Infant Behavior & Development 37 (2014) 632–643

Contents lists available at ScienceDirect

Infant Behavior and Development

Full length article

Understanding of others' knowledge in French and Japanese children: A comparative study with a disambiguation task on 16–38-month-olds

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ARTICLE INFO

Article history:
Received 21 January 2014
Received in revised form 27 June 2014
Accepted 26 August 2014

Keywords:
Theory of mind
Language
Disambiguation task
French
Japanese
Young children

ABSTRACT

In order to explain the cultural differences reported in the results of false-belief tasks, we attempted to verify the 'task bias hypothesis' suggested by certain studies (e.g. Tardif et al. (2004). *Journal of Child Language*, *31*, 779–800; Rubio-Fernandez & Geurts (2013). *Psychological Science*, *24*(1), 27–33. doi 10.1177/0956797612447819). At the same time, we aimed to observe the theory of mind (ToM) ability of infants and young children under the age of three in verbal communication. To this end, we propose a new protocol to test young children's ToM ability, with particular attention paid to the linguistic aspect of the task. This original disambiguation task using proper nouns (first names) was tested on a total of 32 children aged between 16 and 38 months, in France and Japan. The results revealed that after the age of 30 months children begin to correctly interpret nouns while simultaneously taking into account their partner's knowledge (50% of the French and 29% of the Japanese children were successful), whereas this remains difficult for younger children (no child under 30 months was successful). The analysis of error types has shown that 'memory bias' was dominant in younger children in particular and 'association bias' was rarely observed across all ages. Given that the results of French and Japanese children did not differ significantly, we assume that this new task design could minimise the influence of cultural difference caused by the characteristics of different languages.

1. Introduction

1.1. Cultural differences in the acquisition of theory of mind

Over the past thirty years much research has been devoted to investigating when infants or young children acquire the ability to understand others' mental states, or 'Theory of Mind' (ToM). While Premack & Woodruff's (1978) first definition of ToM involved the understanding of a wide range of mental states, such as the desires, goals, intentions, knowledge and

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http://dx.doi.org/10.1016/j.infbeh.2014.08.006
0163-6383/

beliefs of others, much developmental research on human children has focused essentially on false-belief understanding using the standard false-belief task (Wimmer & Perner, 1983), or a variation thereof. If we examine the results of a large number of studies that use the false-belief task, we can see a discrepancy in the age at which different countries report a majority of children succeeding in this task (e.g. Wellman, Cross, & Watson, 2001; Liu, Wellman, Tardif, & Sabbagh, 2008). According to these results, some delay has been reported in Asian children (Chinese, Korean and Japanese) (Lewis et al., 2009; Lewis, Huang, & Rooksby, 2006; Tardif, Wellman, & Cheung, 2004; Liu et al., 2008), in particular Japanese children (Naito & Koyama, 2006; Okumura, Moriguchi, Kanokogi, & Itakura, 2009, etc.). Japanese studies have found that the majority of children succeed in this task at around 5.5 to 6 years old, compared to 4 years old as generally reported in European or North-American children. No clear explanation for this cultural discrepancy has yet to be provided. However, two hypotheses have been formulated by some researchers.

(1) The first hypothesis concerns the influence of cultural environment on the development of ToM (e.g. Liu et al., 2008; Lewis et al., 2009; Kazama, Hirabayashi, Karasawa, Tardif, & Olson, 2013). In this view it is assumed that children's experience in their daily sociocultural context could affect their performance in understanding other people's mental states.
(2) The second hypothesis concerns the existence of a methodological or protocol bias, including linguistic bias, in the task (e.g. Rubio-Fernandez & Geurts, 2013; Tardif et al., 2004). Rubio-Fernandez and Geurts (2013), for example, have highlighted many distractors in the standard false-belief task which prevent young children under 4 years of age from remaining focused and cause them to fail in the task. In other words, a child's true ToM ability might be underestimated due to task bias. (Rubio-Fernandez and Geurts (2013) proposed a new version of the false-belief task that allows children to visually track the protagonist and 3-year-olds were highly successful in the task). In addition, the differences induced by translations may be included in such methodological bias. Tardif et al. (2004) reported a significant difference in the results of Chinese children in the false-belief task according to the verbs used. This reveals an important problem of equivalence of the phrases used in the task.

Moreover, a combination of these two hypotheses exists: Naito and Koyama (2006) reported that many Japanese children interviewed after the false-belief task answered that they had focused their attention on peripheral elements of the story rather than the main point in order to understand the false-belief of others. This directing of their attention to other elements may partly explain their less successful results in the task.

We focused on the second hypothesis of protocol bias since the first hypothesis concerning cultural environment poses a difficulty in identifying the candidate factors potentially affecting ToM development (see Liu et al., 2008).

The hypothesis of protocol bias encompasses two issues: (1) it could be a source of the discrepancy between false-belief task results in different countries; (2) it could be a barrier to examining the ToM ability of younger children under 3 years of age as the task requires a certain degree of linguistic ability. In an effort to find a solution to these problems we will suggest a new protocol to measure ToM ability in younger children under 3 years of age, with particular attention paid to the linguistic aspect of the task.

To our knowledge there are few studies that combine children's linguistic ability, their socio-cognitive ability (ToM ability) and cultural comparison. We attempt to do this in the present study.

1.2. Theory of mind in younger children under the age of three

The standard false-belief task requires a minimum level of language ability in children and becomes difficult to test on younger children under 3 years of age. In the false-belief task, even though the child's answer may be a simple verbal or gestural one, the question asked implies the comprehension of complex embodied structures like 'The child thinks that A will do B because A believes that the object is still in the first location where (s)he placed it'. Furthermore, the ability to interpret this kind of verbal statement structure requires a certain degree of language ability and may be a barrier to examining ToM understanding in younger children under three.

In order to explore the ToM ability of young children and infants, some studies in the last decade have used non-verbal tasks (Call & Tomasello, 1999; Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2007, etc.). As for the type of response used by the child or infant, previous studies have employed different methods: some studies used gaze behaviour to evaluate infants' ability (Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2007, etc.), while others used non-verbal behavioural responses (Call & Tomasello, 1999; Buttelmann, Carpenter, & Tomasello, 2009) or a combination of both (O'Neill, 1996). The results in young infants using gaze behaviour have led to a new hypothesis on false-belief understanding, provoking heated debate; however, some researchers consider gestural or verbal responses by toddlers and young children to be more powerful or explicit evidence of their understanding of mental states (Clements & Perner, 1994; Call & Tomasello, 1999; Apperly & Butterfill, 2009; Buttelmann et al., 2009). It is for this reason that we have chosen to work on ToM ability in speech acts or 'verbal communication'.

Moreover, since verbal communication is a fundamental mode of human communication, it is our view that even for infants or young children, not integrating the verbal mode into the methodology would be prejudicial to improving our understanding of human social cognition. Our challenge was to propose a new protocol based on verbal communication which allows ToM ability in younger children to be observed. Recent research on referential communication has demonstrated the possibility of observing young children's ability to take into account others' knowledge in verbal communication