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Cognitive Development



Phonological awareness, executive functioning, and theory of mind

M. Jeffrey Farrar, Sylvia Ashwell

University of Florida, United States

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ABSTRACT

Language plays a critical role in theory of mind (ToM) development, particularly the understanding of false beliefs (FB). Further, there is some evidence that the development of FB is important for metalinguistic development, such as the understanding of homonyms and synonyms. However, there is debate regarding the nature of this relationship. This study explored the role of ToM, including FB, understanding and executive function in another aspect of metalinguistic development involving phonological awareness, specifically rhyming. Of interest was the relative role of ToM and executive function, particularly inhibitory control, in children's ability to identify rhymes. Two studies of 4-year-olds demonstrated that ToM understanding was primarily associated with rhyming ability, whereas inhibitory control was not independently related. Results are discussed in terms of children's ability to flexibly shift between different perspectives, by bracketing one perspective and focusing on the other, in both metalinguistic and ToM tasks.

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An extensive body of research now shows that language and theory of mind (ToM), usually assessed by false belief (FB) understanding, are closely connected in early childhood (Milligan, Dack, & Astington, 2005). The majority of this research has focused on the facilitative role of language in the development of ToM (de Villiers & Pyers, 2002; Slade & Ruffman, 2005). However, there is some limited research that indicates that an understanding of ToM may also contribute to language development, particularly metalinguistic ability. Yet there is debate regarding the nature of this relationship. The present study explores the role of both ToM and executive functioning (EF) in preschool children's development of phonological awareness with a specific focus on rhyming as a metalinguistic ability. We were particularly interested in EF assessments of inhibitory control. We use the term ToM to refer to tasks that require understanding conflicting representations, including FB, representational change, and appearance–reality distinctions.

1. Theory of mind development

During the preschool years children make rapid progress in the understanding of mental states of themselves and others. This understanding has its origins in infancy as children view others as intentional agents (Tomasello, 1995). An important accomplishment in ToM development occurs by 5-years of age when children develop an understanding of FBs. This reflects an understanding that two people can have different or conflicting beliefs about the same event. For instance, in the standard *unexpected content* task, children are shown a closed band-aid box and asked what they think is inside it. Following the child's typical response of band-aids, the box is opened to reveal that it contains paper clips instead. After closing the box, the child is asked what someone who has never seen the box will think is inside of it. A child who understands FB will reply "band-aids," while a child who does not will respond "paper-clips." To pass this task requires recognition that there can be two distinct ways of representing the situation. Similar achievements occur in children's understanding of appearance vs. reality, in which the child can understand that the underlying reality (e.g., identity of an object) can be different than its appearance (e.g., a sponge that looks like a rock).

2. Theory of mind and language

Language development serves a critical role in the development of ToM, particularly in tasks involving FB (Astington & Baird, 2005). There has been considerable controversy, however, regarding whether particular dimensions of language are more important than others in its development. Studies have shown that both vocabulary (Farrar & Maag, 2002; Milligan et al., 2005) and grammatical development (Jenkins & Astington, 1996; Slade & Ruffman, 2005) are linked to FB understanding.

Is there any evidence that FB understanding is necessary for later language development? The majority of longitudinal studies have shown that language development plays a role in FB reasoning but the reverse is not typically found (Astington & Jenkins, 1999; de Villiers & Pyers, 2002). However, Slade and Ruffman (2005) found that the relation between language and FB was bidirectional once the tasks were equated using the same range for scores, rather than using different scales. Similarly, Lockl and Schneider (2007) found that FB understanding predicted later language ability, although the size of the relation was modest and only existed for the later time points.

One aspect of language that may be dependent on FB understanding is metalinguistic development. Metalinguistic skills involve knowledge of language and/or the ability to manipulate linguistic forms (Bialystok, 1993). They include such skills such as phonological awareness, semantic judgments and grammaticality judgments. Doherty and his colleagues (Doherty, 2000; Doherty & Perner, 1998) have shown that the ability to understand both synonyms and homonyms is linked to FB. In their homonym task, 3- and 4-year-olds were asked to judge whether a puppet selected the correct homonym to a word previously identified. A child was shown four pictures and then asked, for example, to point to a picture of a bat (e.g., living kind); a puppet then selected an object labeled by the homonym (e.g., baseball bat). The child's task was to determine whether the puppet made the right selection. According to Doherty (2000), in order to understand homonyms the child has to attend to the form of the words (both are bats) and ignore the differences in meaning. Children's ability to do so was correlated with their FB understanding even after age and general language ability were controlled. Similar relations between FB and synonyms have been reported (Doherty & Perner, 1998). To correctly detect synonyms, children have to attend to similarities in meaning and make sure that the forms are different.

What accounts for this relation between FB and understanding of synonyms and homonyms? Initially, Doherty and Perner (1998) developed a "representational understanding of mind" (RUM) explanation, according to which children's understanding of mental states as representations is applied to non-mental representations. In the case of homonyms, the homonym task requires children to make a distinction between what is represented and how it is represented, just as FB requires understanding two different representations (beliefs) of a situation. To understand synonyms, children have to recognize that there can be two different names for the same object.

An alternative explanation is that children's difficulty with understanding synonyms resides with their assumption that an object can only have one name or label, similar to the mutual exclusivity

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