaviour with mental representation in pretence in phase II and false-belief prediction in phase III for the UK and Singaporean children.

It should be noted that role-playing occurred during episodes of complex social pretend play behaviour whereas role-enactment occurred either during episodes of cooperative social pretend play or complex social pretend play (see definitions in Chapter 3, Section 3.3.3 and Appendix D). Further correlation analyses were computed to explore whether role-enactment, role-play and metacommunication were associated with naïve psychology development. The results of the 21 correlations between various categories of pretend role-play and naïve psychology concepts for each group are shown in Table 9.2.

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[41]  The results were similar when phase I VMA was partialled out.

Table 9.1. Partial Correlations (Controlling for Phase III VMA and Gender) between Early Pretend Play Behaviour and Later Naïve Psychology Measures for the UK ($N = 26$) and Singaporean ($N = 26$) Children[a]

| Naïve psychology measure | 1[b] | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 Phase I Cooperative social pretend play | - | .03 | .37* | **.03** | **.11** | **.66**\*\* | **.34** | **.29** | **.11** |
| 2 Phase II Cooperative social pretend play | - | - | -.35* | -.13 | .36* | .06 | **-.38** | **-.16** | **-.34** |
| 3 Phase II Complex social pretend play | - | -.11 | - | -.07 | -.16 | .25 | **.38*** | **.36*** | **.33** |
| 4 Phase II Mental representation in pretence | - | .32 | .34 | - | .33 | -.04 | .25 | .34 | -.02 |
| 5 Phase II Appearance-reality distinction | - | -.13 | -.19 | .12 | - | -.12 | .13 | -.08 | .12 |
| 6 Phase II False-belief prediction | - | .31 | .12 | .11 | -.14 | - | .06 | .30 | .22 |
| 7 Phase III Mental representation in pretence | - | **-.18** | **.12** | .04 | .31 | -.06 | - | .18 | .31 |
| 8 Phase III Appearance-reality distinction | - | **-.04** | **.48**\*\* | .28 | .22 | -.08 | .08 | - | .09 |
| 9 Phase III False-belief prediction | - | **.21** | **.29** | **.52**\*\* | -.19 | .06 | .16 | .24 | - |

*Note.* The upper half of the table shows the UK children and the lower half the Singaporean children. As explained in Chapter 6, Bonferroni corrections were not applied due to the increased risk of Type II error in small sample sizes.

[a]The purpose of the correlation analysis was to examine longitudinal associations between early pretend play behaviour and later naïve psychology concepts so phase III social pretend play behaviours were not included. [b]The Singaporean children did not engage in cooperative social pretend play behaviour in phase I. None of the UK and Singaporean children engaged in complex social pretend play behaviour in phase I.

*p < .05. ** p < .01.

Table 9.2. Partial Correlations (Controlling for Phase III VMA and Gender) between Early Pretend Role-play and Later Naïve Psychology Measures for the UK ($N = 26$) and Singaporean ($N = 26$) Children[a]

| Naïve psychology measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Phase I Metacommunication | - | .36* | .29 | .01 | .20 | -.22 | .04 | .30 | .03 | -.11 | .29 |
| 2 Phase I Role-enactment | .65** | - | .29 | -.01 | -.13 | -.09 | -.03 | .65** | .22 | .41* | .04 |
| 3 Phase II Metacommunication | .28 | -.03 | - | .18 | .23 | .24 | .01 | .12 | .07 | .42* | -.31 |
| 4 Phase II Role-enactment | -.13 | -.05 | .20 | - | .01 | -.02 | .53** | -.19 | -.15 | -.08 | .03 |
| 5 Phase II Role-play | .11 | .51** | -.09 | .30 | - | -.15 | -.10 | -.29 | -.01 | -.22 | -.26 |
| 6 Phase II Mental representation in pretence | .28 | -.07 | .10 | -.01 | -.22 | - | .35* | -.07 | .28 | .42* | .07 |
| 7 Phase II Appearance-reality distinction | .64** | .36* | -.04 | -.17 | .25 | .16 | - | -.06 | .12 | -.14 | .18 |
| 8 Phase II False-belief prediction | -.13 | -.18 | .08 | .09 | -.18 | .04 | -.15 | - | .07 | .28 | .33 |
| 9 Phase III Mental representation in pretence | .25 | .51** | -.09 | .15 | .38* | .06 | .35* | -.27 | - | .16 | .29 |
| 10 Phase III Appearance-reality distinction | .28 | .07 | .14 | .09 | -.09 | .26 | .28 | -.16 | .09 | - | -.09 |
| 11 Phase III False-belief prediction | -.14 | -.18 | -.12 | .24 | .06 | .51** | -.14 | -.06 | .23 | .23 | - |

*Note.* The upper half of the table shows the UK children and the lower half the Singaporean children. Bonferroni corrections were not applied due to the increased risk of Type II error in small sample sizes.

[a] The purpose of the correlation analysis was to examine longitudinal associations between early pretend role-play and later naïve psychology concepts so phase III pretend role-play was not included. None of the UK and Singaporean children engaged in role-play in phase I.

*$p < .05$. **$p < .01$.

There were three significant longitudinal associations for the UK children. Phase I role-enactment was significantly correlated with phase II false-belief prediction ($r(22) = .65$, $p < .01$) and phase III appearance-reality distinction ($r(22) = .41$, $p < .05$). Phase II metacommunication was significantly associated with phase III appearance-reality distinction ($r(22) = .42$, $p < .05$). The results showed medium to fairly strong correlations between these aspects of pretend play behaviour and naïve psychology concepts for the UK children. There were no significant correlations for early pretend role-play with mental representation in pretence in phases II and III and false-belief prediction in phase III for the UK children.

Four longitudinal positive associations were observed for the Singaporean children. There were significant correlations between phase I metacommunication and phase II appearance-reality distinction ($r(22) = .64$, $p < .01$). Phase I role-enactment was significantly correlated with phase II appearance-reality distinction ($r(22) = .36$, $p < .05$) and phase III mental representation in pretence ($r(22) = .51$, $p < .01$). Phase II role-play was significantly correlated with phase III mental representation in pretence ($r(22) = .38$, $p < .05$). The findings showed medium to fairly strong correlations between early pretend play behaviour and naïve psychology concepts for the Singaporean children. Similar to the UK children, no significant correlations for early pretend role-play with phase II mental representation in pretence and phase III false-belief prediction were observed for the Singaporean children. There were also no significant relationships between early pretend role-play and phase III appearance-reality distinction for the Singaporean children.

It is important to note that the correlation results do not imply causality and are only suggestive. Taken together, the correlation analyses revealed some significant positive longitudinal relationships but many non-significant findings between early pretend play behaviour and later naïve psychology development for both cultures. Phase II complex social pretend play was significantly related to phase III appearance-reality for the UK and Singaporean children. There were no significant correlations between early pretend play behaviour and phase III false-belief understanding. Additionally, no significant correlations for various categories of pretend role-play with phase II mental representation in pretence and phase III false-belief prediction were observed.

In sum, several cross-cultural differences were found in the correlation analyses. There was significant association between phase I cooperative social pretend play and phase II false-belief prediction for the UK children. Phase II complex social pretend play was associated with phase III mental representation in pretence for the UK children. These correlations were not observed for the Singaporean children. With respect to pretend role-

play, association between phase I role-enactment and phase II false-belief prediction were observed for the UK children. Phase I role-enactment and phase II metacommunication were also related to phase III appearance-reality distinction for the UK children. By contrast, phase I metacommunication and phase I role-enactment were associated with phase II appearance-reality distinction for the Singaporean children. Phase I role-enactment and phase II role-play was related to phase III mental representation in pretence for the Singaporean children.

### 9.3.6 Research question 5b: Are there differences between the UK and Singaporean children in terms of the relationships between early naïve psychology development and later ability to engage in complex forms of pretend play behaviour?

Partial correlations, controlling for the effect of phase III VMA and gender, were employed to examine the relation between early understanding of pretend transformation, level-1 visual perspective-taking and level-2 visual perspective-taking with later engagement in cooperative and complex social pretend play behaviour. The results of the correlations between early naïve psychology concepts and later engagement of complex forms of pretend play behaviour for each group (18 correlations) are presented in Table 9.3. Although the data presented here included between-task correlations and between pretend play behavioural measures correlations, only those correlations highlighted in bold between early naïve psychology concepts and later engagement of complex forms of pretend play behaviour were considered here.

There was no significant longitudinal relationship for the UK children. In contrast, significant positive longitudinal associations were found for phase I level-2 visual perspective-taking with phase II complex social pretend play ($r(22) = .36$, $p < .05$) and phase III cooperative social pretend play ($r(22) = .35$, $p < .05$) for the Singaporean children. Phase II pretend transformation was also longitudinally significantly correlated with phase III complex social pretend play ($r(22) = .48$, $p < .01$) for the Singaporean children. The results showed medium to fairly strong correlations between naïve psychology concepts and engagement in complex forms of pretend play behaviour for the Singaporean children. There were no significant correlations between some aspects of early naïve psychology concepts (phase I pretend transformation, phases I and II level-1 visual perspective-taking and phase II level-2 visual perspective-taking) and later complex forms of pretend play behaviour for either the UK or Singaporean children.

Table 9.3. Partial Correlations (Controlling for Phase III VMA and Gender) between Early Naïve Psychology Measures and Later Complex Forms of Pretend Play Behaviour for the UK ($N = 26$) and Singaporean ($N = 26$) Children[a]

| Naïve psychology measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1  Phase I Pretend transformation | - | .01 | .43 | .15 | .42 | .04 | -.03 | .13 | .03 | -.08 |
| 2  Phase I Level-1 visual perspective-taking | .09 | - | .05 | -.22 | -.30 | -.10 | -.22 | -.14 | -.12 | .22 |
| 3  Phase I Level-2 visual perspective-taking | -.29 | -.05 | - | .11 | .45* | .45* | .04 | -.03 | -.01 | -.31 |
| 4  Phase II Pretend transformation | .16 | .03 | -.34 | - | .48** | .15 | -.17 | .37 | .19 | -.34 |
| 5  Phase II Level-1 visual perspective-taking | .13 | .10 | .06 | .21 | - | .45* | -.04 | .14 | -.27 | -.16 |
| 6  Phase II Level-2 visual perspective-taking | .25 | .25 | .19 | .14 | .01 | - | .15 | .10 | .11 | -.33 |
| 7  Phase II Cooperative Social Pretend Play | -.24 | -.08 | -.24 | -.14 | .09 | -.21 | - | -.33 | .11 | .03 |
| 8  Phase II Complex Social Pretend Play | .18 | .28 | .36* | -.19 | -.01 | .20 | -.26 | - | -.16 | .10 |
| 9  Phase III Cooperative Social Pretend Play | .02 | .08 | .35* | -.48 | .34 | .32 | -.17 | .35* | - | -.69** |
| 10  Phase III Complex Social Pretend Play | .22 | -.02 | -.36 | .48** | .07 | -.20 | .29 | -.40 | -.72** | - |

*Note.* The upper half of the table shows the UK children and the lower half the Singaporean children. Bonferroni corrections were not applied due to the increased risk of Type II error in small sample sizes.

[a] The purpose of the correlation analysis was to examine longitudinal associations between early naïve psychology concepts and later complex forms of pretend play behaviour so phase III naïve psychology concepts and phase I cooperative social pretend play were not included.

*$p < .05$. **$p < .01$.

In sum, longitudinal associations between early understanding of naïve psychology concepts and later engagement in complex forms of pretend play behaviour were observed for the Singaporean children alone. Compared to the earlier analyses between early engagement in various categories of pretend role-play and later naïve psychology concepts, similar number of correlations between early naïve psychology concepts and later engagement in complex forms of pretend play behaviour was observed for the Singaporean children. The current findings, however, show no longitudinal associations between early naïve psychology development and later pretend play behaviour for the UK children.

## 9.4    Discussion

This chapter found differences in children's pretend play behaviour at 2½ years (phase I) between the UK and Singaporean children. More cultural similarities were observed at 3 years (phase II) and 3½ years (phase III). By examining the links between the observational data and the experimental tasks, the present research has also demonstrated that some aspects of pretend play behaviour were related to some naïve psychology concepts.

### 9.4.1    Similarities and differences in pretend play behaviour between the UK and Singaporean children

The first research question of this chapter examined the extent to which various categories of pretend play behaviour differ between the UK and Singaporean children across the three time points. The results in this chapter reflect considerable cultural similarities in the developmental sequence of the peer play scale. The peer social pretend play of the UK and Singaporean children develops in a remarkably similar sequence from simple social pretend play behaviour to cooperative social pretend play behaviour and finally complex social pretend play behaviour. Some children in both cultures developed a rudimentary ability to engage in simple social pretend play behaviour at 2½ years of age, cooperative social pretend play behaviour at 3 years of age and complex pretend play behaviour at 3½ years of age. This increasing complexity reveals children's gradual competence to engage in interactive, reciprocal pretend play behaviour. The present findings confirm the developmental sequence already noted in the literature that Western children engage in simple social pretend play behaviour by 20 to 24 months of age (Howes et al., 1989), cooperative social pretend play behaviour by 30 to 35 months of age (Howes, 1985; Howes & Matheson, 1992; Howes et al., 1989) and complex social pretend play behaviour by 42 to 47 months of age (Dunn & Dale, 1984; Howes & Matheson, 1992). The current findings

further resonate with non-Western research showing similar developmental transitions in peer pretend play of Indonesian children (e.g. Farver & Wimbarti, 1995) and Korean-American and Anglo-American children (e.g. Farver et al., 1995; Farver & Lee-Shin, 2000). It is important to emphasize that while the developmental sequence was found to be largely invariant between the two cultures, distinct variations were observed in the duration of some categories of the peer play scale at 2½ years of age.

The most interesting finding of the observational data was the cultural differences of when children transit from non-pretend to pretend play and from non-social (solitary to parallel) to social pretend play. At 2½ years of age, the Singaporean children spent more time engage in non-pretend play behaviour while the UK children spent more time engaged in social pretend play behaviour. The duration of engagement in non-pretend play behaviour and non-social pretend play behaviour across all phases was significantly higher for the Singaporean children. By contrast, the duration of engagement in social pretend play behaviour across all phases was significantly higher for the UK children. While a significant decline in non-pretend play episodes from phases I to III was observed for the Singaporean children, no significant phase differences were found for the UK children because duration of engagement in non-pretend play was relatively low in phase I. Furthermore, some UK children showed a beginning ability to engage in cooperative social pretend play at 2½ years of age which was not observed for the Singaporean children.

Why were cross-cultural differences in pretend play behaviour observed at 2½ years of age? The different pace in which some Singaporean children moved through the developmental stages of peer play (from non-pretend to non-social pretend and finally social pretend play behaviour) and pretend role-play (other forms of pretence and metacommunication) compared to some UK children might be attributed to cross-cultural variability in child-rearing beliefs and practices. As already discussed, the majority of the mothers in Singapore worked full-time and children attended full-time childcare. Preschools are viewed as providing early childhood care and education for Singaporean children. In Western preschool education system, children learn and develop skills through play-oriented curriculum. In contrast, preschool education in Singapore is often perceived as preparing children for primary school (e.g. Sharpe, 1994, 2000; Tan, 2007). Although there has been a shift in focus to an integrated curriculum, the emphasis on a formal and structured academic-type curriculum which comprises of written work and tests are strongly supported by parents (e.g. Raban & Ure, 1999; Sharpe, 1994). Furthermore, the Singapore educational system is highly competitive and performance-oriented and Singaporean parents focus on achievement

attainment and would prefer an academically-based rather than play-based curriculum (Ebbeck & Gokhale, 2004).

Another possibility is that children under the age of three tend to depend mostly on the presence of similar substitute objects that resembled their referents in their pretend play (see review in Chapter 3, Section 3.3.5). In line with Haight et al.'s (1999) observations of marked variations in availability of types of toys between Irish-American and Taiwanese families, there were cultural differences in the range of toys and props available between the UK and Singapore preschools observed only informally in the present study. The Singapore preschools had a more modest collection of toys compared to the UK preschools. In terms of toys and props in Frankie the Turtle's Treasure basket used in the present study, the Singaporean children were familiar with these toys and props but they might be exposed to them less often compared to the UK children. Younger children depend on an element of reality to integrate pretence into social play, and informal observation in this study suggested that the absence of toy miniatures might have limited children's pretend capability. It is noteworthy to mention that efforts were made to build rapport with and make the children feel at ease and the free play observations were conducted during the final session in each phase. Despite cross-cultural discrepancies regarding the emerging age of social peer pretend play behaviour at 2½ years of age, the mastery of advanced language, pretending, imagination and socialisation skills enables children to acquire and develop sophisticated pretend skills. As Newson and Newson (1979, p. 118) have highlighted, toys are not necessary and it is "all in the mind" which makes play fantasy. This may explain why no cross-cultural differences in social pretend play behaviour were observed in subsequent phases.

While the peer play scale captures the structural complexity of children's play, different socio-cultural contexts may bring out variations in the interactive styles and the content of pretend play between the two cultures. The Singaporean children engaged in more neutral bids and less conflicts in either pretend play episodes or total play episodes across the three phases compared to the UK children. These differences can perhaps be explained in part by how Confucian values shape child-rearing practices in Singapore (discussed in Chapter 2, Section 2.3). Confucian ideas of harmony focus on group-oriented rather than self-oriented behaviours. Cooperative learning situations are encouraged whereas conflicts are viewed negatively. Furthermore, children in collective societies learn the importance of collective values such as depending on the support from adults, siblings and peers in achieving academic success (Otsuka & Smith, 2005). While one can speculate that Confucianism or traditional Chinese values have little influence in 'westernalised' cities like

Singapore, implicit influence from within the family and the five shared values promoted by the Singapore government might play a part in shaping the attitudes of Singaporeans (Lee, 2003). Among the five shared values (see Chapter 2, Section 2.3), of particular relevance to the present results is the emphasis on resolving issues through consensus and not conflict. Even though the education system in Singapore is highly competitive, cooperative learning approaches to teaching and learning are encouraged in Singapore schools (e.g. Crawford, 1995; Divaharan & Atputhasamy, 2002). Contrary to expectation, the UK children engaged in more positive bids during phase I. A possible explanation for this is that the UK children spent more time engaged in social pretend play behaviour in phase I and this might have fostered more positive bids. Together, these findings illustrated how based on their prior learning, children display culturally-appropriate and socially-appropriate behaviour during peer play.

In looking at how pretend play behaviour is related to culture, it is also important to consider the content of pretend play. The themes observed in this analysis were characterised by both similarities as well as culture-specific manifestations (see Figures 9.2a and 9.2b and Appendix E, Figures E3.2a to E3.2c). In contrast to Haight et al.'s (1999) study which found substantial cultural variations in play themes, more similar pretend themes than differences were observed for the UK and Singaporean children. A possible explanation for the cultural similarities in the content of pretend play is that availability and kinds of toys in the present study may account for the types of pretend play themes that children engage in. Haight et al. (1999) observed children playing with their own toys at home with their caregivers, siblings and peers. Compared to the Irish American children who possess extensive range of commercially marketed toy miniatures, including dress-up costumes, pretend cooking set and action figures, the Chinese Taiwanese children have a modest collection of toys such as stuffed animals and few toy cars and dolls. The similar patterns of pretend play themes between the two cultures observed in the present study reflect the fact that children played with the same toys and props provided to them within the context of the study and greater differences might be found if children were observed playing with the toys in the nursery or at home.

The UK and Singaporean children engaged in significantly more adult occupational themes at 3 and 3½ years than at 2½ years of age. Through observing adults in their cultures, children recreate adult occupations such as doctors and police officers. For example, two 3-year-old Singaporean boys assumed the roles and modelled the behaviours of fire fighters by re-enacting a pretend scenario of putting out a pretend fire with imaginary hoses. This finding suggests that children's pretend play behaviour is deeply rooted in their experience

of everyday events, social interactions with people in their cultures and theme-based curriculum.

The thematic content of children's pretend play reflects subtle differences between the two cultures. Due to the geographic location of the two countries, climate being one factor, there were significant variations in engagement in outings, holiday and weather theme across the three phases. The UK children often discussed the four seasons and holiday trips they experienced. The first phase of the study was conducted during springtime, phase II during autumn time and phase III during summertime in the UK. By contrast, neither weather was frequently discussed nor holiday trip experience was enacted during peer pretend play episodes for the Singaporean children. The observed differences may be explained by the fact that Singapore is generally hot and humid all year with no distinct seasons. The working culture and child-rearing practices suggest that some Singaporean children tend to spend their vacation time attending enrichment classes. Due to the relatively small size of Singapore, holidays are trips made abroad and such trips are fairly infrequent.

There were also no substantial cross-cultural differences in children's pretend transformation skills across the three phases. The available published cross-cultural evidence is limited. Within-cultural comparison showed no differences in this aspect of pretend play among children of different socioeconomic status in Brazil (Gosso et al., 2007). In contrast, there were notable differences in the standardised play measure which assesses children's pretend transformation skills between the UK and Singaporean children in the present study. While both groups of children showed improvement in ToPP scores between phases, the UK children performed better than the Singaporean children at 3½ years of age. The contradictory result between the observational data and standardised play measure is in agreement with Lewis and Boucher's (1997a) explanation that children may reveal their competence in pretend play in different conditions (i.e. structured versus unstructured, free play).

In summary, this chapter has provided an interesting developmental account of children's pretend play behaviour between a Western and hybrid culture between 2½, 3 and 3½ years of age and has suggested how cultural and social environmental factors might determine the observed cultural similarities. At the same time, these factors might play an important role contributing to cross-cultural differences, with the patterns of results suggesting that children's pretend play behaviour portrays and reflects cultural and family values and expectations. Children's pretend play behaviour may be closely tied to naïve psychology development. Their ability to attribute multiple representations to roles, objects and situations, incorporate imaginary persons and objects and distinguish between fantasy

and reality in pretend play could lay the groundwork for mastery of conflicting representation of mental-states and in turn support their ability to pass naïve psychology tasks.

### 9.4.2 Relationships between pretend play behaviour and naïve psychology development

The second and third research questions of this chapter explored the extent to which the associations between pretend play behaviour and naïve psychology development differ between the UK and Singaporean children. With respect to the relation between early social pretend play behaviour and later acquisition of naïve psychology concepts, the present findings demonstrate some significant longitudinal positive associations, after VMA and gender were taken into consideration. For the UK children, cooperative social pretend play behaviour at 2½ years of age was associated with understanding false-belief prediction at 3 years of age. There were also significant relationships between complex social pretend play behaviour at 3 years of age and mental representation in pretence at 3½ years of age for the UK children. For the UK and Singaporean children, significant associations between complex pretend play behaviour at 3 years of age and appearance-reality distinction task at 3½ years of age were observed. In contrast, no significant positive associations were found between non-social (solitary and parallel) pretend play behaviour and naïve psychology concepts for the UK and Singaporean children.

From a theoretical perspective, the present results support the transitional model of the metarepresentational nature of pretend play proposed by Jarrold et al. (1994; see Chapter 3, Section 3.6.3), who posit that children progress gradually from non-metarepresentational individual pretend play behaviour to metarepresentational complex form of shared pretend play behaviour. The present finding extends prior Western results documenting that jointly constructed cooperative social pretend play behaviour but not solitary pretend play behaviour was associated to children's naïve psychology (Schwebel et al., 1999). When children engage in social pretend play behaviour, they employ more advanced representational ability than in solitary pretend play behaviour (Lillard, 2002a; Schwebel et al., 1999). In joint pretend play, as children collectively assign status functions to objects, they have to make sense of each other's actions before carrying out successive appropriate actions (Rakoczy, 2006). While children merely require a decoupled secondary representation in solitary pretend play, they need metarepresentational understanding to decipher their playmate's non-literal behaviours, perspectives and intentions and respond with appropriate actions to continue the pretend episodes. During social pretend play, the ability to anticipate the goals

and intentions of their playmates and imagine the thoughts, behaviours and feelings of the roles they are enacting and their playmates provides evidence for their growing understanding of others' minds (Dunn et al., 1991b; Youngblade & Dunn, 1995).

Children's cooperative social pretend play behaviour and complex social pretend play behaviour were significantly associated with some later aspects of naïve psychology. However, significant correlations between social pretend play behaviour and false-belief prediction were relatively limited. For example, cooperative social pretend play behaviour at 2½ years of age was only associated with false-belief prediction at 3 years of age for the UK children. This correlation was not found for the Singaporean children. These results provide partial support for Leslie's (1987, 1989, 1994) premise that a metarepresentational mechanism is responsible for the development of all components of pretend play behaviour. The present findings are not surprising given that previous studies found no relation between some aspects of pretend play behaviour and false-belief understanding (e.g. Jenkins & Astington, 2000; Youngblade & Dunn, 1995). This chapter, however, has demonstrated longitudinal links between early measures of pretend play behaviour (role-enactment at 2½ years of age and metacommunication at 3 years of age) and appearance-reality distinction ability at 3½ years of age for the UK children. Likewise, there were longitudinal relations between early measures of pretend play behaviour (metacommunication and role-enactment at 2½ years of age) and later appearance-reality distinction ability at 3 years of age for the Singaporean children. These findings differ from Nielsen and Dissanayake (2000) who found that explicit verbal assignment of roles to self, other or objects was related with children's use of mental-state terms and false-belief understanding. However, the present results converge with Schwebel et al. (1999) who demonstrated that children who displayed more shared pretend play behaviour and rated high on transformation skills performed better on an appearance-reality task. As discussed in Chapter 3 (Section 3.6.3), children's ability to attribute multiple pretend identities to objects and situations in their pretend play may enable them to differentiate between what an object looked like and what it actually was in an appearance-reality task. The current findings also corroborate with the idea of Harris (2000) who suggests that not all pretend play behaviour in general support the development of naïve psychology. More importantly, the present results demonstrate that false-belief understanding should not be the only measure considered when exploring the relationship between pretend play behaviour and naïve psychology development.

According to Jarrold et al. (1994), children's capability to use metacommunication during shared pretend play indicates a representational understanding of pretence. The present results did not provide support for this premise. A possible explanation for the non-

significant finding between social pretend play behaviour and mental representation in pretend task might be that metacommunication is closely related to children's language ability and VMA was controlled for in the correlation analyses.

In relation to the link between early pretend role-play and later naïve psychology concepts, role-enactment at 2½ years of age was longitudinally associated with false-belief prediction task at 3 years of age and appearance-reality distinction task at 3½ years of age for the UK children alone. For the Singaporean children, role-play at 3 years of age was significantly associated with mental representation in pretence task at 3½ years of age. In role-enactment, children create a mental representation of category of action and simply act it out or project it to a doll without verbal definition of role (see Chapter 3, Section 3.3.3). When engaged in role-play, children behave and think according to the imaginative states of the characters they are acting. Once children are able to enact the roles of another person or non-person and engage in reciprocal exchanges in pretend play with playmates, they could appreciate conflicting and multiple perspectives. This line of reasoning is consistent with the simulation theory (Harris, 1994; see Chapter 1, Section 1.3) and Twin Earth Model (Lillard, 2001; see Chapter 3, Section 3.6.3), which suggest that joint pretend role-play supports children's naïve psychology development. According to Harris (2000), the simulation process offers children the flexibility to gain insight into the psychological process (mental-states, actions, speech) of another person or character during their role-play, thus helping them to reflect on the perspectives of that person or character (see Chapter 1, Section 1.3).

Compared to the relations between early pretend play behaviour and later naïve psychology development, there were fewer longitudinal correlations between early naïve psychology concepts and later engagement in complex forms of pretend play behaviour. For the Singaporean children, longitudinal correlations were observed between pretend transformation task performance at 3 years of age and complex social pretend play behaviour at 3½ years of age. In addition, understanding level-2 visual perspective-taking at 2½ years of age was significantly related to complex social pretend play behaviour at 3 years of age and cooperative social pretend play behaviour at 3½ years of age. Singaporean children's emerging ability to understand causal transformation and differentiate their own perspective to consider that of another person might have enriched their later ability to consider the different perspectives of playmates during discussion and negotiation about plans, roles and objects and thus sustain longer complex reciprocal pretend play behaviour. It remains unclear why these correlations were not found for the UK children. Additionally, no significant correlations were found for pretend transformation at 2½ years of age, level-1 visual perspective-taking at 2½ and 3 years of age and level-2 visual perspective-taking at 3

years of age with later complex forms of pretend play behaviour for the UK and Singaporean children.

Another important finding was that some one-sided and some reciprocal relations were observed between pretend play behaviour and other aspects of naïve psychology for the UK and Singaporean children respectively. The reciprocal relationships between pretend play behaviour and naïve psychology concepts for the Singaporean children alone provide partial support for the claim that young children's pretending capabilities share a similar structure of cognitive representational skills as mental representation abilities (e.g. Jenkins & Astington, 2000; Leslie, 1987, 1989; Lillard, 1993a, 1993b). The wider implications of the present findings for the role of early pretend play behaviour in children's acquisition of naïve psychology concepts are discussed further in Chapter 10.

### 9.5    Conclusion

The current findings add substantially to our understanding of the similarities and differences in children's pretend play behaviour between a Western and a hybrid culture. While the pace at which children moved through the developmental stages of peer pretend play varied in the first phase of study, the gap closed in subsequent phase. Cultural values, norms and language (metacommunication) were incorporated in children's pretend play. These culturally-specific experiences guide the ways children interact with other people and understand others' thoughts, behaviours, feelings and intentions.

Overall, this chapter demonstrated more similarities than differences in the longitudinal relationships between pretend play behaviour and naïve psychology development. The findings provide partial support for the premise that social pretend play behaviour might be an early indicator of understanding mental representation. There were significant associations between early social pretend play behaviour and appearance-reality distinction ability at 3½ years of age for both cultures. However, no significant relationships were observed for early social pretend play behaviour or early pretend role-play with false-belief prediction at 3½ years of age in either culture. The longitudinal results also indicate that some aspects of early naïve psychology might be related to later engagement in complex forms of social pretend play behaviour for the Singaporean children. For the UK children, no significant longitudinal relations were observed. Taken together, these findings only provide partial support for the proposition that pretend play behaviour and naïve psychology development are inextricably linked.

Chapter 10, the concluding chapter of this thesis, will synthesise the key empirical findings reported in this thesis. The implications of the cultural similarities and differences

observed in this thesis will be discussed in relation to current theories of naïve psychology development. The findings of this research raise a number of important implications for policy and practice that will also be addressed in the final chapter.

# CHAPTER 10

# GENERAL DISCUSSION: YOUNG CHILDREN'S NAÏVE PSYCHOLOGY AND PRETEND PLAY BEHAVIOUR DEVELOPMENT IN TWO CULTURES

## 10.1    Introduction

The purpose of this chapter is to draw together the results presented in this thesis by considering the development of children's naïve psychology and pretend play behaviour from a socio-cultural perspective. Rather than merely repeating the discussions presented in the preceding five empirical results chapters, the first objective of this chapter is to discuss the main findings in relation to how children's development of naïve psychology and pretend play behaviour occur in different cultural contexts. The second objective of this chapter is to address the roles of language and social interactions in the context of peer pretend play in naïve psychology development, specifically focusing on how development within the social context is integrated within the broader cultural context.

As shown in Figure 10 below, this thesis set out to document the extent to which understanding of pretence, desires, visual perceptions and beliefs develop in a similar pattern between children in the UK and Singapore at approximately 2½, 3 and 3½ years of age (phases I, II and III respectively) and to explore the connections between naïve psychology development and pretend play behaviour. The development of naïve psychology and pretend play behaviour across the three phases (depicted by orange arrows in Figure 10) was compared between the UK and Singapore cohorts (depicted by brown arrows in Figure 10). This research which has provided a new understanding of the developmental changes in children's naïve psychology and pretend play behaviour between a Western and Singapore, a hybrid culture, was guided by five research questions. The first research question addressed the degree to which naïve psychology develops differently between the UK and Singapore cohorts at 2½ years of age (Chapter 5). The second research question explored longitudinal differences between the UK and Singapore cohorts in naïve psychology development between 2½ and 3½ years of age (Chapter 6). The third research question compared children's developing understanding of knowledge-ignorance and belief from 3 to 3½ years of age between the two cultures (Chapter 7). The fourth research question focused on the extent to which individual (VMA and bilingualism) and social (presence of sibling(s) and birth order) variables contribute to individual differences in naïve psychology development (Chapter 8). The fifth and final research question examined cultural differences in pretend play behaviour and its links with naïve psychology development (Chapter 9).
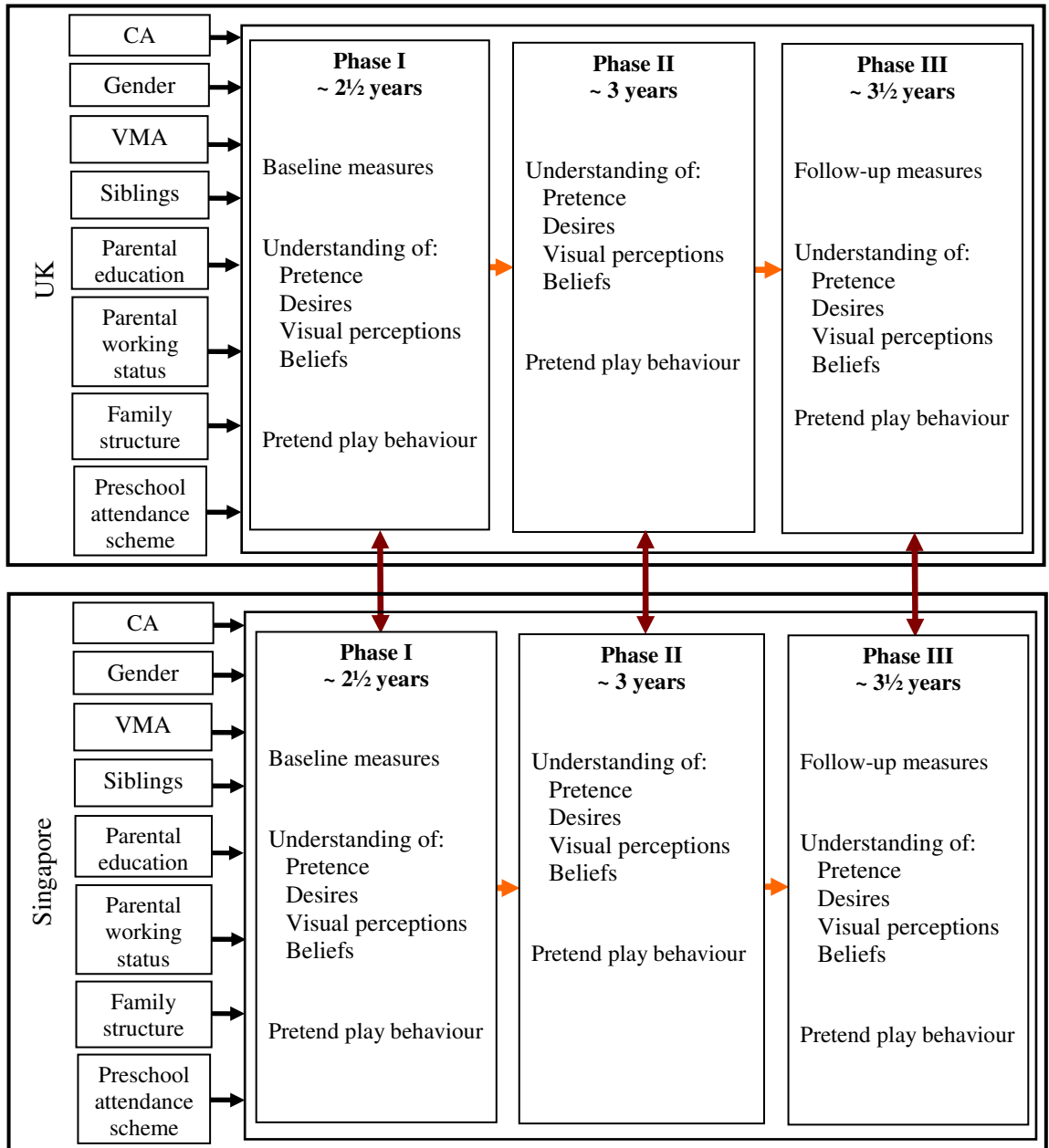
*Note.* CA = chronological age, VMA = verbal mental age.

*Figure 10.* A longitudinal cross-cultural comparison of the development of children's naïve psychology and pretend play behaviour between 2½, 3 and 3½ years of age.

In this chapter, a synthesis of the key findings of the study is first presented. This leads to a detailed discussion of the four main results themes of the study. The findings of this study have a number of important implications for theory and practice. The implications for theories of naïve psychology development are first discussed. The discussion then focuses on the proposal of a number of important recommendations for policy and practice.

This is followed by a reflection on the methodological issues associated with conducting cross-cultural research in children's naïve psychology and pretend play behaviour development. Finally, the limitations of this thesis and directions for future research are discussed.

**10.2     Synthesis of Empirical Findings and Discussion of Results Themes**

Four main results themes emerged from the present study which framed the development of naïve psychology and pretend play behaviour between a Western and a hybrid culture. The first results theme concerns the striking cultural similarities in children's naïve psychology and pretend play behaviour development (Research Questions 1, 2, 3 and 5). The second results theme centres on the observed cultural differences in the development of children's naïve psychology and pretend play behaviour (Research Questions 1 to 5). The third results theme relates to how language is associated with naïve psychology and pretend play behaviour development (Research Questions 4 and 5). The fourth and final results theme concerns the relationship between pretend play behaviour and naïve psychology development (Research Question 5). In what follows, each theme is discussed in more detail.

**10.2.1     Cultural universals in the development of naïve psychology and pretend play behaviour**

The first results theme of the present study adds substantially to our understanding of how children's knowledge of various naïve psychology concepts develops progressively in similar pattern at 2½, 3 and 3½ years of age in the UK and Singapore. Despite the contrasting cultural backgrounds of the children involved in this study, the findings demonstrated that children in both cultures showed an age-related gradual acquisition of naïve psychology concepts across the three phases. At 2½ years of age, toddlers acquired an understanding of rudimentary mental-states such as some aspects of pretence, discrepant desires and level-1 visual perspective-taking (see Chapter 5). Children's naïve psychology underwent profound changes at 3 and 3½ years of age. At 3 years of age, children's knowledge of rudimentary mental-states became fairly well-established. However, the 3-year-old children in both cohorts presented below-chance performance in naïve psychology tasks that assessed children's understanding of sophisticated mental-states such as false-belief prediction (see Chapter 6, Section 6.3.4). At 3½ years of age, children showed improvement in mastery of level-2 visual perspective-taking, appearance-reality distinction, the false-belief question in the appearance-reality distinction task and false-belief

explanation (see Chapter 6). Their appreciation of rudimentary mental-states, however, continued to precede knowledge of sophisticated mental-states (Chapter 6, Section 6.3.5).

The consistency in patterns of gradual development is suggestive of cross-cultural universals in naïve psychology development. These results provide further support for the contention of a universal naïve psychology development across cultures, and broadens earlier empirical evidence in Western contexts (e.g. Flavell et al., 1981; Flavell et al., 1983a; Nielsen & Dissanayake, 2004; Repacholi & Gopnik, 1997; Wellman et al., 2001; Wimmer & Mayringer, 1998; Wimmer & Perner, 1983). The sequence of development of naïve psychology concepts is also in agreement with the developmental pattern reported in non-Western studies (e.g. Avis & Harris, 1991; Callaghan et al., 2005; Flavell et al., 1983b; Wellman et al., 2001; as reviewed in Chapter 2, Section 2.3). There were, however, subtle cultural differences in children's understanding of naïve psychology concepts at 2½ years of age (see Chapter 5). The UK cohort showed better understanding of action prediction at 2½ years of age. By contrast, the Singapore cohort demonstrated better knowledge of discrepant desires. Although this thesis indicates a slight divergence in the development of some aspects of naïve psychology at 2½ years of age, more cultural similarities were observed for the majority of naïve psychology concepts across the three phases. Hence, culturally universal patterns of development in naïve psychology do not exclude diversity in developmental outcome (Callaghan et al., 2005).

A comparison of the order of task performance revealed more cross-cultural similarities than differences in sequence at 2½ and 3 years of age (see Chapters 5 and 6). Cross-cultural variations in task performance sequence, however, were found at 3½ years of age. These patterns of results are consistent with those of Wellman et al. (2006) who found more similarities than differences in the developmental sequences of sophisticated mental-states including diverse desires, false-belief and hidden-emotion. The present study contributes additional evidence to suggest cross-cultural similarities in the developmental sequence of a wider range of rudimentary mental-states (see Chapter 5, Section 5.3.5 and Chapter 6, Section 6.3.5).

Comparing children's false-belief prediction with false-belief justification and explanation abilities (see Chapter 7) provided supportive evidence for previous research on false-belief understanding: Younger children possess an implicit understanding of false-belief, then they are capable of making predictions explicitly between 3 years 5 months to 4 years of age and finally they are able to justify their answers verbally and explain a character's behaviour based on false-beliefs (e.g. Clements & Perner, 1994; Flynn, 2006; Wellman et al., 2001). A similar order of emergence of knowledge-ignorance attribution,

true-belief ascription and false-belief prediction was observed within each cohort, even after VMA and gender were considered as covariates. This pattern of development is also consistent with that observed in Western samples (e.g. Riggs & Simpson, 2005; Sullivan & Winner, 1991). Together, these findings suggest that children transit from implicit to explicit in their understanding of mental representation and some aspects of naïve psychology develop in a coherent pattern. The results discussed within this section thus far may have important implications for theories of naïve psychology development. These points will be discussed in depth in Section 10.3 of this chapter.

The similar developmental sequences from non-pretend to non-social pretend and finally to social pretend play behaviour and from simple to complex forms of social pretend play behaviour corroborates Howes' (1980) peer play scale. The findings are also consistent with earlier findings in non-Western (e.g. Farver & Wimbarti, 1995) and Western contexts (e.g. Howes & Matheson, 1992). Furthermore, cross-cultural similarities were also evident in the present study in children's duration of engagement in many aspects of pretend play behaviour, including role-enactment, role-play, pretend play themes and modes of transformation across the three phases. Together, these findings add to the current literature by showing similar developmental patterns in pretend play behaviour in a hybrid culture. It has been suggested that the development of children's pretend play behaviour is universal (e.g. Fein & Fryer, 1995). Cross-cultural similarity in Chinese and Irish American children's use of objects to support their pretend play was also reported by Haight et al. (1999).

The developmental data capture changes in the emergence of and developmental sequence in various aspects of naïve psychology and pretend play behaviour between the ages 2½, 3 and 3½ years in children from diverse cultural backgrounds. Nonetheless, one cannot simply assume that naïve psychology concepts and pretend play behaviour are acquired in a culturally universal pattern across diverse cultural groups without understanding the varied cultural and social contextual factors that shape the developmental process.

### 10.2.2  Cross-cultural differences in the development of naïve psychology and pretend play behaviour

The second results theme, as the evidence in this thesis shows, is that not all naïve psychology concepts and pretend play behaviour were acquired in a similar pattern in the two cultures. The experimental data demonstrated that children's naïve psychology begins at the same pace but some concepts diverge over the course of development at 3 and 3½ years of age in the two cultures. While subtle cross-cultural differences were observed at 2½ years,

marked variations of when children attained certain naïve psychology concepts were found at 3 and 3½ years (see Chapters 5, 6 and 7). In contrast to the Singapore cohort, the UK cohort showed an advantage in false-belief prediction and true-belief ascription (for the false-belief prediction task) at 3½ years of age. There was also considerable cultural variability in the developmental changes of some naïve psychology concepts that occurred between phases (see Chapter 6, Section 6.3.4). For example, the UK cohort showed significant improvement in false-belief prediction scores from 3 to 3½ years of age whereas no significant differences were observed for the Singapore cohort. Across the three phases, the Singapore cohort displayed comparatively better comprehension of discrepant desires whereas the UK cohort demonstrated an advantage in understanding level-1 visual perspective-taking. Compared to the Singapore cohort, the UK cohort achieved higher total mean for the mental representation in pretence task, knowledge-ignorance attribution question (for the false-belief prediction and false-belief explanation tasks) and true-belief ascription question (for the false-belief explanation task) across phases II and III.

Differences in age of onset of false-belief understanding across cultural groups have also been reported in other non-Western studies (e.g. Naito, 2003; Naito & Koyama, 2006; Vinden, 1996, 1999, 2002). Similar differences in developmental timing have also been found in a published study between Western cultures and Hong Kong, a hybrid culture similar to Singapore. In a meta-analysis of false-belief understanding in Chinese children, Liu et al. (2008) reported that children in Hong Kong not only develop much later than children in the North America but also children in China. It may be the case that the variations indicate how different cultures elaborate understanding differently as suggested by Avis and Harris (1991). Some cultures are more oriented towards explaining behaviours and labelling experiences differently than other cultures and this might promote children's naïve psychology development at an earlier age (Lillard, 1998a). The false-belief prediction task assesses children's ability to attribute to another person beliefs that differ from their own belief and from reality. Therefore, it seems possible that an emphasis on shared rather than different perspective in interdependent, collective cultures (Greenfield, Keller, Fuligni, & Maynard, 2003) may have explained the cross-cultural differences in task performance. It is worthwhile noting that even though there were differences in the age of emergence of children's understanding of false-beliefs, children in different continents will follow the same developmental path (Wellman et al., 2001).

With respect to the developmental sequence of understanding of knowledge-ignorance and belief (see Chapter 7), the UK cohort performed more poorly on false-belief justification and false-belief explanation than knowledge-ignorance attribution, true-belief

ascription and false-belief prediction at 3½ years of age. By contrast, the Singapore cohort exhibited a similar performance sequence in knowledge-ignorance attribution, true-belief ascription, false-belief prediction and false-belief explanation even though they performed more poorly on false-belief justification than false-belief prediction. Together, these results suggest that although both cohorts might have achieved the same broad developmental goals through different cultural routes, cultural and social factors might have led to a divergence in acquisition of some naïve psychology concepts.

The cross-cultural differences observed in the current study in children's justifications/explanations of a naïve character's actions may be due to variations in cultural traditions and practices. As reported in Chapters 6 and 7, the UK cohort showed an earlier explicit ability to predict false-belief at 3½ years and employed more mental-state terms in their false-belief justifications and explanations at 3 years than the Singapore cohort. In contrast to the UK cohort, the Singapore cohort tended to provide "I don't know" or give no response to the adult's questions and justify their prediction or explain a character's behaviour based on behavioural cues at 3 and 3½ years of age. Together, the results suggest that different cultures may talk about the mind differently. Cross-cultural variations in pattern of interactions between parents and children have been suggested to account for this difference (see Chapter 7, Section 7.4). Prior research has reported that cultural disinclination to talk about thinking with young children and the complexity in the language structure (e.g. same verb expressed differently) could have explained the time-lag in reference to thinking for Mandarin-speaking and Cantonese-speaking children in China and Hong Kong respectively compared to English-speaking children in Bartsch and Wellman's (1995) study (Tardif & Wellman, 2000).

It is interesting to note that cultural differences in coherence among naïve psychology concepts were observed in the present study. Compared to the UK cohort, the Singapore cohort's performance was more interrelated for both the non-representational and the representational tasks at 2½ years of age (see Chapter 5). Similar results were replicated between understanding mental representation in pretence and other naïve psychology concepts, showing more correlations for the Singapore cohort than the UK cohort (see Chapter 6). In addition, the analysis of the language data revealed more correlations for the Singapore cohort compared to the UK cohort (see Chapter 8). It is noted that children's understanding of naïve psychology concepts was fragmented at 3 and 3½ years of age for both cultures (see Chapter 6). As explained in Chapter 5 (Section 5.4), an emphasis on holistic learning in the Singapore preschool curriculum might have enhanced children's conceptual understanding. Another possible explanation is that domains that are important to

a culture are given more emphasis, which in turn promotes more elaborate links among specific concepts (Murphy & Medin, 1985).

It has been suggested that children may acquire their naïve psychology partly through engagement, conflict resolution and interaction in social activities with siblings (e.g. Perner et al., 1994b). The findings of the present study departed from existing literature in several important ways. In contrast to earlier findings (e.g. Perner et al., 1994b; Ruffman et al., 1998), this study was unable to demonstrate the impact of presence of sibling(s) and birth order on naïve psychology development for both cohorts (see Chapter 8). The significantly higher performance of only-children in the mental representation in pretence and false-belief prediction tasks at 3½ years of age for the Singapore cohort could point wholly to the role of culture at work or could stem from a third, underlying variable. The importance of considering the impact of cultural influences on social environmental factors in shaping naïve psychology development is emphasised. However, this finding must be interpreted with caution due to the small sample size.

Interestingly, the observational pretend play behaviour data, conducted for a sub-sample of the UK and Singapore cohorts, revealed a reverse pattern to that of the experimental results. While there were cross-cultural differences in the developmental onset of peer social pretend play behaviour at 2½ years of age, children's pretend play behaviour developed in remarkably similar pattern at subsequent time points. The findings showed that duration of engagement in social pretend play across all phases was significantly higher for the UK children. In contrast, the Singaporean children spent significantly more time engaged in non-pretend play and non-social pretend play across all phases. The data also indicated that cooperative social pretend play emerged for some UK children at around 2½ years of age but that this type of peer play was not present for the Singaporean children at this age. Compared to the UK children, the Singaporean children spent significantly less time engaged in positive complementary bids, negative conflict, other forms of pretence, metacommunication and in the pretend theme of outings, holiday and weather across all phases. Despite the seemingly modern Westernised Singapore society, cultural resistance to Western norms might have led to diversity rather than uniformity in developmental timing and social interaction styles in pretend play behaviour among children in Singapore.

The current study demonstrates that the impact of culture on social environmental factors could be borne out in naturalistic free play observations. Cultural values are reflected in the beliefs and expectations that parents have about the nature and timing of development which in turn determine the opportunities which parents provide for children to develop their cognitive skills (Gauvain, 2005b). The UK and Singapore differ in the education practices

and goals for young children. Even though the education of Singaporean children is influenced by Western theories of child development, high regard is placed on education and good grades (Tan, 2007). As discussed in Chapter 9 (Section 9.4), Singaporean parents favour a highly structured and formal curriculum with an emphasis on acquisition or rote learning of academic skills to prepare children for formal schooling at 7 years of age (e.g. Tan, 2007). In line with previous non-Western studies showing the influence of socio-economic context on the extent of caregivers' engagement in children's play (e.g. Göncü et al., 2000), Singaporean parents may not participate in children's play because of their work load and cultural beliefs about learning. Furthermore, the degree to which parents encourage pretend play or are comfortable or competent with pretending varies across cultures (Gaskins et al., 2006). Hence, an emphasis on achievement attainment and an academically-based curriculum and cultural-specific child-rearing practices might have explained the differences in early peer pretend play behaviour. A possible explanation for the cultural similarities in peer pretend play behaviour in phases II and III of the present study might be that children's mastery of advanced social interaction skills and linguistic competence promote the acquisition of complex social pretend play behaviour among peers. Another possible explanation for this is that as children get older, parents and older siblings might have scaffolded and guided children to acquire complex forms of pretend play behaviour. Therefore, when assessing the developmental patterns of children's pretend play behaviour between different cultures, it is important not to simply attribute disparities to time-lag but consider the effect of culture-specific variables upon children's pretend play behaviour.

The acquisition of naïve psychology can be seen as a process of cultural learning whereby culturally relevant knowledge and skills are transmitted from one generation to another or from one culture to another (Tomasello, 1999). Alongside Western theories of child development, Eastern philosophical and religious beliefs influence attitudes toward child-rearing practices in Singapore (Ang, 2007). For example, Confucian values of self-restraint, modesty and humility are encouraged in Singapore where Chinese people are the major ethnic group. Child-rearing values and practices in Singapore are also characterised by Asian values of collectivism, conformity to norms and filial piety (discussed in Chapter 2, Section 2.3). Through active participation in discourse about the social rules and goals of family members, children learn about the nature of the rules of their culture (Dunn, 1988). In pretend games, children establish rules which govern the behaviours of the role enacted and identities for objects and situations. These rules reflect the traditional norms and values of each culture and children adjust their behaviours, attitudes, views and beliefs to conform to the socially acceptable norms. This view is supported by the present results showing that the

Singaporean children spent significantly more time engaged in neutral bids and less conflict during their pretend play across the three phases than the UK children (see Chapter 9). This study has also shown that the Singapore cohort scored significantly better in understanding discrepant desires across three phases compared to the UK cohort, demonstrating that children within different cultures may interpret emotions differently. As noted in Chapter 5 (Section 5.3), greater emphasis is placed on empathy towards others' emotions and feelings in Asian compared to Western cultures (e.g. Wang, 2001; Wang & Leichtman, 2000).

The results and explanations highlight how culture might play an influential role in affecting social environmental factors on children's care and development. In the case of the Singaporean children, the majority of them attended full-time preschool. Consequently, there were numerous opportunities to interact with adults and other preschool-age children. For the UK children, a play-based curriculum, though not examined in the present study, might have contributed to children's pretend play behaviour development and strengthened their ability to understand sophisticated naïve psychology concepts. As illustrated in the socio-cultural model proposed and empirically tested in this thesis (see Figure 3 in Chapter 3, Section 3.7), the current findings thus far establish that children's naïve psychology development is inherently socially embedded within a larger cultural context. The need to focus on cross-cultural differences in the process of acquisition of naïve psychology concepts and development of pretend play behaviour is underscored. Wellman et al. (2001, pp. 678-679; *cf.* Wellman et al., 2006) contend that the results of their meta-analysis provide evidence against Lillard's (1998a) premise that "understanding of belief, including false-belief, is the culture-specific product of socialisation within literate, individualistic Anglo-European cultures". There are, however, culturally varied ways in how adults explain the same human behaviour to children. Children acquire the naïve psychology of their culture through listening and discussing about stories of their everyday family life, learning appropriate behaviour and appreciating how people think, feel and behave (Astington, 1993). Cultural values and practices may contribute to substantial variations to the process of social coordination and the learning that ensues (Gauvain, 2005b). Hence, a deep understanding of how children acquire their naïve psychology and how pretend play behaviour develops in different cultural and social contexts is considered more important.

### 10.2.3 Role of language (VMA and bilingualism) in children's naïve psychology and pretend play behaviour development

The third results theme of the current study concerns the role of language (VMA) and bilingualism in the development of children's naïve psychology and pretend play

behaviour. Through mastery of linguistic skills, children learn to participate in shared attention activities with others and understand and reproduce intentional actions on cultural artefacts and tools (Rakoczy, 2007; Tomasello, 1999). Acquiring language, a cultural artefact, entails a process of intersubjective interactions that support children's understanding of mental representation (Tomasello, 1999). Language enables children to "get in touch" and "get it across" with others through expressing and sharing their mental-states and learning about others' mind (Astington, 1993, p. 43).

This thesis highlights cross-cultural similarities in the longitudinal associations between level-1 visual perspective-taking at 2½ years of age and VMA at 3½ years of age for both cohorts. There were also longitudinal associations between VMA at 2½ years of age and false-belief prediction at 3½ years of age even though there were marked differences in terms of the number of languages spoken between the two cultures (see Chapter 8). Additionally, there was evidence of significant concurrent (within phase) associations between VMA and false-belief prediction at 3½ years of age for both cohorts. Of note, there were no significant associations between early VMA and some aspects of naïve psychology. The present findings add to a growing body of literature on the particularly important role of language in children's false-belief understanding. The significant concurrent and longitudinal associations between VMA and false-belief prediction demonstrate that language ability contributes to individual differences in false-belief understanding. Some researchers have attributed children's difficulties with false-belief tasks to their linguistic skills (e.g. Freeman et al., 1991; Siegal & Beattie, 1991) and a host of studies have addressed the methodological shortcomings of the standard false-belief tasks by reducing the linguistic load (see review in Chapter 1, Section 1.2.4). An implication of the present findings, along with other empirical evidence reviewed in Chapter 2 (Section 2.4.2), is that cross-cultural research should take into account that language plays an active role in the development of false-belief understanding when comparing children from different linguistic backgrounds. This issue will be addressed in Section 10.5.

During social exchanges, children use language to communicate their feelings and thoughts and learn that other people may have desires, perspectives and beliefs that differ from their own. As discussed in Chapter 3 (Section 3.3.4), children use verbal metacommunication as a tool to engage in complex social pretend play. The observational data revealed significant longitudinal associations between early metacommunication and later knowledge of appearance-reality distinction for both cohorts, after VMA and gender were controlled for (see Chapter 9). There were, however, no significant correlations between metacommunication and false-belief understanding. The results suggest that

children's language, the use of verbal metacommunication, within the context of pretend play to discuss and attribute multiple pretend properties to objects and situations may in turn support their later ability to differentiate what an object looked like and what it actually was in the appearance-reality distinction task.

In the research presented in this thesis children's language ability was assessed using the BPVS, a measure of receptive vocabulary ability, in order to ensure that children's language was in line with their CA and any differences in development between the two cohorts were not due to language abilities (see Chapters 2 and 4). The present study was not designed specifically to address the role of language in naïve psychology and pretend play behaviour development. As reviewed in Chapter 2 (Section 2.4.2), several studies have found that language ability, as measured using either the BPVS or PPVT-R, is important for understanding some aspects of naïve psychology (e.g. Happé, 1995; Taylor & Carlson, 1997). The present mixed pattern of results between language and naïve psychology concepts suggest the necessity of making explicit which aspects of the linguistic systems are involved in naïve psychology development. Some naïve psychology tasks may simultaneously draw on more than one aspect of language ability. Astington and Jenkins (1999) found that syntactic ability was related to false-belief understanding whereas Ruffman et al. (2003) demonstrated that semantics contributed to false-belief understanding. Slade and Ruffman (2005) showed that both syntax and semantics predicted false-belief understanding. Milligan et al.'s (2007) meta-analysis covered five measures of language ability (receptive vocabulary, semantics, syntax, general language and memory for complements) and found weaker association between receptive vocabulary measures and false-belief understanding than measures of general language. Since other measures of language abilities were not included in the present study, this issue cannot be directly addressed here.

In contrast to earlier findings (e.g. Kovács, 2009), this thesis found no evidence of a bilingual advantage in naïve psychology task performance. Furthermore, the UK/Singaporean bilingual children performed significantly more poorly in the false-belief prediction task at 3½ years of age compared to the UK monolingual children (see Chapter 8). A possible explanation for the variations in task performance might be due to differences in linguistic system between monolingual and bilingual children (see Bialystok, 1991, for more discussion on language development of bilingual children). In a study on the effects of bilingualism on naïve psychology development, Goetz (2003) reported no relationship between PPVT and naïve psychology task scores. The present study was not specifically designed to evaluate the role of language in naïve psychology development between monolingual and bilingual children. Therefore, an issue that was not directly addressed in

this study was the linguistic processing in the bilingual children's two languages and how this affects naïve psychology development. In future investigations, it might be possible to use other tests of linguistic ability and naïve psychology tasks which are translated into different languages to explore whether the cross-cultural variations could be a result of different language processing between monolingual and bilingual children. These types of studies might explain how the linguistic systems of English-Chinese bilingual children are associated with naïve psychology development.

In the current study, the UK/Singaporean bilingual children demonstrated an advantage in the verbal baby Stroop task at 3½ years of age (see Chapter 8). There were, however, no bilingual advantage in the baby Stroop task at 2½ years of age or in the non-verbal cartoon Stroop tasks at 2½ and 3½ years of age. The children in the Singapore cohort are taught English as a first language and Mandarin as a second language in the preschools and some children speak a third language at home. Functional magnetic resonance imaging (fMRI) studies of Chinese-English bilinguals have reported that different cortical regions were called into play during processing of the two languages (Klein, Zatorre, Milner, & Zhao, 2001). Syntactic and semantic processing of Chinese phrases by Chinese-English bilinguals showed opposite patterns of brain activation to those seen when they process English phrases (Luke, Liu, Wai, Wan, & Tan, 2002). When switching between languages, there was an increased intensity of activation in the dorsolateral prefrontral cortex, suggesting that language switching involves increased general executive processing (Hernandez, Dapretto, Mazziotta, & Bookheimer, 2001). Research of cross-linguistic influence suggests that certain aspects of bilingual children's languages may interact with acquisition of some aspects of other language (e.g. Paradis & Navarro, 2003). A recent study by Byers-Heinlein and Werker (2009) involved comparing the number of languages being learned and infants' tendency to associate a novel noun with a novel object rather than a familiar one. This study revealed that monolinguals showed strong use of disambiguation, bilinguals showed marginal use and trilinguals showed no disambiguation, demonstrating how different types of early language experience influence the emergence of word-learning heuristic. This result provides insight into how bilingual or trilingual children, even when using one language, may process linguistic information in a different pattern from monolingual children. The implications of children's language experiences on executive function abilities and naïve psychology development merit careful attention.

In sum, considerably more work is needed to establish the relative contribution of language and bilingualism in children's naïve psychology and pretend play behaviour development. One important point to note, as discussed elsewhere in this thesis, is the

simultaneous developmental changes of children's naïve psychology and language skills. The transition from solitary to complex social pretend play behaviour also mirrors the developmental changes in naïve psychology and language ability. As children gain more advanced language skills, this has important implications for their social interaction and pretend play behaviour.

### 10.2.4 The relationship between pretend play behaviour and naïve psychology development

The final results theme relates to the role of pretend play behaviour in children's naïve psychology development. The non-significant sibling effect reflects the need to examine different socialisation contexts in which children acquire their naïve psychology. There were significant associations between some aspects of early social experiences in the context of peer pretend play and later acquisition of some naïve psychology concepts for the UK and Singaporean children. None of the non-social (solitary and parallel) pretend play behaviours were related with naïve psychology development. These findings suggest that an emphasis should be placed on early social interaction and intersubjective engagement in pretend play as potential avenues for children's naïve psychology development.

The reciprocal analyses adopted in this thesis presented two different perspectives of the relationship between pretend play behaviour and naïve psychology development (see Chapter 9): (a) some aspects of early social pretend play behaviour may be associated with later acquisition of some sophisticated naïve psychology concepts for both cultures, and (b) early acquisition of some naïve psychology concepts may be related to later engagement in complex forms of social pretend play behaviour for the Singaporean children. It is noteworthy that not all aspects of social pretend play behaviour and naïve psychology were related for both cultures. It is important to note here that the current results do not preclude the possibility that certain aspects of pretend play behaviour, other than those measured in the present study, may provide a better explanation of the associations between pretend play behaviour and naïve psychology development.

Vygotsky (1967) suggested that play supports children's learning and development within their ZPD. The relevance of social interactions (metacommunication, role-enactment and role-play) embedded in shared pretend play in children's later naïve psychology development is partially supported by the current findings. Several studies in Western contexts have shown how early social pretend play interactions lead to individual differences in later naïve psychology development (discussed in Chapter 2, Section 2.4). A host of studies have also demonstrated that pretend play serves a facilitating role in the development

of a range of diverse cognitive and social skills including role-taking, quantitative invariance, perspective-taking ability, language acquisition, problem-solving, creativity and divergent thinking (see Rubin et al., 1983, for a review). Collating data from nine correlational studies, Smith (2010, p. 187) argued for "pretend play being one kind of experience useful for theory of mind skills". In sum, these strands of evidence are consistent with the notion that social pretend play behaviour is significant for children's naïve psychology development (discussed in Chapter 3). Although the results presented in this thesis provide partial support for the notion that social pretend play behaviour may be an early marker of understanding mental representation, the findings have important implications for parents and education practitioners. This topic will be discussed in detail in Section 10.4.

The discussion within this section thus far has concentrated mainly on how social interactions in peer pretend play act as catalysts for the development of naïve psychology. An important issue that has not been addressed directly is the consequences of acquiring early or later naïve psychology concepts for later pretend play behaviour development. The current results show associations between level-2 visual perspective-taking at 2½ years of age and complex forms of pretend play behaviour at 3 and 3½ years of age and between pretend transformation at 3 years of age and complex social pretend play behaviour at 3½ years of age for the Singaporean children. It is noted that no significant correlations between early naïve psychology concepts and later engagement in complex forms of pretend play behaviour were observed for the UK children. Acquisition of naïve psychology concepts is important for children to understand their own and others' minds and to predict and explain human behaviours (Frith, 2000; Lee, 2000; Sodian & Kristen, 2010). Even though the reciprocal links between pretend play behaviour and naïve psychology were not observed in both cultures, the age of onset of naïve psychology concepts has significant implications for children's social development such as when they enter into social play, develop turn-taking and sharing skills, learn to cooperate together and empathise with others (see further discussion of this point below in Section 10.4).

Together, this thesis contributes additional longitudinal evidence of reciprocal associations between some aspects of social pretend play behaviour and some naïve psychology concepts of children from a hybrid culture. The reciprocal associations for the Singaporean children suggest that pretend play behaviour and naïve psychology development may be closely intertwined. This finding confirms previous Western studies that reported associations between early social pretend play behaviour and later naïve psychology development (e.g. Hughes & Dunn, 1997) and between early acquisition of naïve

psychology concepts and later pretend play behaviour development (e.g. Jenkins & Astington, 2000).

In summary, the experimental and observational approaches employed in the present longitudinal study reveal gradual developmental changes in children's naïve psychology and pretend play behaviour. Children's acquisition of various aspects of naïve psychology and pretend play behaviour encompasses both universal features and cross-cultural divergence in development. Children's differential early socialisation experiences may affect their later naïve psychology development. The current findings reinforce the importance of going beyond merely attributing variations to assumed differences between Eastern and Western cultures or along the individualistic-collectivism dimension to investigate how cultural and social factors interact to shape individual differences in early or late acquisition of naïve psychology concepts and development of pretend play behaviour. The discussion thus far highlights that the dominant theories of naïve psychology should consider how cultural factors may influence social environmental factors and subsequently shape children's naïve psychology development. Given that the major part of this thesis concerns naïve psychology development in two cultures, the implications of the present findings for theories of naïve psychology will be discussed further in Section 10.3. Another issue drawn from these discussions relates specifically to how early naïve psychology concepts and pretend play behaviour support the next level of development and clearly have important implications for policy and future practice. This issue will be addressed in detail in Section 10.4.

## 10.3    Implications for Theories of Naïve Psychology Development

This thesis adds to existing theoretical discourse by confirming the cultural universality of some naïve psychology concepts in Singapore, a hybrid culture and the UK. The four dominant theoretical frameworks of the development of naïve psychology (namely, modularity theory, theory theory, representational change theory and simulation theory; see Chapter 1, Section 1.3), as will be discussed, can be applied to explain some aspects of developmental changes in naïve psychology concepts in the present research. The issue of conceptual coherence within the theory theory framework will also be discussed.

Rather than an innate ability with the modules coming 'on-line' over the course of development as suggested by modularity theory (e.g. Leslie 1987, 1994), the development of children's naïve psychology might differ due to cultural variations in social experiences. The findings presented in this thesis provide evidence of divergence in some aspects of naïve psychology and pretend play behaviour at 2½, 3 and 3½ years of age between the two cultures. The disparity in the specific behaviour exhibited by children of the same age in

different cultures underscores the importance of considering cultural influences in children's development (Tomasello, 1999). Development does not occur within "the individual, the sole child" (Bruner, 1986, p. 149). The modularity theory could still hold, though not assessed within this thesis, because infants may be born with innate knowledge of some rudimentary naïve psychology concepts.

The current findings do not support Fodor's (1992) account of a desire-based reasoning in predicting a character's action. As discussed in Chapter 7 (Section 7.4), less than one-third of the children in either the UK cohort or Singapore cohort made references to desires when justifying their prediction or explaining a character's false-beliefs at 3 and 3½ years of age. Furthermore, the current results are consistent with those of Wimmer and Weichbold (1994) who found no support for Fodor's (1992) account that false-belief explanation ability develops earlier than false-belief prediction ability.

The developmental patterns of naïve psychology concepts in both cultures lend some support to Wellman's (1990) model of theory formation: 2-year-old children acquire simple desire psychology, 3-year-old children are characterised as desire-belief psychology and 4-year-old children are described as belief-desire psychology. Hence, the first theory change occurs from 2 to 3 years of age and the second change from 3 to 4 years of age (discussed in Chapter 1, Section 1.3). The data also fit Perner's (1991) representational model where 2 and 3-year-old children's understanding of mind is considered as a 'situation theory' of behaviour. By 4 years of age, children develop a representational understanding of mental-states (discussed in Chapter 1, Section 1.3). However, as Lewis and Carpendale (2011) have noted, rather than developing in a theory-like manner, children's performance reflects different levels of cognitive loads or linguistic demands imposed by different naïve psychology tasks. Even if naïve psychology concepts tend to be acquired at a similar age, an emphasis on the influences of cultural and social factors on children's growing understanding of mind should not be ignored. The focus of children's naïve psychology development should be on the processes and contexts that can affect understanding and conceptual change rather than age of emergence. Carpendale and Lewis (2004, 2006) propose that early social interactions account for the 'gradualism' observed in children's developing understanding of various aspects of naïve psychology.

Within the framework of theory theory, it has been proposed that children's naïve psychology concepts are interrelated to form a coherent and cohesive system (e.g. Gopnik & Wellman, 1992). Given the variability in coherence of naïve psychology concepts for the two cultures, this thesis provides little support for the notion of "conceptual coherence in the child's theory of mind" (Slaughter & Gopnik, 1996, p. 2967). At 2½ years of age,

performance on non-representational and representational naïve psychology tasks was more consistent for the Singapore cohort. By contrast, children's naïve psychology was fragmented for the UK cohort. At 3 and 3½ years of age, the internal consistency of the battery of non-representational and representational tasks and subsets of pretence, visual perception and belief tasks was low for both cohorts. The between-task correlation results presented in Chapter 6 (Table 6.4) and Chapter 8 (Table 8.2) indicate that not all aspects of naïve psychology were interrelated for both cohorts. Together, the Cronbach's alpha coefficients and correlation analyses showed a more fragmented system in the development of naïve psychology concepts for both cohorts.

As Murphy and Medin (1985) have pointed out, there are a number of measures that might reflect a coherent and cohesive conceptual system. A coherent concept is one "whose members seem to hang together" (Murphy & Medin, 1985, p. 291). Although the correlations among knowledge-ignorance attribution, true-belief ascription and false-belief prediction were not assessed in the current study, the results reveal that these concepts are acquired simultaneously at around the same age. The observed cross-cultural similarities in age of onset of knowledge-ignorance attribution, true-belief attribution and false-belief prediction in phases II and III within each cohort add substantially to our understanding that much of children's understanding of knowledge-ignorance and beliefs forms a coherent conceptual system and some specific naïve psychology concepts are conceptually linked together. It has been suggested that internal features define how concepts are integrated and learnt (Murphy & Medin, 1985). It is therefore likely that concepts that share connecting properties are acquired at the same age. As results from a training study have shown, children trained in belief or desires and perception performed better in post-test naïve psychology tasks but not on the number conservation task (Slaughter & Gopnik, 1996).

In partial support of the simulation theory, the present results indicate that pretend role-play and not pretend play in general supports children's understanding of mental representation. For the UK children, role-enactment at 2½ years of age was significantly correlated with false-belief prediction at 3 years of age and appearance-reality distinction at 3½ years of age. For the Singaporean children, role-enactment at 2½ years of age was significantly associated with appearance-reality distinction at 3 years of age and mental representation in pretence at 3½ years of age. In addition, significant correlation between role-play at 3 years of age and mental representation in pretence at 3½ years of age was observed for the Singaporean children. Of note, there were no significant correlations for role-enactment and role-play with some aspects of naïve psychology. The simulation

theorists overlook the fact that cultural diversity in pretend play or imagination may lead to differences in naïve psychology development.

There are some results observed in the present study that the current dominant theoretical approaches cannot explain. It is worthwhile noting that the present results do not rule out the proposition that cultural values, practices and beliefs contribute to the developmental process of children's acquisition of naïve psychology concepts. While theory theory, representational change theory and simulation theory have acknowledged the role of early social experiential factors, these frameworks fail to fully consider the enculturation process that shapes the developmental changes in naïve psychology. The aim of cultural psychology, according to Miller (2005), is not to refute universals and the importance of innate drives or presume that psychological theories must be constructed differently in every culture but is to recognise cultural process as playing a fundamental role in influencing the pattern of development. Appreciating cultural and social influences as factors contributing to a mix of universal and diversity in development is the key to understand children's naïve psychology.

**10.4    Integrating Cultural Perspectives into Naïve Psychology Theories**

The present results suggest that no single theoretical approach can be used to fully explain naïve psychology development in the two cultures. Hybrid theoretical accounts that integrate the perspectives of the dominant frameworks have been proposed by a few theorists (see Hurley, 2008a, 2008b; Nichols & Stich, 2003). Drawing on the differences between theory theory and simulation theory, Hurley (2008a, p. 770, original emphasis) argued that the two theoretical approaches are compatible "because theorizing might *implement* simulation". Hurley (2008b) proposed the five-layer shared circuits model (SCM) that can reconcile the views of the two theoretical approaches. According to Hurley (2008b), a fundamental self/other distinction can be provided by simulative mirroring (SCM's layers 3 and 4). Mature self/other and other/other distinctions that require the abilities to distinguish and identify multiple persons and attribute and interpret the mental-states of multiple other persons depend on theorising (SCM's layer 5). Nichols and Stich (2003) suggested a theory of third-person mindreading that comprise components of the modularity theory, theory theory and simulation theory. As Carpendale and Lewis (2004) have pointed out, the dominant theoretical approaches tend to converge with respect to certain aspects of naïve psychology development. Infants may be born with innate abilities. Experience provides children with the knowledge to revise and improve their understanding of various aspects of naïve psychology. Some naïve psychology concepts might be acquired in an interconnected coherent structure. Through simulation (e.g. pretend role-play), children develop

understanding of the minds of others. Critics have raised several objections on how the dominant theoretical approaches fail to account for the many factors that may influence naïve psychology development (see discussions in Bruner, 1990; Carpendale & Lewis, 2004, 2006). The experimental and observational data presented in this thesis indicate that an important feature neglected by current theories is that the acquisition of different naïve psychology concepts is influenced not only by social environmental factors but also by cultural factors. Neither a hybrid theoretical and simulation account nor a combination of the theoretical approaches is able to explain the specific way children interact with and understand other people in different cultures.

A few theorists have emphasised the role of culture in shaping children's naïve psychology development (e.g. Astington, 2006; Vygotsky, 1978). As Bruner (1986, p. 149) pointed out, "man, surely, is not "an island, entire of itself" but a part of the culture that he inherits and then recreates". Lillard (1999) proposed the CIAO (culture, introspection, analogy, ontogeny) model to explain how infants attribute mental-states. The proposal that children's naïve psychology is shaped by culture is echoed, but with a somewhat different emphasis. The influence of culture extends beyond the divisions between the East and West or between individualistic and collectivistic cultures. Culture is viewed as a way of life and the social aspects of human life that determine the ways people interact with others and behave in a given society.

How is culture shaping the mind? Culture is a body of information acquired through social learning experiences such as teaching and imitation (Peterson, 2011). Cultural influences are reflected in childrearing beliefs and practices. Culture plays a part in shaping children's socialisation experiences, therefore playing an active role in influencing every aspect of naïve psychology development from birth through preschool years and even in adulthood. The non-significant relationship between presence of sibling(s) and naïve psychology development but significant associations between early peer social pretend play behaviour and later naïve psychology concepts found in the present study suggest that caregivers may structure children's environment in various ways. More importantly, cultures may have markedly different socialisation practices. Parental knowledge of child development and expectation of appropriate and acceptable behaviours vary across cultural settings. The cultural differences in social bids observed in the present study suggest that children's behaviour depends on the behaviours common in the culture in which they acquire understanding of beliefs, perspectives, desires and intentions. Within a culture, members use information to regulate their own behaviour and interpret the behaviour of other individuals for meaningful social interaction (Blount, 1982). Children acquire culturally related ways of

not only understanding their own pretence, desires, perspectives, beliefs and behaviours but also adopting others mental-states and differentiating between their own and others' mental-states.

The present results indicating universal development in some aspects of naïve psychology do not preclude the fact that culture has a formative role in contributing to these similarities. Globalisation may result in trans-cultural transmission of ideas and values. However, resistance to external influences (from within a culture) may lead to variations in development of some aspects of naïve psychology. Hence, it is necessary to appreciate the extent to which cultural diversity might unfold within universal development (Astington, 2006). While culture is a form of inheritance, it is very different in details from genes (Peterson, 2011). Children do not blindly imitate their parents or another person but select among cultural variants (Peterson, 2011). The present results showed that the UK cohort achieved better performance in level-1 visual perspective-taking tasks across the three phases compared to the Singapore cohort. Elements and traits of both individualism and collectivism may exist in the UK or Singapore. Hence, it is important that culture is not reducible to drawing a distinction between Western individualistic and Eastern collectivist dimensions. Cultural diversity may occur due to differences in religion, race, ethnicity, language and geographic location. The observed cultural differences in the duration of engagement in the pretend play themes of outings, holidays and weather across the three phases suggest that ecological factors may influence children's learning.

The present research suggests that the dominant theoretical frameworks should consider going beyond the existing non-Western studies that focus primarily on children's appearance-reality distinction and false-belief understanding. Naïve psychology comprises a range of conceptual understanding that develops gradually from birth through preschool years. The acquisition of different naïve psychology concepts such as understanding of pretence, desires, visual perceptions, intentions and beliefs should be explicitly studied. Some aspects of naïve psychology might be more susceptible to cultural and social environmental influences. Some cultures might confer certain kinds of advantage for early acquisition of particular naïve psychology concepts. Some cultures expose children to a rich variety of activities that provide the beginnings of the development of naïve psychology in infancy that will be built upon through the preschool years. For example, children who are exposed to mothers' mental-state language at an early age are more likely to perform better on naïve psychology tasks at a later age (e.g. Ruffman et al., 2002). Nevertheless, it is argued that no one culture is more sophisticated in understanding of mind than other cultures. It is

important to note that cultural influences on early understanding may pave the way for the development of later theorizing or simulation.

The development of children's naïve psychology should be viewed as a process rather than age of attainment of conceptual understanding. In the majority of non-Western studies on children's false-belief understanding, the tendency is generally to evaluate children's responses as right or wrong without trying to explore the thought processes that children engage in to arrive at their conclusion. The non-Western results showing similar age of emergence of appearance-reality distinction and false-belief understanding with Western samples have largely guided theoretical perspectives, characterising children's naïve psychology development as universal across cultures. Kovács (2011) has argued that in order to ensure effective communication and collaboration, the main function of ToM is not to explain but to predict others' behaviour. The present study, however, demonstrates that there are culturally varied ways of how children justify their predictions and explain the behaviour of a naïve character who has a false-belief. This finding is consistent with those of Naito and Koyama (2006, Experiment 2) who found a tendency for Japanese children to incorrectly justify action based on behavioural and situational cues rather than provide desire-based explanations to account for the character's false-belief. Therefore, a theoretical framework of naïve psychology should not assume a universal developmental pattern in children's explanations for a naïve character's false-beliefs but should consider how children's thinking might be guided by cultural beliefs, norms and values. "A culturally sensitive psychology …… must be based not only upon what people actually *do*, but what they *say* they do and what they *say* caused them to do what they did. It is also concerned with what people *say* others did and why" (Bruner, 1990, p. 16, original emphasis).

Language plays a critical role in naïve psychology development (e.g. Astington, 1996; Bruner, 1986; Carpendale & Lewis, 2004). The acquisition of sophisticated language skills allows successful interactions with other people. Culture and language are inseparable. Language is "a socially-conduced kind of cultural transmission" and is acquired locally through social interaction (Enfield, 2011, p. 50). It is impossible to understand cultural phenomena (including language, ritual practices and practical knowledge) and conventionalised social behaviour without making reference to mental states (Enfield, 2011). According to Bruner (1986, 1990), children use narratives as a tool to make sense of and explain others' behaviour (see also Dunn, 1988). As Bruner (1990, p. 80) has suggested, "while we have an "innate" and primitive predisposition to narrative organization …… the culture soon equips us with new powers of narration through its tool kit and through the traditions of telling and interpreting in which we soon come to participate". Within a culture,

there are culturally specific ways of how people use language to share thoughts, feelings, perspectives and beliefs. Even though children in the UK and Singapore cohorts speak English as their first language, there is cultural and linguistic diversity in terms of the usage of English in their daily conversations. The larger number of significant correlations between VMA and naïve psychology concepts and language measures between the two time points for the Singapore cohort suggests that language may play a more crucial role in Singaporean bilingual children's acquisition of naïve psychology concepts (see Chapter 8). As discussed earlier (see Section 10.2.3), the mixed pattern of results indicates that acquisition of specific naïve psychology concepts might depend on different or more than one aspect of language abilities. In other words, it is important to determine which language and which aspects of the language influence which aspects of naïve psychology. The current results suggest that the dominant theoretical frameworks should consider the impact of culture on language acquisition and the subsequent influence on children's thinking and behaviour.

Children's naïve psychology concepts develop gradually in the context of social interaction (Carpendale & Lewis, 2004). The importance of social pretend play serving a vital context in children's naïve psychology development in different cultures should be included in the theoretical discussions. The non-significant findings between non-social pretend play behaviour and naïve psychology concepts but significant associations between some social pretend play behaviour and some naïve psychology concepts suggest that naïve psychology development takes place in a social context. Children appear to be social learners, adapting their learning in different social environments. Joint attention and imitation first appear during infancy (e.g. Meltzoff, 1988a, 1988b; Tomasello & Haberl, 2003). Children gradually acquire the ability to engage in more complex social interactions with others during the preschool years. As noted elsewhere in this thesis, joint activities in play provide a channel through which enculturation and socialisation take place. In the present study, the cultural differences in the significant associations between some early pretend play behaviour and later acquisition of some aspects of naïve psychology reveal that culturally-specific pretend play behaviour might be linked to different aspects of naive psychology development. Of note, not all pretend play behaviours developed in similar patterns between the two cultures. The cultural similarities in the developmental sequence of social pretend play behaviour and in the significant relationships between early pretend play behaviour and later naïve psychology concepts suggest an interplay of biological, cultural and social influences. This does not discount the role of innate factors in the early emergence and development of play behaviour.

In conclusion, a hybrid integration of theoretical approaches is able to explain some aspects of naïve psychology and pretend play behaviour development in the two cultures (see Section 10.3). More emphasis, however, should be placed on the role of culture in children's acquisition of different naïve psychology concepts and development of pretend play behaviour. A theoretical framework that embodies the influence of cultural factors on social environmental factors and the subsequent impact on children's developing understanding of different naïve psychology concepts will lead to more fruitful and insightful knowledge of children's naïve psychology development in different cultures. However, an emphasis on cultural and social contexts in children's naïve psychology development does not completely discount the role of innate factors, although external environmental factors might play a more influential role in conceptual change.

## 10.5    Implications for Policy and Practice

There are a number of important issues for policy and practice that need to be addressed, including greater emphasis on play-based learning in the early years curriculum, use of scaffolding and guided participation in early development of pretend play behaviour, fostering of awareness among parents and education practitioners on the importance of children's naïve psychology development and dissemination of research findings to parents and education practitioners. These issues are discussed in further detail below.

An important practical implication of the current findings is that more emphasis on the role of pretend play in children's learning and development should be advocated in the early years curriculum in all cultures. It has been argued in this thesis that children's pretend play behaviour is influenced by cultural norms and values, socialisation beliefs and the physical and social contexts (see Chapter 3, Sections 3.4 and 3.5). The conception of pretend play as a freely chosen, personally directed activity or a pedagogical tool in differing cultural contexts may influence play behaviour, choice of playmates, types of play activities and availability of play materials. Preschool education in Western cultures has traditionally focused on play-based curriculum to support children's learning while it is often perceived as preparation for primary school in Eastern cultures. With the launch of a new preschool curriculum framework in year 2003 in Singapore, there has been a shift in focus from an academically-based curriculum to a more broad-based learning experience (Tan, 2007). In a review of the early years curriculum in 20 countries commissioned by The Qualifications and Curriculum Authority, United Kingdom, Bertram and Pascal (2002) reported that a common principle found in the curriculum frameworks in countries like England, Ireland, Scotland and Wales, is an emphasis on the importance of play in children's learning and

development. The review also showed that preschools in Hong Kong, Korea and Singapore give greater emphasis to social learning and cohesiveness through discovery and exploratory play rather than formal teacher-directed delivery method. Nevertheless, not all Singaporean parents and teachers prefer a child-centred model to structured teacher-directed teaching methods (Siraj-Blatchford & Wong, 1997). Consequently, there is a need to develop policies to raise greater awareness of the importance of pretend play in children's learning and development.

One of the principles in the document entitled "A framework for a kindergarten curriculum in Singapore" is 'learning though play' (Singapore Ministry of Education, 2003). In the one-page section on play, education practitioners in Singapore are encouraged to use play as a medium for learning and provide opportunities for spontaneous and structured play. By contrast, the national guideline "Pre-birth to Three" in Scotland provides more detailed suggestions on how education practitioners can plan and support both indoor and outdoor play through scaffolding, intervention, interaction and observations (Learning & Teaching Scotland, 2010). Some early education practitioners in the UK and Singapore may lack the skills to implement a play-based curriculum. The challenges are for policy makers to raise the awareness of the importance of providing opportunities for free and structured play and allocate funding for educating and training education practitioners to equip them with the necessary skills. In the case of Singapore, greater attention should also be given to delivering a curriculum that is regarded as developmentally appropriate by Western standards and yet is culturally and contextually appropriate (Ang, 2007). It is important to recognise diversity within cultures. That is, child-rearing practices, beliefs, norms and values are not culturally homogeneous. The educational implications discussed within this section may be applicable in many cultures but require careful consideration of cultural adaptation.

The findings of the present study also suggest that scaffolding and guided participation should be provided in the early stages of pretend play development. Research in Western contexts has shown that mother's non-verbal behaviours may assist younger children's interpretation of pretence acts (e.g. Lillard & Witherington, 2004; Ma & Lillard, 2006; Richert & Lillard, 2004). In interpreting and understanding the meanings and intentions of mothers' non-literal behaviour, children acquire early social cognitive skills of social referencing, joint attention and reading intentions (Lillard, 2006a). Observational studies of early pretend play behaviour showing that children exhibit more complex forms of pretend play behaviour with their mothers than when engaged in solitary play lend support to the premise that social interaction may contribute to complexity of pretend play (e.g. Fiese, 1990; O'Connell & Bretherton, 1984). These findings highlight that early scaffolding

provided by mothers may act as a springboard for children to engage in collaborative play that facilitates the development of complex interaction and pretend play behaviour. Moreover, scaffolding of child socialisation may help preserve cultural traditions and practices (Gauvain, 2005a). It is worth noting that there are cultural differences in child-rearing practices. For example, since the majority of the children in the Singapore cohort attended full-time preschool, they spent more time interacting with peers and adults in the childcare centres than with family members. Hence, education practitioners can guide and facilitate children in play through play tutoring (Tan-Niam, 1993). In this approach, after the education practitioners read and discuss a fantasy story with the children, they assign roles and guide children's enactment of the story.

Children's naïve psychology depends in part on their growing knowledge that people's behaviour is guided by desires, goals, intentions and beliefs, which in part are acquired from their daily socialisation experiences. Parents and education practitioners in all cultures might be more aware of the developmental changes from rudimentary to sophisticated naïve psychology so that they encourage children to talk explicitly, think and reflect upon their own and others' thoughts during their daily activities. In the family context, this may be enhanced by parents' and non-parental caregivers' discussion about mental-states during adult-child and adult-sibling interactions. The evidence of this study suggests that early role-enactment and metacommunication were significantly associated with later appearance-reality distinction ability for the UK and Singaporean children. In the context of pretend role-enactment, it is important for parents and education practitioners to draw children's attention to the conflicting perspectives between playmates' and children's roles during pretend play episodes and differences between pretend and real entities (object, people or situation). In daily conversations and book sharing, parents and education practitioners are greatly encouraged to engage in rich and frequent discussions about feelings, emotions, intentions and behaviours. It is important to note that children also observe the social interactions and hear mental-state talk among family members (discussed in Chapter 2, Section 2.4.3). Education practitioners working with children from diverse cultures need to be aware that there are culturally-specific ways of displaying and interpreting feelings, emotions and behaviours. In relation to the roles of scaffolding and guided participation in pretend play behaviour development discussed earlier, an important implication is that through these social activities, parents, non-parental caregivers and education practitioners can enhance the development of early social skills in the context of pretend play that might aid children's naïve psychology development.

As children's rudimentary naïve psychology becomes increasingly well-established, together with the emergence of sophisticated naïve psychology concepts, they are able to use the wide spectrum of conceptual abilities to engage in rich and varied social interactions. According to Dunn (1988), children's increasing sensitivity to others' feelings, emotions, goals and intentions has profound consequences for their understanding of the social world. The emergence of children's ability to talk about other people's thoughts, feelings, desires and perceptions permit them to share information with others and engage in social exchanges with family members and peers (Astington, 1993). Previous studies have shown that naïve psychology is related to prosocial behaviour and peer acceptance. In a recent publication of a longitudinal study, children's emotion understanding at 3 years of age predicted prosocial behaviours (sharing and helping) during social play at 4 years of age (Ensor, Spencer, & Hughes, 2011). Children who were rated as popular and controversial by their peers scored higher on naïve psychology tasks than children who were rated as rejected or neglected (Slaughter et al., 2002). As such, children's developing conceptual understanding forms the foundation skills for building fruitful social relationships with their family members, other adults and peers. An important issue that emerges from these findings is that parents and education practitioners may help to extend children's social development through supporting their naïve psychology development.

Another important practical implication is to highlight the importance of the development of children's naïve psychology and pretend play behaviour to policy makers, parents and education practitioners. In a review article of research on children's play in both developmental and early education journals from year 2005 to 2007, Cheng and Johnson (2010) reported that researchers of education and not developmental articles discussed the implications of their findings for practice. The current approach taken to tackle this issue is to narrow the gap between research/theory and practice, involving two-way collaboration between researchers and education practitioners through regular communication (Johnson, 1994). Knowledge exchange is a process that involves exchange of scientific evidence, information, ideas and family experiences among academic researchers, policy makers, parents and education practitioners. Ginsburg and Gorostiaga (2001) remind us that the relationship between research and practice is influenced by the beliefs and attitudes of researchers, policy makers, parents and education practitioners. Therefore, achieving effective dialogue depends on researchers, policy makers, parents and education practitioners agreeing on terms of cooperation (Wagner, 1997).

**10.6    Methodological Considerations for Cross-cultural Research in Children's Naïve Psychology and Pretend Play Behaviour**

The thesis highlights a number of key methodological issues to be considered for those undertaking research evaluating children's naïve psychology and pretend play behaviour development from different cultural backgrounds. Variations observed in cross-national comparisons are often attributed to "country" rather than "cultural" differences (Matsumoto & Yoo, 2006, p. 237). Hence, the sampled groups should be comparable. By including a comparison group of Western children with matched language ability and demographic background, this thesis extended previous cross-cultural research by making a direct assessment of the age of emergence and developmental patterns of children's naïve psychology concepts and pretend play behaviour. Naïve psychology development is "multifaceted and complex" and it is impossible to reduce the effect of changes down to a single environment factor (Hughes & Leekam, 2004, p. 590). The present study recognised that it is necessary to identify several important cultural and social environmental variables that might be intertwined with individual differences in naïve psychology development. As shown in Figure 10 above, on the broad cultural level, demographic data of parental education, parental working status, family structure and preschool program were collated. There was no evidence that these variables were associated with naïve psychology development (see Chapters 5 and 8). In addition, the wide range of factors that might have an impact on children's development should not be ignored. For example, the differences in the duration of engagement in the pretend play theme of outings, holidays and weather across the three phases suggest that ecological variable such as climate should not be overlooked as factor influencing how children portray their social experiences in their pretend play (see Chapter 9).

On the individual level, this thesis has discussed and identified individual characteristics (VMA) and social variables (presence of child sibling(s), birth order and social interactions in the context of pretend play) as factors that might explain any observed variation in individual differences in naïve psychology development. As discussed in Chapter 2, the majority of the research conducted in the non-Western contexts failed to take into account confounding factors such as language and demographic variables. In the present study, to control for the possible effect that bilingual children's superior performance on naïve psychology tasks might be attributed to their advantage in inhibiting attention to competing cues, inhibitory control conflict tasks were administered at 2½ and 3½ years of age. The UK and Singapore cohorts were similar in terms of first language spoken, number of siblings and birth order. Nevertheless, it is worth mentioning the existence of

uncontrollable variables such as the variability in number of siblings at each phase of study. Given that the BPVS is a norm-referenced test of receptive vocabulary, it may be considered a conservative measure of language ability for the Singapore cohort.

It has been suggested that through language acquisition and social experiences, children gradually develop an understanding of mental representation (e.g. Astington, 1996; Astington & Baird, 2005; Capendale & Lewis, 2004, 2006). Drawing evidence from a range of research with typically and atypically developing children, Astington (2004) reminds us that language and social interaction may each contribute differently to the development of naïve psychology. Astington (2004) defines language as the child's individual linguistic ability whereas social interaction as the joint activity within triadic interaction. Therefore, particular attention should be given to the relative contribution of children's growing ability to engage in social interactions and language development. In play, children display not only culturally accepted behaviours, beliefs, values and norms but also their perspectives and interpretations of situation and human behaviour. Consequently, the enculturation process embedded in pretend play is a viable context for studying children's naïve psychology development. This thesis addresses a gap in our understanding of the cross-cultural similarities and differences in the associations between language and some aspects of naïve psychology. Moreover, this thesis contributes additional cross-cultural evidence regarding the relationships between some pretend play behaviour and some naïve psychology concepts.

Previous non-Western studies have tended to focus on narrow age range and rely on false-belief task as a single measure of an acquisition of understanding of representational mental-states (discussed in Chapter 2). This thesis adds to the literature by its focus on a repeated-measures design that traces the development of a broad range of naïve psychology concepts from 2½ to 3½ years of age. The administration of sophisticated naïve psychology tasks in earlier phases allowed an investigation of when changes occurred. Moreover, the results indicate that it is important to study the intermediate stage between 3 years 5 months and 4 years of age when some children transit from an explicit ability to predict false-belief before they are able to provide explanations based on false-beliefs. Taken together, this thesis highlights the importance of employing a longitudinal approach and taking into account the influences of language ability, family background characteristics and early social interactions in the context of peer pretend play on children's naïve psychology development over time. This method allows for the identification of variables that might explain developmental similarities and differences between cultures. A number of important limitations, however, need to be considered regarding the present research.

**10.7    Limitations and Suggestions for Further Research**

The present study was limited in several ways that were outwith the scope of this thesis. The relatively small sample size limits possible statistical analyses. A larger sample size will illuminate us on the predictive links among language, pretend play behaviour and naïve psychology concepts. It should be noted that the sample size decreased over time in the current longitudinal study. In terms of methodology, a few unavoidable weaknesses need to be considered. For example, the task demands placed on children to construct verbal responses may account for varied performance between the false-belief prediction and false-belief explanation tasks (Bartsch, 1998). Children simply chose between two alternatives on the prediction task whereas they had to provide verbal responses on the 'why' question in the explanation task. When answering the open-ended explanation question, the Singapore cohort tended to provide no explanation or give irrelevant answers at 3 and 3½ years of age. Future studies should make the explanation question of equal difficulty to the prediction question.

Some non-Western research has employed experimental adaptations of the standard false-belief tasks. For example, previous research of children in China and Hong Kong has explored the effect of Mandarin and Cantonese verbs with different degree of false-belief connotation on children's task performance (e.g. Lee et al., 1999; Tardif, Wellman, Fung, Liu, & Fang, 2005). There was evidence showing that false-belief understanding was strongly related to comprehension of the semantics of the Cantonese verb /ji5-wai4/ (falsely think) that carry a false-belief connotation of 4-year-old children in Hong Kong, after verbal intelligence and general language ability were taken into account (e.g. Cheung, Chen, & Yeung, 2009; see also Shatz et al., 2003). Although children in the Singapore cohort were fluent in English, it would be interesting to conduct the naïve psychology tasks in two languages to examine whether performance is related to different language processing in bilingual children. Additionally, assessing the second language ability of the Singapore cohort would provide a clearer picture of the relationships between bilingual children's language development and understanding of naïve psychology concepts.

Within this thesis it was not possible to fully analyse all the data collected (e.g. pretend play observations) and some specific aspects of the data collected. This included, for example, the cross-cultural similarities and differences in developmental changes in children's mental-state talk with peers in the context of pretend play.  A host of Western research has demonstrated that children talk about the mind using mental-state verbs such as *want*, *need*, *know*, *think* and *remember* to express desires, beliefs, feelings, thoughts, knowledge and intentions from 2 years of age (e.g. Bartsch & Wellman, 1995; Bretherton &

Beeghly, 1982; Shatz, Wellman, & Silber, 1983). Children in Western cultures have been shown to acquire sentence forms involving mental-state verbs and their complements and pass the standard false-belief tasks between 3 and 4 years of age (e.g. Astington & Jenkins, 1999; de Villiers, 2007; Tager-Flusberg, 1992). Few studies on the conversational use of mental-state terms, however, were conducted in the non-Western contexts. A naturalistic study of ten Mandarin-speaking children in China (Study 1) and analysis of eight Cantonese-speaking children from the Child Language Data Exchange System (CHILDES) database in Hong Kong (Study 2) was conducted by Tardif and Wellman (2000). Their study revealed that non-Western children acquired early use of desire terms followed by other mental-state terms (knowing how, know that, think/believe), a similar developmental pattern compared to a sample of English-speaking children from an earlier study (Bartsch & Wellman, 1995). However, Mandarin-speaking and Cantonese-speaking children referred to thinking at a later age than English-speaking children. In the present study, the Singapore cohort used very few mental-state terms in justifying their answers or explaining a naïve character's behaviour on the basis of false-beliefs at 3 years of age compared to the UK cohort. Further work needs to be done to analyse and compare the developmental changes in children's use of mental-state terms during peer pretend play between the two cultures.

More specifically, research on this topic needs to be undertaken to determine whether there are different cultural orientations of how and in what contexts children talk about the mind. In relation to the individualistic-collectivism dimension, the focus on "How do I do it" versus "How do we do it" (Earley, Gibson, & Chen, 1999, p. 594) necessitates the separation of mental-state references to self and others. Therefore, special attention must be given to culture-specific expressions in children's mental-state talk.

It is also important to note that each mental-state verb might carry different degree of implicit and explicit understanding. An example is that younger children's initial use of the word *pretend* may not demonstrate an understanding of mental representation involved (Lillard, 1993b). Children's use of the mental-state terms such as *think* and *know* may simply reveal an implicit rather than explicit understanding of beliefs and desires (e.g. Bartsch & Wellman, 1995; Carpendale & Lewis, 2004; Wellman, 1990). Consequently, more work is needed to establish the developmental changes in children's use of various categories of mental-state verbs.

In the context of pretend play, children engage in a lot of mental-state talk (Smith, 2003). Several studies have shown that children use more mental-state terms during pretend play such as describing the feelings of inanimate object (e.g. Hughes & Dunn, 1997). Frequently pretending sibling dyads were more likely to employ mental-state terms during

negotiation (e.g. Howe et al., 1998; Howe et al., 2005). The back and forth interactions allow children to express and discuss desires, thoughts and feelings in order to expand the pretend play episodes. The practice in temporarily stepping out of the pretend acts to establish scripts ("I want to have my teddy bear picnic") or rules ("Racing car can't fight baby monster"); describe pretend actions ("I want to have some more cereal"), characters ("We've to be really quiet or the teacher will be very crossed"), objects ("He's real, my teddy") and settings ("You can't come with us to the wedding"); assign roles ("Pretend I'm the big boy. You're the teacher"); and differentiate the pretend nature of play ("Let's pretend. Not eat it") may serve as a platform for children's understanding of representational nature of pretence. The examples cited, taken from children's conversations during the free play sessions in the current study, emphasise that the cooperative nature of social pretend play might facilitate the use of mental-state terms which might be linked to a representational understanding of mind.

Naturalistic observational studies of family interactions in Western cultures have demonstrated that individual differences in naïve psychology development are predicted by discourse about mental-state terms (e.g. Dunn et al., 1991a; Dunn et al., 1991b; Ensor & Hughes, 2008). A positive correlation was also found between children's use of mental-state terms during pretend play and false-belief task performance (Nielsen & Dissanayake, 2000). The results presented in this thesis have captured the richness of some aspects of children's pretend play behaviour and their associations with some naïve psychology concepts. Although not investigated in the present study, mental-state term competence may influence naïve psychology task performance. An analysis of the complexity of children's mental-state talk in the context of pretend play may provide further information of whether individual differences in mental-state talk explain the cross-cultural variations in naïve psychology development observed in the current study.

Children's use of mental-state terms is tied to their social interactions with others and such experiences provide them with opportunities to understand that others' beliefs and perspectives do not coincide with their own (Carpendale & Lewis, 2004). It has been suggested that everyday conversation plays a role in children's conceptualisation of naïve psychology concepts (Harris, 1996, 2005; Harris, de Rosnay, & Pons, 2005). As discussed in Chapter 7 (Section 7.4), Asian children are exposed to less frequent mental-state talk during their daily social interactions with their families compared to Western children. It is likely that early scaffolding assists children to acquire mental-state terms (references to cognitive states such as think, know and pretend) and enhances their later naïve psychology development. Therefore, to extend our understanding of the cultural foundations of

children's naïve psychology development, future research should attempt to study how different cultural and social contexts (e.g. child interaction with parents, other adults, siblings and peers) facilitate children's gradual developing understanding of their psychological world. The interactive processes should be investigated to determine whether scaffolding provided by different people contributes to children's naïve psychology development. With an emphasis not only on how cultural norms and practices are being transmitted to the next generation but also on the learning processes that occur within social relationships, it allows an investigation into whether there are any cultural differences in use of scaffolding and how shared understanding occurs within these scaffolding experiences.

Children's temperament might have an effect on their styles of interaction with other people which in turn may influence their naïve psychology development. A recent longitudinal study by Wellman, Lane, LaBounty and Olson (2011) demonstrated predictive relationships between Western children's early temperament characteristics (shy-withdrawn, non-aggressive and social-perceptual sensitivity) at 3 years of age and their false-belief prediction and explanation abilities 2 years later. A limitation of Wellman et al.'s (2010) study is that children's social interaction skills with other people were not assessed. It is noteworthy that child-rearing practices vary across cultures and cultural practices may affect children's temperament and pretend play behaviour. Therefore, it would be interesting to explore whether the cultural diversity in naïve psychology and pretend play behaviour observed in the present study is related to parental reports of children's temperament.

The current results suggest that parental demographic measures were unrelated to naïve psychology development. The results differ from previous research that found associations between maternal education and children's naïve psychology development (e.g. Cutting & Dunn, 1999) but they are consistent with other studies that reported non-significant results (e.g. Farhadian et al., 2010; Ruffman et al., 1998). A possible explanation is that the influence of parental demographic characteristics has an indirect effect or is mediated by other types of parental characteristics such as parenting style which may have a direct influence on children's naïve psychology development. This possibility is supported by several studies demonstrating that styles of parenting affect children's naïve psychology development in the Western settings (e.g. Ruffman et al., 1999; Ruffman et al., 2006) and a comparison study between Korean American and Anglo-American mothers (Vinden, 2001). Likewise, children's growing understanding of naïve psychology concepts may influence parenting styles (Dunn, 1988). These issues were not addressed in this study. Culture plays a role in shaping parenting styles. Consequently, parenting styles is one driving force for children to behave in a way that is acceptable or expected for their parents (Dunn, 1988).

Hence, the impact of parenting styles on parent-child relations and subsequent effects on naïve psychology and pretend play behaviour development between the two cultures is an important issue for future longitudinal research. An alternative explanation is that the present study did not have an adequate sample size to detect any small effects of parental demographic characteristics on children's naïve psychology development. Future research with larger sample size, that takes demographic variables into account, will need to be undertaken.

Finally, the cross-cultural study reported in this thesis has charted naïve psychology development from 2½ to 3½ years of age. Astington (1993) draws our attention to how children's early naïve psychology prepares them for the learning that ensues in formal schooling and how the education system should capitalise on first-order social behaviour acquired during the preschool years (ages 4 to 5) in facilitating second-order social understanding in formal schooling age (6 to 7 years). This is an area that merits substantial attention not just for policy makers and education practitioners but also for cross-cultural psychological research. As noted in Chapter 1 (Section 1.2), naïve psychology develops early in infancy when infants use social referencing to coordinate their interactions with another person by 9 months of age (e.g. Astington, 1993). From 9 months to 14 months of age, infants display knowledge of a range of prerequisite naïve psychology skills such as understanding joint attention and intention (see Tomasello, Carpenter, & Liszkowski, 2007, for a review). Yet few published non-Western studies have focused on development during infancy. Moreover, the emergence of second-order false-beliefs has been much less studied than the emergence of first-order false-belief in cross-cultural studies. Future research should therefore employ second-order false-belief tasks (inferences about a belief about a belief, e.g. Perner & Wimmer, 1985) or more demanding higher-order task for school-aged children (e.g. fourth-level, Liddle & Nettle, 2006). As noted elsewhere in this thesis, measures of naïve psychology should move away from assessing false-belief understanding alone to use other higher-level tasks (e.g. "Eyes Task" by Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; story that depicts motivations in everyday conversations that are false by Happé, 1994). To advance this area further, future longitudinal cross-cultural research needs to place greater emphasis on the socio-cultural influences on children's gradual acquisition of rudimentary and complex naïve psychology concepts from infancy to formal schooling years.

## 10.8    Conclusion

Despite these limitations, this thesis provides a fresh cross-cultural perspective on how we view the development of naïve psychology and pretend play behaviour at 2½, 3 and

3½ years of age by comparing children in the UK and Singapore. Children's naïve psychology and pretend play behaviour feature both cross-cultural similarities and culturally-specific developmental patterns. Despite the contrasting cultural backgrounds of the UK and Singapore cohorts, the similarities in the age of emergence of various naïve psychology concepts and some aspects of pretend play provide evidence for a cross-culturally universal development. There are, nonetheless, important cultural differences in some naïve psychology concepts and pretend play behaviour. Cultural values and practices, as well as parental beliefs and knowledge of children's development might be important sources of variability in the timing of onset of naïve psychology concepts and pretend play behaviour. This is an important issue for future cross-cultural research. The fundamental roles of language and social interactions in the context of peer pretend play in shaping some aspects of naïve psychology development must be recognised. Moreover, special attention should be given to the influence of cultural factors on these individual characteristics and social variables.

In conclusion, it has been argued in this thesis that research should move away from simply documenting age-related changes to studying how developmental patterns vary with different cultural and social experiences. It is essential that the dominant theories of naïve psychology development should consider the socio-cultural factors in shaping a mixed pattern of similarities and differences in children's developing understanding of naïve psychology concepts. Furthering our understanding of how children gradually acquire their naïve psychology concepts and why they need these concepts in their daily lives will help generate knowledge that can be used by policy makers, parents, non-parental caregivers and education practitioners to promote the development of naïve psychology. Furthermore, this thesis highlights the need to raise more awareness regarding the importance of pretend play in supporting children's learning and development. It is hoped that this thesis has gone some way towards enhancing our understanding of how different cultural and social experiences may have contributed to the similarities and differences in children's naïve psychology and pretend play behaviour development between a Western and a hybrid culture.

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# APPENDIX A

# DOCUMENTS OF THE RECRUITMENT PHASE

A1      Invitation Letters to Nurseries and Childcare Centres

A2      Invitation Letters to Parents

A3      Informed Consent Form

January 2008

Dear

**Re:   Invitation to Participate in the Pretend Play Study**

My name is Ai Keow Lim and I am currently enrolled in a PhD degree program at the Moray House School of Education in the University of Edinburgh. I am carrying out a longitudinal cross-cultural research project under the supervision of Dr Joanne Williams, Dr Katie Cebula, and Dr Dagmara Annaz. My research topic is concerned with whether children from different cultures show any differences in the age of onset of pretend play behaviour and understanding of mental-states such as thoughts and feelings. One of the aims is to explore cultural variations in the association between young children's pretend play and their understanding of mental-states.  I hope that the project would be of value to your nursery in highlighting the ways in which your nursery encourages children's social and cognitive development through pretend play.

The data collection for this research will consist of three inter-linked studies over a 21-months period, starting from April 2008 and ending in December 2009. Forty-five children each from Edinburgh, United Kingdom and Singapore will be invited to participate in this research. Both groups of children will include participants from a diverse range of ethnic backgrounds (e.g. White and Asian Chinese, Malay and Indian). The children will be followed from 2 to 4 years of age. The fieldwork in Edinburgh is scheduled to start from April 2008.

The plan includes administering several cognitive tasks using a variety of toys, puppets and stories and observation of children playing with a familiar peer at different time intervals. Each task session and free play observation would take approximately 15 minutes per child. I am not interested in "right" or "wrong" answers but how children of different ages understand various mental-states.

I would also like to seek your permission to use both audio and video-recordings during this research. The data collected are used for analysis of children's conversations during play. I will handle the data collected in a confidential manner. The recordings will be destroyed when the project is complete.

The information gathered from this research will be kept strictly confidential. All the children's answers will be anonymous. All data obtained in the study will be used for research purposes only and reported as group data with no identifying information. An informed consent form will be sent to the parents seeking their approval for their children to participate in this study. I have obtained the Enhanced Disclosure Certificate from Disclosure Scotland and a Certificate of No Criminal Conviction from the Singapore's Police Force.

I appreciate your time in reading this letter. I sincerely hope that you will participate in this research study. I will be very delighted to engage in further discussions about this research. If you require any further information, please do not hesitate to get in contact with me any time via email: A.K.Lim@sms.ed.ac.uk, office: 0131 651 6360 or mobile: 0797 932 1182.

Once again, thank you for your consideration of this request. I look forward to a positive decision on my request to include *[nursery's name]* in my study and an opportunity to work with *[nursery's name]*.

Yours sincerely,

Ai Keow Lim
PhD student
The Moray House School of Education
The University of Edinburgh
Room 2.22B, St John's Land,
Holyrood Road
Edinburgh EH8 8AQ

**A2.    Invitation Letters to Parents**


February 2008


Dear Parent/Guardian,

**Re:    Invitation to Participate in the Pretend Play Study**

Do you want to know more your child's development in the next two years? Are you interested to know about your child's play activities in the preschool? I am PhD student at the Moray House School of Education in the University of Edinburgh. I will be conducting a longitudinal cross-cultural research project under the supervision of Dr Dagmara Annaz, Dr Joanne Williams, and Dr Katie Cebula. Your child is invited to participate in this study on the role of pretend play in children's social and cognitive development. I am investigating this topic in order to further our understanding of when children develop an understanding of various mental-states and to examine the extent to which children from different cultures show differences in the age of onset of a range of mental-states including thoughts and feelings.

**PURPOSE OF THE STUDY**
Relatively little is known about individual differences in children's early pretend play behaviour and its subsequent role in later understanding of mental-states between different cultures. The aim of the proposed research is to incorporate cultural and social dimensions to examine the similarities and differences in pretending capabilities and understanding of mental-states in young children from Edinburgh, United Kingdom and Singapore, comparing a Western and hybrid Eastern-Western culture. From a social-cultural perspective, the research focuses on young children's learning and development in culturally and socially embedded environments.  By examining the pretend play of 2 to 4-year-old children and by following them longitudinally, I hope to establish a better understanding of the associations between children's early pretend play and later understanding of mental-states.

**PROCEDURES**
The data collection for this research will consist of three inter-linked studies over a 21-month period, starting from April 2008 and ending in December 2009. Forty-five children each from Edinburgh and Singapore will be invited to participate in this research. Both groups of children will include participants from a diverse range of ethnic backgrounds (e.g. White and Asian Chinese, Malay and Indian). The children will be followed from 2 to 4 years of age. The fieldwork in Edinburgh is scheduled to start from April 2008.

The plan includes administering several cognitive tasks using a variety of toys, puppets and stories and observation of children playing with a familiar peer at different time intervals. Each task session and free play observation would take approximately 15 minutes per child. I am not interested in "right" or "wrong" answers but how children of different ages understand various mental-states.

I would also like to seek your permission to use both audio and video-recordings during this research. The data collected are used for analysis of children's conversations during play. I will handle the data collected in a confidential manner. The recordings will be destroyed

when the project is complete. Your child will be informed of any recording that may be done. Your child may request the recordings to be stopped at any time during the study.

**NO POTENTIAL RISKS / DISCOMFORTS**
The activities related to the project will take place during free play period. The gathering of information for this project during these activities offers no risks of any kind to your child. I do not anticipate that any task will be stressful, but if for some reason your child seems unhappy or distressed I will stop the task.

**POTENTIAL BENEFITS**
It is hoped that your child's participation will provide useful data that inform developmental theory and practices. Cross-cultural studies can offer valuable information that can improve our knowledge and appreciation of cultural influences in children's development. The report will be used to share what I have learned as a result of this project with other professionals in the field of education.

**CONFIDENTIALITY**
All the children's answers will be anonymous and the information gathered will be kept strictly confidential. All data obtained in the study will be used for research purposes only and reported as group data with no identifying information. Participant will not be identified by name in any report of the completed study. All data will be kept in a secure location and only those directly involved with the research, which includes my supervisors and myself, will have access to them. After the research is completed, the data will be destroyed. I have obtained the Enhanced Disclosure Certificate from Disclosure Scotland and a Certificate of No Criminal Conviction from the Singapore's Police Force.

**PARTICIPATION AND WITHDRAWAL**
Your child's participation in this research study is entirely voluntary. In addition to your permission, your child will also be asked in each session if he or she would like to take part in the games. Your child may choose to withdraw from the study at any time without negative consequences. If at any point during the game sessions and free play observations, your child does not want to continue or feel uncomfortable, I will end the sessions immediately. Your child may skip any questions he/she does not wish to answer.

**QUESTIONS AND CONCERNS**
I sincerely hope very much that your son/daughter will be able to participate in this research. Please complete the attached reply slip to indicate your decision and return it to your child's teacher. If you have any questions or concerns regarding this study or would like further information about my project, please feel free to contact me via email: A.K.Lim@sms.ed.ac.uk, office: 0131 651 6360 or mobile: 0797 932 1182.

Your help is very greatly appreciated.

Yours sincerely,


Ai Keow Lim
PhD student
The Moray House School of Education
The University of Edinburgh
Room 2.22B, St John's Land,
Holyrood Road
Edinburgh EH8 8AQ

**A3.    Informed Consent Form**

**PARENT/GUARDIAN INFORMED CONSENT FORM**

**REPLY SLIP**

**Consent to Participate in the Pretend Play Study**

I, _____, the parent/legal guardian of the minor named below, understand the purpose of this research and acknowledge that the researcher has offered to answer any questions I may have about the nature of my child's participation. I freely and voluntarily consent to my child's participation in this project. I understand that all information gathered during this project will be kept completely confidential, reported only as group data, and that every possible effort will be made to preserve the anonymity regarding these data. I also understand that I may keep a copy of this consent form for my own information.

☐      You have my permission to use both audio and video-recordings.

Child's Name: _____

Parent's/Guardian's Signature: _____ Date: _____

# APPENDIX B

# MATERIALS DISTRIBUTED DURING DATA COLLECTION PHASE

B1      Parental Questionnaire (Basic Information Form)

B2      Thank You Letters for Nurseries/Childcare Centres

         Phase I

         Phase II

         Phase III

B3      Feedback Information Sheets

         Phase I

         Phase II

         Phase III

**B1.    Parental Questionnaire**

# BASIC INFORMATION FORM[42]

Child's Name _____    Gender:  M/F
               GIVEN NAME              SURNAME

Child's Date of Birth _____

Child's Birth Order:        1st            2nd            Other _____ (specify)

Please tell me about all other children in your family:

| Date of Birth | Gender | Date of Birth | Gender |
|---|---|---|---|
| _____ | M/F | _____ | M/F |
| _____ | M/F | _____ | M/F |
| _____ | M/F | _____ | M/F |

**Mother/Guardian/Partner**                    **Father/Guardian/Partner**
Name of Mother/Guardian/Partner:               Name of Father/Guardian/Partner:

_____              _____
GIVEN NAME          SURNAME                    GIVEN NAME          SURNAME

Please indicate your current marital status:   Please indicate your current marital status:

   Single                                         Single

   Married and living with spouse                 Married and living with spouse

   Living with partner                            Living with partner

   Separated                                      Separated

   Divorced                                       Divorced

   Widowed                                        Widowed

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[42]    Some sections of this Basic Information Form were adapted from MacArthur-Bates Communicative Development Inventories: User's Guide and Technical Manual (Fenson et al., 2007).

## EXPOSURE TO OTHER LANGUAGES

Is your child regularly exposed to a language other than English?      **YES**

**NO**

**If YES:** What language? _____      By whom? _____

Approx. no. of days per week? _____      Approx. no. of hours per day? _____

Since what age (in months)? _____


## HEALTH INFORMATION

Did you experience any major pregnancy or birth complications?      **YES**

**NO**

      **If YES:** Please describe: _____

Was your child born prematurely (i.e., before the due date)?      **YES**

**NO**

      **If YES**: How many weeks early? _____

Does your child experience chronic ear infections (5 or more)?      **YES**

**NO**

      If so, has your child undergone any intervention (e.g., tubes)?      **YES**

**NO**

      **If YES:** Please describe: _____

Is there some reason to suspect that your child may have a hearing loss?      **YES**

**NO**

Has your child had any major illnesses, hospitalizations, or diagnosed disabilities?

**YES**

**NO**

      **If YES:** Please describe: _____

      _____

## CAREGIVER INFORMATION

Who participates in the day-to-day care of your child?
(Tick all that apply.)

Mother/Guardian

Father/Guardian

Nursery/Childcare Centre (_____ hours/week)

Non-Parent Caregiver

    ☒ Grandparents (_____ hours/week)

    ☒ Nanny (_____ hours/week)

    ☒ Maid (_____ hours/week)

In which language(s) do they communicate with your child? _____

Others (please explain) _____ (_____ hours/week)

## EDUCATION

Please specify the highest level of qualification.

| Mother/Guardian/Partner | Father/Guardian/Partner |
|---|---|
| None | None |
| O'levels/GCSE or equivalent | O'levels/GCSE or equivalent |
| A Levels/Highers or equivalent | A Levels/Highers or equivalent |
| College qualification or equivalent | College qualification or equivalent |
| University degree | University degree |
| Postgraduate qualification | Postgraduate qualification |
| Other (please specify) _____ | Other (please specify) _____ |

## ETHNIC BACKGROUND

Please tick the box which you feel best describes your ethnic background.

| **Mother/Guardian/Partner** | **Father/Guardian/Partner** |
|---|---|
| Asian | Asian |
| Asian British | Asian British |
| Asian Chinese | Asian Chinese |
| Asian Indian | Asian Indian |
| Asian Malay | Asian Malay |
| Black or Black British | Black or Black British |
| White | White |
| Mixed | Mixed |
| Other ethnic background | Other ethnic background |
| Please specify _____ | Please specify _____ |

## OCCUPATION

Please provide a brief description of your occupation.

| **Mother/Guardian/Partner** | **Father/Guardian/Partner** |
|---|---|
| Full-time<br>Please indicate job title:<br>_____ | Full-time<br>Please indicate job title:<br>_____ |
| Part-time<br>Please indicate job title:<br>_____ | Part-time<br>Please indicate job title:<br>_____ |
| Student | Student |
| Retired | Retired |
| Not currently employed | Not currently employed |

June 2008

Dear *[name of manager/principal]*

**Re: The Pretend Play Study**

I would like to take this opportunity to thank you for allowing me to carry out research at your nursery. Without your interest and support, this study into the role of pretend play in supporting children's social and cognitive development simply could not have taken place. Working with children in the naturalistic environment of the nursery can provide rich information about the development of their pretend play. I would like to thank you for contributing to the research in this way.

Please pass on my thanks to all of the nursery nurses who have been so kind and supportive during the first phase of the study. They have welcomed me into the nursery and have generously adjusted their daily schedules and plans to accommodate me. I would also like to thank you for sending out the invitation letters to the parents and encouraging them to allow their children to participate in this research.

I hope that the children enjoyed participating in the study and that they found the games interesting and fun. It has, and continues to be, a pleasure to work with them. Phase I of the study is now complete and the second phase will commence in November 2008. I look forward to working with you, the staff and the children again. I will keep you informed about the results of this phase of the study.

Yours sincerely,

Ai Keow Lim
PhD student

January 2009

Dear *[name of manager/principal]*

**Re: The Pretend Play Study**

I would like to thank you once again for participating in The Pretend Play Study. Phase II of the study is now complete. Once gain, I could not have done it without your generous support.

Please relay my sincere appreciation to all of the teachers for their thoughtful assistance. They have unreservedly adjusted their daily schedules to accommodate me. I hope that the children enjoyed participating in the games. It is a pleasure to work with them. The third phase of the study will commence in June 2009. I look forward to working with you, the staff and the children again. I will send you the results of the second phase of the study.

Yours sincerely,

Ai Keow Lim
PhD student

August 2009

Dear *[name of manager/principal]*

**Re: The Pretend Play Study**

I want to extend my sincere appreciation to you for supporting The Pretend Play Study. The final phase of the study is now complete. I could not have done it without your continued support. Your belief in the ultimate value of this research has been critical to the successful completion of the three phases of data collection.

Please convey to all the teachers my special thanks and appreciation for their kind cooperation. They have again generously adjusted their daily schedules and plans. It has been a pleasure to see the enthusiastic response from the children in participating in the games.

I will inform you about the results of this phase of the study. Once again, my heartfelt thanks for your participation and cooperation.


Yours sincerely,



Ai Keow Lim
PhD student

# The Pretend Play Study

Dear Parents, Managers, Principals and Teachers,

Thank you for assisting with the pretend play study. This study, based at the University of Edinburgh, focuses on play because it is such an important area of child development. In play, children learn to be creative, to use and explore language, to cooperate with others and much more. Pretend play helps to build strong foundations for the development of both social and cognitive skills.

The aim of this study is to investigate how early pretend behaviour may influence children's developing sense of other people's thoughts and feelings, and the role that is played by different cultures. Children from both Edinburgh and Singapore are participating in this study. So far around 88 preschool children have taken part in the study from 6 nurseries in Edinburgh and 7 childcare centres in Singapore.



Going on a picnic with the Loch Ness Monster



Naughty donkey playing tricks



Honey and blueberries for Pooh Bear and the Hundred Acre Wood Gang

Phase I of this 3-phase study is now complete. During my visits, the children and I played lots of games involving pretend play and cognitive skills (see pictures), which the children seemed to really enjoy. I also observed the children playing together in pairs with a variety of toys – every child found a different game to play with the toys!

Do you see bear or dog?


Let's play pirates


John likes to eat celery

The preliminary results revealed some interesting findings:

(1) As expected, children performance improves on a range of cognitive tasks.

(2) In line with previous studies, the findings showed a relation between pretence and socio-cognitive development. This shows that pretend play is important for children's early developing understanding of mental-states.

In the next two phases of this study, I am going to look at individual changes over time and observe how children's play and socio-cognitive development are influenced by their cultural contexts. The second phase will commence in November 2008 in Edinburgh and January 2009 in Singapore.

It has, and continues to be, a pleasure to work with the children. I look forward to working with all of you again. Should you have any questions or concerns regarding this study, please feel free to contact me at +(44) 0131 651 6360 (office) or A.K.Lim@sms.ed.ac.uk (email). You may also contact my supervisor, Dr Joanne Williams at (44) 0131 651 6339 (office) or Jo.Williams@ed.ac.uk (email).

Yours sincerely,

Ai Keow Lim

# The Pretend Play Study

Dear Parents, Managers, Principals and Teachers,

Many thanks for your continued support in this Pretend Play Study. Phase II of this 3-phase study is now complete. The first phase investigated children's early understanding of various social and cognitive skills, including pretence, desires, emotions and visual perceptions. The second phase, which included 83 children from Edinburgh and Singapore, explored children's more advanced understanding of these skills.

The children were happy to see me and my large collection of toys again. During my visits, the children and I played different games involving pretend play and cognitive skills (see pictures). To track the development of their play behaviour, I also observed the children playing together in pairs, which they seemed to really enjoy, with the same big basket of toys used in the first phase.

Specifically, preliminary analysis of this phase revealed interesting changes in pretend play and children's understanding of others compared to the previous phase. By phase II, many of the children are beginning to:

- become more sophisticated in their understanding of pretence
- understand that other people might want different things from them (e.g., they like to eat lollipops but others like to eat cabbage)
- understand that someone else may see something that they do not
- become more sophisticated in their play and interaction with friends

Afternoon tea with Barney

Ice-cream for Tigger and Eeyore

Bananas and strawberries for Mickey and pals

Interestingly, initial comparisons of free play behaviour between children in Edinburgh and Singapore seem to indicate differences, which is one of the themes that I will explore in phase III. This study provides support for the idea that the development of pretend play is influenced by social and cultural context.

| Do you see an elephant or a cat? | Where is Sally's marble? | Megan likes to eat spinach |

Phase III of this study is tentatively scheduled to begin in June 2009 in Edinburgh and September 2009 in Singapore. With the results from the 3 phases, I will be able to explore the development of various socio-cognitive skills in children's pretend play and understanding of others.

It has, and continues to be, a pleasure to work with the children. I look forward to working with all of you again. Should you have any questions or concerns regarding this study, please feel free to contact me at +(44) 0131 651 6360 (office) or A.K.Lim@sms.ed.ac.uk (email). You may also contact my supervisor, Dr Joanne Williams at +(44) 0131 651 6339 (office) or Jo.Williams@ed.ac.uk (email).

Yours sincerely,

Ai Keow Lim

# The Pretend Play Study

Dear Parents, Managers, Principals and Teachers,

Many thanks for your continued support in this Pretend Play Study. The final round of this 3-phase study is now complete. The first phase investigated children's early understanding of various socio-cognitive skills, including pretence, desires, emotions and perceptions. The second phase explored children's more advanced understanding of these skills. The final phase, which comprised of 74 children from Edinburgh and Singapore, examined the developmental changes of these socio-cognitive skills throughout the preschool years.

Once again, the children were happy to see me, my large collection of toys and the cartoon stickers. During my visits, the children and I played different games involving pretend play and cognitive skills (see pictures). To track the development of their play behaviour and social skills, I also observed the children playing together in pairs, which they seemed to really enjoy, with the same big basket of toys used in the previous phases.


Ice-cream for Mickey and Donald


Let's imagine there's pencil in the a box


A party with Dino

Specifically, preliminary analysis of this phase revealed more remarkable changes in pretend play and children's understanding of others. By phase III, many of the children are beginning to:
- acquire a more sophisticated understanding of the differences between pretence and reality
- understand that sometimes things look like one thing when they are really something else (e.g., a mirror that looks like a bar of chocolate)
- understand that someone else may represent a single object in two different ways
- engage in more sophisticated pretend play with friends

Comparisons of free play behaviour between children in Edinburgh and Singapore indicated cross-cultural variations in pretend themes. Gender differences were also observed in object play and pretend play themes. This study highlights the importance of cultural and social influences in children's pretend play. With the results from the 3 phases, I will explore the roles of children's early pretend play and understanding of pretence in their latter cognitive skills.


Oh, pencils!


Is that really a rabbit or a bag?


Where is Sara's teddy?

I would like to express my sincere thanks to the children, parents, nurseries and childcare centres for participating in this study. Should you have any questions or concerns regarding this study, please feel free to contact me at +(44) 0131 651 6360 (office), 0786 799 0507 (mobile) or A.K.Lim@sms.ed.ac.uk (email). You may also contact my supervisor, Dr Joanne Williams at +(44) 0131 651 6339 (office) or Jo.Williams@ed.ac.uk (email).


Yours sincerely,

Ai Keow Lim

# APPENDIX C

## MATERIALS EMPLOYED IN NAÏVE PSYCHOLOGY TASKS

C1     Photographs of Inhibitory Control Tasks

     (a)     Baby Stroop task

     (b)     Cartoon Stroop game

C2     Photographs and Drawings of Naïve Psychology Tasks

     (a)     Action prediction

     (b)     Emotion prediction

     (c)     Representational change

     (d) & (e)     Object substitution and Attribution of pretend properties

     (f)     Pretend transformation

     (g)     Discrepant desires

     (h)     Level-1 visual perspective-taking

     (i)     Level-2 visual perspective-taking

     (j)     Appearance-reality distinction

     (k)     Mental representation in pretence[43]

     (l)     Pretend-reality distinction

     (m)     Unexpected transfer false-belief prediction ('Sally-Anne' task)

     (n)     Unexpected transfer false-belief explanation

     (o)     Imaginary-reality distinction

     (p)     Unexpected content false-belief prediction ('Plasters' task)

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[43]  The coloured line drawings are enclosed at the end of this section.
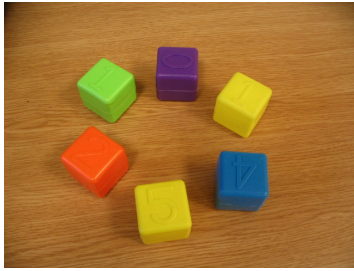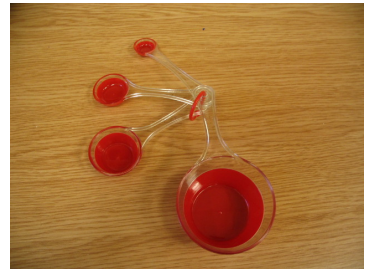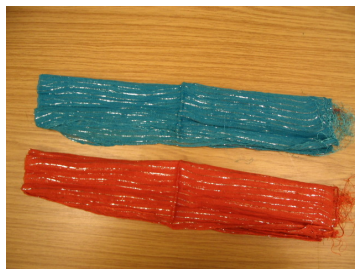
# APPENDIX D

# MATERIALS EMPLOYED IN FREE PLAY OBSERVATIONS

# AND CODING SCHEME OF PRETEND PLAY BEHAVIOUR

D1      Photographs of Toys, Props and Materials: Frankie the Turtle's Treasure

          Basket

D2      Pretend Play Behaviour Observation Coding Scheme

**D1.    Photographs of Toys, Props and Materials: Frankie the Turtle's**

**Treasure Basket**

**D2.    Pretend Play Behaviour Observation Coding Scheme**

Child's code:                _____

Age:                         _____

Gender:          Boy    /     Girl

Gender of playmate:   Boy    /     Girl

*General Coding Plan*

The specific category of play behaviour in each episode is defined as starting when the target child's exhibits the particular behaviour and ends when the child moves to a different category of behaviour. In some episodes, there was a need to look beyond the 5-minute observation period to code the type of pretend role-play and themes. Categories 1, 2, 3 and 4 were coded for duration of occurrence and category 5 was coded for frequency only.

1.    **Peer Play Scale** *(modified from Fein, 1981; Howes, 1980; 1985; Howes et al., 1989; Howes & Matheson, 1992)*

**1.1    Uninvolved in Play**

**1.2    Non-pretend Solitary Play**

Target child plays alone while peer is uninvolved in play or engages in solitary pretend play without an element of pretence. It includes conventional play with toys alone, exploration or description of toys use.

**1.3    Non-pretend Parallel Play**

Target child and partner engage in the same or similar activity in a non-pretend manner but do not make eye contact or engage in social interaction.

**1.4    Non-pretend Simple Social Play**

Target child and partner engage in the same or similar activity without an element of pretence and direct social bids to each other, e.g. smile, offer or receive an object.

**1.5    Non-pretend Cooperative Play**

Target child and partner engage in social play with a verbal turn-taking structure without an element of pretence, e.g. target child chases partner and then is being chased.

**1.6    Solitary Pretend Play**

Target child engages in non-literal 'as-if' manner alone while peer is uninvolved in play or engaged in solitary play. The child needs not be speaking or using props but it must be clear from his/her actions that his/her play is pretence. The child may display various types of nonverbal gestures (e.g. throwing one's head back while pretending to drink), facial expressions (e.g. expressing fear or anger, smiling and laughter), symbolic action (e.g. pretending to eat a block) and content cues (e.g. absence of food on the spoon) to signal the non-literal meaning of an activity.

**1.7    Parallel  Pretend Play**

Target child and partner engage in same or similar pretend actions but do not make eye contact or engage in social interaction.

**1.8    Simple Social Pretend Play**

Target child and partner engage in same or similar social pretend activities with a turn-taking structure such as talk, smile and offer and receive toys (e.g. Child A smiles at Child B and Child B offers toy to Child A. Both children push different toy cars along the floor). Both players do not assume complementary pretend roles and their actions show no within-pair integration.

**1.9    Cooperative Social Pretend Play**

Target child and peer enact complementary and reciprocal roles which are compatible with a pretend theme. The two key markers of complementary and reciprocal play are mutual social awareness and coordination of action (Howes, 1980). The pretend behaviour of one partner must conform to the expectations and demands of another so that the activity of one partner is tied to the activity of another. Each partner's actions reverse the actions of another (e.g. Child A feeds Child B with spoon. Child B opens mouth to eat the 'pretend' food. Child A makes pretend sound as if coaxing Child B to eat the food). The roles may be reciprocal in that they reflect complementary social relationships (e.g. mother-baby, sister-brother or doctor-patient) and integrated role structures (e.g. Child A says 'I'm driving the bus' and Child B says 'I'm driving the bus too.' Child A says 'Beep, beep, brrrmmm' and Child B imitates 'Beep, beep, brrrmmm'). It includes attributing pretend properties to toys and props and enacting a role using the toys. The roles are established through appropriate mutual exchange between the players. Role does not have to be named

explicitly but must be clear from the pretend action or in compliance with proposals made by peers.

**1.10    Complex Social Pretend Play**

Target child and peer demonstrate both social pretend play and metacommunication which include naming the roles (e.g. 'I'm a bus driver'), assigning roles, leaving a role to modify the play script, proposing a play script or prompting the other child.

**1.11    Out-of-camera Shot**

**2.    Types of Social Bids** *(modified from Howes, 1985)*

**2.1    Neutral**

No observable change in behaviour.

**2.2    Recruitment**

Target child performs an action in an attempt to engage peer in play, can be either verbal (e.g. child asks peer to get ready to go on a holiday) or non-verbal (e.g. object offer).

**2.3    Positive Imitative**

Target child performs the same action as peer.

**2.4    Positive Complementary**

Target child performs a different action from peer but one that is thematically related to the specifics of the peer's action allowing peer to continue his/her activity, thus expanding the activity to include both children.

**2.5    Negative Conflict**

Negative behaviours such as refuse to be involved in play, ignore the initiation, walk away and display instrumental aggression such as toy taking. Conflicting situations lead to negotiations within the play frame, e.g. two children get into squabble/fight and then seek resolution.

**3.** **Pretend Play Themes** *(modified from Dunn & Dale, 1984; Gosso et al., 2007; Youngblade & Dunn 1995)*

In the event that more than one type of themes is engaged, only the dominant theme is coded. The objective, goal or destination and duration of children's pretend activities are taken into consideration when deciding the appropriate theme for each pretend episode. Themes are also identified based on the main defining characteristics of the pretend activities. In scenario when the child is driving a transport (main activity) and singing (complementary activity), the main activity took precedence. Complementary activities are usually more brief in duration than the main activity. For episodes where there are considerate overlap between themes (e.g. taking a bus to school), the data are coded and summarised into mini-episodes and minutes per theme. Therefore, there may be more than one theme per pretend episode.

**3.1** **No Pretend Play Theme**

**3.2** **Family-related Activities**

(a) Playing house.

(b) Caretakers or homemakers (e.g. feeding, dressing, bathing, cleaning, taking to school, includes disciplinary actions such as reprehending, sending to bed, ordering silence (Gosso et al., 2007)).

(c) Going to shops or supermarkets are classified under family-related activities because these trips are normally not considered frequent and daily activities for a child.

(d) Doll play (e.g. baby dolls, teddy bears).

(e) Fixing things, mowing lawn, working on car, tools, fishing, hunting.

**3.3** **Daily Activities**

(a) Behaviour pertaining to a child's daily routine (e.g. sleeping, eating, dressing, going to the bathroom, making telephone calls, studying, going to school, leaving home).

**3.4** **Adult Occupations**

(a) Nurse, doctor, hospital, teacher, waitress, salesperson, fireman, policeman, community worker, musician, postal clerk, archaeologist, artist, beauty parlour, bus driver.

(b) Pretend acts involving "going to work" is classified as adult occupations because the child is engaged in an adult's role.

**3.5    Violence/Aggression**

(a)    Army, killing, cops-and-robbers, blood and guts, soldiers, guns, shooting, killing enemy invaders, shooting, bows and arrows, pretend fighting, crashing, dangerous situations.

**3.6    Animals**

(a)    Being animals (e.g. barking like a dog, neighing and galloping like a horse).

**3.7    Transportation**

(a)    Driving a car, boat or plane. To differentiate from sophisticated functional play, the behaviour must be accompanied by appropriate pretend voices/sound.

(b)    If the target child drives a toy car and crashes it with peer's toy car, the episode begins as 'transportation' theme and moved into 'violence' theme.

(c)    If a non-literal object (e.g. stacking ring) is used as a steering wheel, the episode is classified as a 'transportation' theme. If the stacking rings are used to build a tower, it is coded as 'construction play with pretend themes' because the main activity is to create something using the objects.

**3.8    Fantasy/Adventure**

(a)    Monsters, ghosts, alien, Superman, Batman, Spiderman, Wonderwoman, The Hulk, Teenage Mutant Ninja Turtles, king/queen, prince/princess, Disney characters like Mickey Mouse, Winnie the Pooh, Snow White, wicked witch.

(b)    Cowboys, help/rescue, spaceman, action figures, adventures in nature (snow storm, hurricane, etc.), mountaineering.

**3.9    Music**

(a)    Marching band, parade, cheerleader, pretending to be in a band, playing with musical instruments.

**3.10    Construction Play with Pretend Themes**

(a)    Target child pretends through verbal or non-verbal cues that objects become non-literal, e.g. child stacks blocks together and says, "I'm building a tower".

**3.11     Outings, Holidays and Weather**

(a)      Restaurant, café, hotel, beach, seaside, swimming, going on a trip, holidays, special rituals, birthday parties and weddings.

(c)      Events that are not normally performed on a daily basis.

(d)      If the child is on a plane going on a holiday, the episode begins with a 'transportation' theme while he/she is on the 'plane' and continues with a 'outings, holidays and weather' theme when he/she reaches the 'destination'.

(e)      If the child wears the stacking rings on his/her arms and says, "I'm going swimming", the episode is coded as 'outings, holidays and weather' theme.

(f)      Discussion about the weather (e.g. cold, warm or hot, four seasons, rainy, windy, sunny).

**4.       Types of Pretend Role-play** *(modified from Halliday-Scher et al., 1995; Hughes & Dunn 1997; Youngblade & Dunn, 1995)*

**4.1     No Pretend Role-play Type**

**4.2     Other Form of Pretence**

All instances of pretend play in which the target child does not act out a specific role (e.g. "Pretend it's raining").

**4.3     Role-enactment**

Role-enactment involves mental representation of category of action. Target child needs not verbally define the role, merely to act it out, e.g. speaking in a character's voice or exhibiting behaviour characteristic of a certain role such as making scary monster noises, flying like a superhero and pretending to be a daddy going to work (Youngblade & Dunn, 1995). It covers episodes when the child creates the roles but projects it onto a doll or toy that serves as a prop for the role without verbal assignment of role.

**4.4     Role-play**

Target child assumes the role of a person or non-person. Target child has to verbally define the particular role he/she is enacting. Child's behaviour designates the behaviour of another person or character (Miller & Garvey, 1984). It includes episodes when the child invents a creature, person or an animal without the support of any props (Harris, 2000). The

category applies as long as the child is engaged in the role and even when the role is assigned after the child has enacted the role.

## 4.5 Metacommunication

Target child temporarily steps out of pretence to discuss the development of pretend episode (coding stops at this level). Preliminary observations of play episodes in the present study revealed that children engaged in metacommunication during cooperative pretend play. The procedures employed to identify children's use of verbal messages to establish a pretend script in the present study were guided by the within-frame and out-of-frame metacommunication classification scheme developed by Halliday-Scher et al. (1995):

### 4.5.1 Within-frame metacommunication

- Statements that intimate or suggest an appropriate response are classified as *ulterior conversation* (e.g. "Shouldn't you eat your medicine now?").
- Statements that describe actions, characters, objects or setting are classified as *underscoring* (e.g. "This is our boat").
- Verbal commands or directions are classified as *prompting* (e.g. "Get back in the house").

### 4.5.2 Out-of-frame metacommunication

- Statements that establish rules or assign roles are classified as *implicit pretend structuring* (e.g. "You a baby, so you supposed to say ga-ga-goo-goo" or "I'm the mother, you be the daddy").
- Statements that explicitly reveal the pretend nature of the play are classified as *formal proposals* (e.g. "I'm not crying for real. I was just playing" or "Pretend that Santa is coming").

## 5. Modes of Transformation *(modified from Gosso et al., 2007[44])*

Matthew (1977) distinguished six categories of transformation modes: (1) substitution; (2) attribution of function; (3) animation; (4) insubstantial material attribution, (5) insubstantial situation attribution; and (6) character attribution. Gosso et al. (2007)

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[44] Definition of the transformation modes was adapted from Gosso et al. (2007) but examples were cited from children's pretend play behaviour and conversations during the free play observations in the present study.

proposed an alternative classification scheme based on differences in complexity: property and identity modification and creation.

## 5.1    No Transformation

## 5.2    Symbolic Modification: Modifications of the Meaning of Objects or Persons

### 5.2.1    Property

Characteristics not really possessed are attributed to objects (e.g. a toy saw is treated as a knife) or to living beings (e.g. child pretends to fly). *(Animation and attribution of function to an object).*

### 5.2.2    Identity

Target child attributes to a peer or themselves assumes a different identity from the real one or transforms an object into another one in such a way that the main characteristics of the new identity are incorporated, e.g. a teddy bear is treated as a baby; the basket is treated as a washing machine; the child behaves as a dog or as a teacher; the child says 'I'm a Superman'. *(Substitution of objects and assigning roles/character attribution).*

### 5.2.3    Condition

Target child attributes to a peer or assumes a particular state that he/she does not possess at the moment, like pretending to be dead, sick, or angry. This category includes conditions that do not exist in the environment in the present situation, such as pretending that it is windy, snowy or cold. *(Insubstantial situation attribution).*

## 5.3    Creation: Creation of an Element Without Real Existence

Target child behaves as if there are some elements without any material support present in the environment, e.g. pretending to be a spaceship, to be in a car and fasten a seat belt, swimming, taking a shower. *(Invention of imaginary objects).*

# APPENDIX E

# FURTHER STATISTICAL ANALYSIS

## LIST OF TABLES

## LIST OF FIGURES

**Appendix E1 (for Chapter 6)**

Table E1.1. Mean[a] (Standard Deviation) Scores after Excluding Children Who Failed the Memory and Control Questions

| Naïve psychology | Phase I | | Phase II | | Phase III | |
|---|---|---|---|---|---|---|
| measure | UK | Singapore | UK | Singapore | UK | Singapore |
| Discrepant desires | 1.24 (.83) | 1.62 (.70) | 1.58 (.79) | 1.59 (.69) | 1.89 (.40) | 1.87 (.48) |
| | [1.19 (.86)] | [1.58 (.72)] | [1.47 (.85)] | [1.58 (.68)] | [1.86 (.42)] | [1.87 (.48)] |
| False-belief prediction | - | - | .46 (.85) | .23 (.65) | 1.37 (.94) | .59 (.93) |
| | | | [.44 (.84)] | [.22 (.63)] | [1.33 (.96)] | [.58 (.92)] |
| False-belief explanation | - | - | .17 (.57) | .16 (.55) | .56 (.91) | .47 (.86) |
| | | | [.17 (.56)] | [.16 (.55)] | [.56 (.91)] | [.47 (.86)] |

*Note.* Task scores when all children were included are presented in parenthese [ ]. [a] Range of scores: 1 to 2.

# Appendix E2 (for Chapter 7)

Table E2.1. Children's Performance on Prediction and Justification Questions for the False-belief Prediction Task across Phases II and III for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| | | Phase II False-belief Transfer Justification | | | |
| --- | --- | --- | --- | --- | --- |
| | | UK | | Singapore | |
| | | Failed | Passed | Failed | Passed |
| Phase II False-belief Transfer Prediction | Failed | 27 (75.0%) | 1 (2.8%) | 34 (89.5%) | 0 |
| | Passed | 6 (16.7%) | 2 (5.6%) | 4 (10.5%) | 0 |

| | | Phase III False-belief Transfer Justification | | | |
| --- | --- | --- | --- | --- | --- |
| | | UK | | Singapore | |
| | | Failed | Passed | Failed | Passed |
| Phase III False-belief Transfer Prediction | Failed | 12 (33.3%) | 0 | 27 (71.1%) | 0 |
| | Passed | 18 (50.0%) | 6 (16.7%) | 6 (15.8%) | 5 (13.2%) |

*Note.* Number of children (Percentages are shown in parentheses).

Table E2.2. Children's Justifications and Explanations for the False-belief Prediction and False-belief Explanation Tasks for the UK (*N* = 36) and Singapore (*N* = 38) Cohorts

| | UK | | | Singapore | | |
|---|---|---|---|---|---|---|
| Category | Prediction Task | Explanation Task | Total | Prediction Task | Explanation Task | Total |
| **Phase II** | | | | | | |
| Epistemic | 1 (2.8%) | 2 (5.6%) | **3 (4.2%)** | 0 | 1 (2.6%) | **1 (1.3%)** |
| Earlier location | 2 (5.6%) | 1 (2.8%) | **3 (4.2%)** | 0 | 2 (5.3%) | **2 (2.6%)** |
| Irrelevant/No explanation | 5 (13.9%) | 3 (8.3%) | **8 (11.1%)** | 14 (36.8%) | 12 (31.6%) | **26 (34.2%)** |
| Current location/Actual state of affairs | 19 (52.8%) | 17 (47.3%) | **36 (50.0%)** | 14 (36.9%) | 18 (47.4%) | **32 (42.1%)** |
| Desires/Goal | 6 (16.7%) | 7 (19.4%) | **13 (18.1%)** | 2 (5.3%) | 2 (5.3%) | **4 (5.3%)** |
| Behaviour of second character | 3 (8.3%) | 6 (16.7%) | **9 (12.5%)** | 8 (21.1%) | 3 (7.9%) | **11 (14.5%)** |
| **Phase III** | | | | | | |
| Epistemic | 0 | 7 (19.4%) | **7 (9.7%)** | 0 | 7 (18.4%) | **7 (9.2%)** |
| Earlier location | 6 (16.7%) | 6 (16.7%) | **12 (16.7%)** | 5 (13.2%) | 2 (5.3%) | **8 (10.5%)** |
| Irrelevant/No explanation | 5 (13.9%) | 2 (5.6%) | **7 (9.7%)** | 8 (21.1%) | 5 (13.1%) | **13 (17.1%)** |
| Current location/Actual state of affairs | 10 (27.8%) | 15 (41.7%) | **25 (34.7%)** | 6 (15.8%) | 13 (34.3%) | **18 (23.7%)** |
| Desires/Goal | 6 (16.7%) | 4 (11.1%) | **10 (13.9%)** | 4 (10.5%) | 5 (13.2%) | **9 (11.8%)** |
| Behaviour of second character | 9 (25.0%) | 2 (5.6%) | **11 (15.3%)** | 15 (39.5%) | 6 (15.8%) | **21 (27.6%)** |

*Note.* Number of children (Percentages are shown in parentheses).

Table E2.3. ANCOVA[a] Results of the Performance Sequences of Phase III Knowledge-ignorance and Belief Measures[b] for the UK ($N = 36$) and Singapore ($N = 38$) Cohorts

| | Performance sequence between measures | Main effect of culture | Main effect of question | Culture by question interaction |
|---|---|---|---|---|
| (a) | False-belief prediction and false-belief explanation | $F(1, 70) = 12.74$, $p = .001$, $\eta_p^2 = .15$ | $F(1, 70) = 1.61$, n.s. | $F(1, 70) = 5.16$, $p < .05$, $\eta_p^2 = .07$ |
| (b) | False-belief justification and false-belief explanation | $F(1, 70) = 1.22$, n.s. | $F(1, 70) = .15$, n.s. | $F(1, 70) = .76$, n.s. |
| | False-belief prediction task | | | |
| (c) | True-belief ascription and knowledge-ignorance attribution | $F(1, 70) = 26.65$, $p < .001$, $\eta_p^2 = .28$ | $F(1, 70) = .08$, n.s. | $F(1, 70) = 2.00$, n.s. |
| (d) | False-belief prediction and true-belief ascription | $F(1, 70) = 36.61$, $p < .001$, $\eta_p^2 = .34$ | $F(1, 70) = 6.79$, n.s. | $F(1, 70) = .24$, n.s. |
| (e) | False-belief prediction and knowledge-ignorance attribution | $F(1, 70) = 21.21$, $p < .001$, $\eta_p^2 = .23$ | $F(1, 70) = 8.92$, n.s. | $F(1, 70) = .88$, n.s. |
| (f) | False-belief justification and true-belief ascription | $F(1, 70) = 13.05$, $p = .001$, $\eta_p^2 = .16$ | $F(1, 70) = 1.07$, n.s. | $F(1, 70) = 18.43$, $p < .001$, $\eta_p^2 = .21$ |
| (g) | False-belief justification and knowledge-ignorance attribution | $F(1, 70) = 5.72$, $p < .05$, $\eta_p^2 = .08$ | $F(1, 70) = 1.61$, n.s. | $F(1, 70) = 6.34$, $p < .05$, $\eta_p^2 = .08$ |
| | False-belief explanation task | | | |
| (h) | True-belief ascription and knowledge-ignorance attribution | $F(1, 70) = 17.51$, $p < .001$, $\eta_p^2 = .20$ | $F(1, 70) = .01$, n.s. | $F(1, 70) = .06$, n.s. |
| (i) | False-belief explanation and true-belief ascription | $F(1, 70) = 9.35$, $p < .01$, $\eta_p^2 = .12$ | $F(1, 70) = .28$, n.s. | $F(1, 70) = 1.36$, $p < .05$, $\eta_p^2 = .05$ |
| (j) | False-belief explanation and knowledge-ignorance attribution | $F(1, 70) = 10.08$, $p < .01$, $\eta_p^2 = .12$ | $F(1, 70) = .42$, n.s. | $F(1, 70) = 3.87$, $p = .05$, $\eta_p^2 = .05$ |

*Note.* [a] Separate two-way 2(culture) x 2(question) mixed-model repeated-measures ANCOVAs, with VMA and gender as covariates, were computed for each phase. [b] Phase II results revealed no significant main effects of culture and question or culture by question interaction and are not presented in this table.

# Appendix E3 (for Chapter 9)

Table E3.1. Mean (Standard Deviation) Duration in Seconds[a] and Frequency[b] of Play Behavioural Measures for the UK ($N = 26$) and Singaporean ($N = 26$) Children[c]

| Play behavioural measure | Phase I | | Phase II | | Phase III | |
|---|---|---|---|---|---|---|
| | UK | Singapore | UK | Singapore | UK | Singapore |
| Category 1: Peer play scale | | | | | | |
| (1.1) Uninvolved in play | 5.38 (17.67) | 15.81 (29.70) | 6.62 (16.80) | 7.31 (17.84) | 5.31 (11.01) | 6.08 (12.30) |
| (1.2) Non-pretend solitary play | 13.58 (31.90) | 9.08 (16.25) | 2.65 (7.77) | 3.31 (13.81) | 2.58 (9.19) | - |
| (1.3) Non-pretend parallel play | 29.69 (55.66) | 126.81 (106.89) | 18.65 (31.95) | 30.88 (62.69) | .81 (3.25) | - |
| (1.4) Non-pretend simple social play | 11.50 (28.20) | 14.85 (25.70) | 16.58 (34.76) | 6.54 (19.54) | 1.88 (6.99) | 1.23 (5.52) |
| (1.5) Non-pretend cooperative play | 8.85 (41.40) | 14.19 (38.17) | 12.35 (52.69) | 6.46 (32.95) | 3.46 (12.23) | 3.31 (11.58) |
| (1.6) Solitary pretend play | 17.88 (38.36) | 39.19 (58.75) | 9.92 (25.71) | 42.88 (87.65) | 15.08 (53.89) | 2.23 (9.60) |
| (1.7) Parallel pretend play | 22.46 (26.42) | 48.85 (87.44) | 16.19 (34.19) | 22.85 (52.99) | 6.27 (19.35) | 21.12 (51.81) |
| (1.8) Simple social pretend play | 191.73 (136.67) | 61.38 (89.30) | 76.96 (105.07) | 87.42 (106.15) | 35.00 (75.18) | 29.69 (67.47) |
| (1.9) Cooperative social pretend play | 28.77 (88.92) | - | 131.04 (154.07) | 106.04 (147.07) | 178.81 (145.74) | 190.35 (136.49) |
| (1.10) Complex social pretend play | - | - | 39.04 (107.62) | 16.88 (68.01) | 81.88 (131.69) | 76.54 (117.73) |

*table continues*

Table E3.1 (*cont.*)

| Play behavioural measure | Phase I | | Phase II | | Phase III | |
|---|---|---|---|---|---|---|
| | UK | Singapore | UK | Singapore | UK | Singapore |
| Category 2: Types of social bids in pretend play | | | | | | |
| (2.1) Neutral | 57.69 (40.30) | 86.73 (93.32) | 32.62 (48.42) | 76.85 (98.94) | 25.50 (38.66) | 30.50 (57.65) |
| (2.2) Recruitment | 45.65 (45.63) | 18.62 (35.67) | 58.73 (51.66) | 47.62 (47.21) | 101.54 (74.87) | 115.08 (54.70) |
| (2.3) Positive imitative | 20.15 (28.51) | 6.77 (19.80) | 13.15 (20.06) | 12.62 (20.78) | 13.08 (27.08) | 8.19 (14.31) |
| (2.4) Positive complementary | 117.58 (93.73) | 33.54 (62.03) | 135.65 (98.56) | 123.88 (97.84) | 139.96 (70.21) | 137.35 (60.95) |
| (2.5) Negative/conflict | 19.92 (31.69) | 3.85 (10.28) | 32.92 (44.56) | 15.27 (18.06) | 36.65 (43.84) | 29.15 (25.19) |
| Category 3: Pretend play themes[d] | | | | | | |
| (3.2) Family-related activities | 51.73 (77.92) | 14.23 (49.48) | 42.81 (82.78) | 43.54 (85.43) | 69.58 (97.55) | 67.85 (110.08) |
| (3.3) Daily activities | 124.88 (105.22) | 98.77 (110.07) | 77.54 (100.95) | 153.81 (134.90) | 95.46 (118.18) | 97.27 (102.89) |
| (3.4) Adult occupations | - | 1.62 (8.24) | 4.08 (14.53) | 29.12 (74.63) | 14.88 (40.75) | 24.15 (63.30) |
| (3.5) Violence/aggression | 1.00 (5.10) | 2.19 (11.18) | 9.54 (41.23) | 6.88 (21.79) | 1.65 (8.43) | 15.58 (31.11) |
| (3.6) Animals | 15.12 (32.43) | 6.46 (27.62) | 19.42 (52.64) | 9.81 (47.82) | 7.15 (30.13) | 6.96 (20.73) |
| (3.7) Transportation | 15.19 (47.60) | 13.92 (39.62) | 20.88 (57.88) | 13.92 (49.45) | 18.00 (52.31) | 37.23 (65.02) |
| (3.8) Fantasy/adventure | 17.85 (47.25) | - | 17.15 (56.23) | 11.42 (48.40) | 43.42 (87.98) | 35.81 (72.84) |
| (3.9) Music | .92 (4.71) | 9.23 (44.68) | .69 (3.53) | - | - | - |
| (3.10) Construction play with pretend themes | - | - | 2.15 (10.98) | - | - | - |
| (3.11) Outings, holidays and weather | 31.31 (63.21) | - | 78.69 (123.84) | 7.19 (36.67) | 64.85 (108.15) | 35.81 (72.84) |

*table continues*

Table E3.1 (*cont.*)

| Play behavioural measure | Phase I | | Phase II | | Phase III | |
|---|---|---|---|---|---|---|
| | UK | Singapore | UK | Singapore | UK | Singapore |
| **Category 4: Types of pretend role-play** | | | | | | |
| (4.1) No pretend role-play | 69.85 (103.45) | 183.27 (127.13) | 58.88 (84.36) | 57.27 (97.58) | 16.15 (27.01) | 10.62 (16.40) |
| (4.2) Other form of pretence | 188.04 (106.74) | 97.92 (108.09) | 29.54 (71.20) | 30.92 (71.70) | 4.62 (17.17) | 1.38 (6.48) |
| (4.3) Role-enactment | 47.35 (81.27) | 41.19 (92.57) | 150.00 (96.47) | 195.77 (121.07) | 183.69 (102.00) | 206.19 (102.12) |
| (4.4) Role-play | 0 | 0 | 29.96 (79.40) | 14.15 (56.14) | 67.46 (103.64) | 64.77 (101.19) |
| (4.5) Metacommunication | 24.85 (23.77) | 7.92 (17.22) | 61.42 (42.28) | 32.62 (23.85) | 58.85 (29.01) | 47.65 (24.15) |
| **Category 5: Modes of transformation[d]** | | | | | | |
| (5.2a) Property | 2.19 (4.31) | 2.58 (4.58) | 3.54 (5.31) | 4.08 (7.30) | 2.12 (3.30) | 3.77 (6.30) |
| (5.2b) Identity | 1.85 (2.22) | 1.23 (1.90) | 4.46 (8.98) | 2.85 (4.63) | 6.69 (5.22) | 6.88 (5.83) |
| (5.2c) Condition | 1.04 (1.87) | 0 | 1.12 (2.34) | .85 (2.68) | 1.50 (1.53) | 1.81 (2.77) |
| (5.3) Creation | 5.88 (5.70) | 8.54 (12.90) | 11.77 (12.65) | 12.50 (16.21) | 8.38 (6.70) | 10.19 (9.27) |

*Note.* The play behaviour within each category were mutually exclusive and independent of each other. [a] Duration of play: 0 to 300 seconds. [b] Range of frequency: 0 to 331. [c] Categories 1, 2, 3 and 4 were coded for duration of occurrence and Category 5 was coded for frequency only. [d] Non-pretend play behaviour (i.e. no pretend play theme and no transformation) were not included.
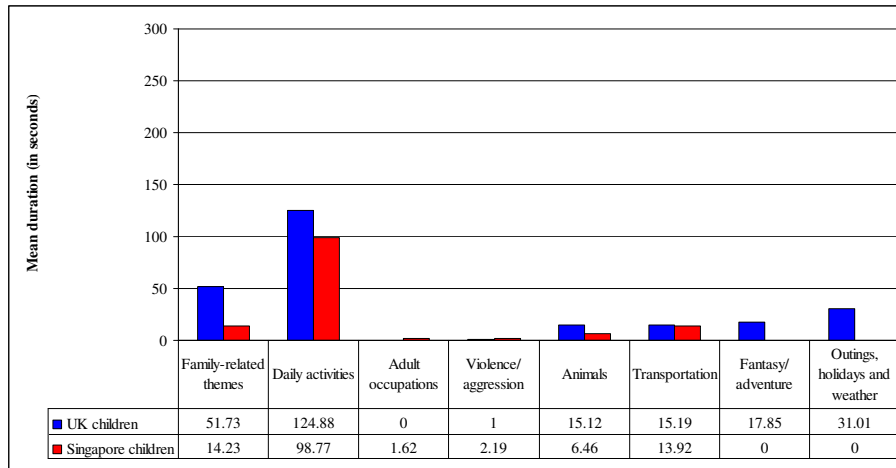
*Figure E3.2a.* Mean duration of pretend play themes in phase I for the UK (*N* = 26) and Singaporean (*N* = 26) children
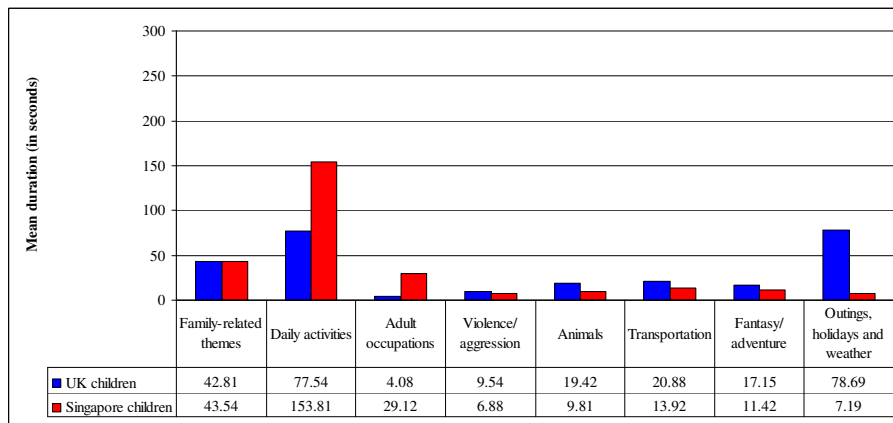
| | Family-related themes | Daily activities | Adult occupations | Violence/ aggression | Animals | Transportation | Fantasy/ adventure | Outings, holidays and weather |
|---|---|---|---|---|---|---|---|---|
| UK children | 51.73 | 124.88 | 0 | 1 | 15.12 | 15.19 | 17.85 | 31.01 |
| Singapore children | 14.23 | 98.77 | 1.62 | 2.19 | 6.46 | 13.92 | 0 | 0 |



*Figure E3.2b.* Mean duration of pretend play themes in phase II for the UK (*N* = 26) and Singaporean (*N* = 26) children

| | Family-related themes | Daily activities | Adult occupations | Violence/ aggression | Animals | Transportation | Fantasy/ adventure | Outings, holidays and weather |
|---|---|---|---|---|---|---|---|---|
| UK children | 42.81 | 77.54 | 4.08 | 9.54 | 19.42 | 20.88 | 17.15 | 78.69 |
| Singapore children | 43.54 | 153.81 | 29.12 | 6.88 | 9.81 | 13.92 | 11.42 | 7.19 |



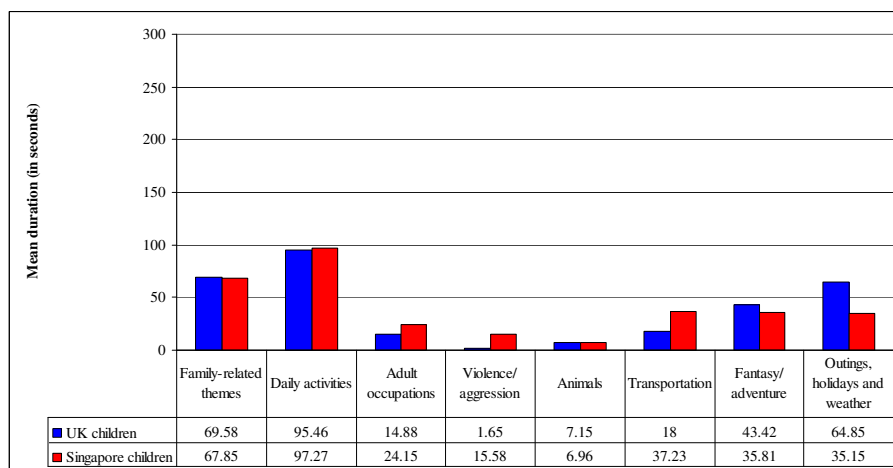*Figure E3.2c.* Mean duration of pretend play themes in phase III for the UK (*N* = 26) and Singaporean (*N* = 26) children

| | Family-related themes | Daily activities | Adult occupations | Violence/ aggression | Animals | Transportation | Fantasy/ adventure | Outings, holidays and weather |
|---|---|---|---|---|---|---|---|---|
| UK children | 69.58 | 95.46 | 14.88 | 1.65 | 7.15 | 18 | 43.42 | 64.85 |
| Singapore children | 67.85 | 97.27 | 24.15 | 15.58 | 6.96 | 37.23 | 35.81 | 35.15 |

# APPENDIX F

# JOURNAL ARTICLE