



Are there different pathways to explicit false belief understanding? General language and complementation in typical and atypical children



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ABSTRACT

Though converging empirical evidence strongly supports the role of language in explicit false belief understanding (FBU), there is a lack of consensus on the theoretical basis of this link. This debate has centered on whether complement syntax is required for FBU or whether general language skills are sufficient. Although hundreds of investigations have confirmed the role of language in FBU, the precise role of complementation and general language remains unclear. In the present review, we selectively examine through both meta-analysis and qualitative analysis, only studies that utilize both complementation and general language measures in typically and atypically developing children (e.g., children with autism). These analyses supported the general language hypothesis, but not the complementation hypothesis in typically developing children. In contrast, the complementation hypothesis was supported in the children with autism, as well (children with deafness and SLI). Together, these results suggests there are different linguistic pathways for developing FBU in typical and atypical children. These alternate routes may be attributable to differences in children's ability to benefit from social interactions in acquiring FBU. Finally, we discuss suggestions for future research including methodological choices in research design, language assessments, and populations.

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Contents

1. Introduction	50
2. Language and FBU	51
2.1. Perspectives on complements, general language, and FBU	51
2.2. Empirical findings regarding language and false belief	52
3. Analytic approach	52
3.1. Meta-analysis	52
3.1.1. Data extraction	52
3.1.2. Meta-analysis modeling approach	53

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3.1.3.	Meta-analysis results	53
3.1.4.	Results supporting the complementation hypothesis	53
3.1.5.	Results supporting the general language hypothesis	53
3.2.	Qualitative analysis	54
3.2.1.	Studies supporting the complementation hypothesis	54
3.2.2.	Studies supporting the general language hypothesis	57
3.3.	Training studies	58
3.4.	Summary	58
4.	Children with autism, language, and hearing impairments	59
4.1.	Children with autism	59
4.2.	Children with hearing impairments	59
4.3.	Children with specific language impairment (SLI)	59
4.4.	Summary	61
5.	Discussion	61
5.1.	Different pathways explanation	61
5.2.	Executive function, language, and false belief	63
5.3.	Methodological explanations	63
5.4.	Implications and conclusions	64
	References	64

1. Introduction

Language and cognition interact in complex ways during development. In the current paper, we review this relation by considering the role of language in theory of mind development in typically and atypically developing children. A critical achievement in theory of mind occurs around 4 ½ to 5 years of age when children come to understand the representational nature of their own as well as others' mental states (Wellman, Cross, & Watson, 2001). False belief understanding (FBU) enables the child to know that individuals can hold conflicting beliefs about the same event. This phenomenon has been tested using scenarios that require the child to separate his or her own knowledge from what a story character might believe or think in a given scenario. In the classic version of the *unexpected locations task* used to index FBU (Baron-Cohen, Leslie, & Frith, 1985; Wimmer & Perner, 1983), the child is asked to predict where a story character, Sally, will search for an object that has been secretly moved by Anne from one location to another location. To pass the task, the child must correctly predict that Sally will search in the last location she put the object and not the place the child knows it to be. As noted, typically developing children pass the FB task by around 5 years of age. In contrast, children with impairments in language and/or social cognition show delays in FBU (e.g., de Villiers & de Villiers, 2012).

Explanations of the transitions in theory of mind understanding are abundant in the developmental literature. Empirical findings and theoretical approaches address the connections between language and understanding other minds from infancy through early childhood. For instance, implicit FBU emerges in younger infants and toddlers (Baillargeon, Scott, & He, 2010; Buttelmann, Carpenter, & Tomasello, 2009; Onishi & Baillargeon, 2005) and language has been suggested to serve a crucial role in the transition from implicit to later explicit FBU (San Juan & Astington, 2012). Thus, identifying the process by which children achieve this explicit understanding is critical. Further, comparisons of typical and atypical children suggest that the connection between language and FBU may vary depending on the population.

The role of language as a key, underlying mechanism of children passing explicit FBU tasks is well established (Astington & Baird, 2005; San Juan & Astington, 2012). However, opposing views question the mechanism driving this relation. Questions remain regarding whether general language (e.g., Slade and Ruffman, 2005) or a specific understanding of sentential complements (e.g., de Villiers, 2007) is responsible for the changing nature of preschoolers' explicit FBU. While some studies have indicated that complementation is needed for FBU (de Villiers & Pyers, 2002), others argue that general language skills are sufficient and complementation is not necessary (Ruffman, Slade, Rowlandson, & Rumsey, 2003; Slade & Ruffman, 2005). Further, the conclusions drawn from many of these studies are limited, as not all included both general language and complementation measures in the same investigation.

The focus of the current selective review is to evaluate both the complementation and general language hypotheses by appraising those studies that provide a direct test of the necessary role of complementation in FBU. As explained more thoroughly below, these two hypotheses propose different mechanisms for the achievement of FBU. The role of language in FBU will be reevaluated by focusing on studies that include both general language and complementation measures for children who are typically developing as well as children with primary or secondary language impairments (e.g., children with specific language impairment; children with autism, and children who are deaf). By restricting studies to those that contain both general language and complementation measures, we can evaluate the relative contribution of both, as well as their interaction.

Further, by reviewing the evidence on language-FBU links in both typical and atypical groups, we can determine whether similar relations exist across populations. To anticipate our interpretation of the evidence, we argue that there are multiple language pathways leading to the emergence of FBU. Our focus on language and FBU, however, does not imply that other cognitive advancements do not contribute as well. Specifically, various measures of executive function contribute to FBU in typical and atypical children (Benson, Sabbagh, Carlson, & Zelazo, 2013; Devine & Hughes, 2014; Pyers & de Villiers, 2013;

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