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Challenging PAR

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It has long been recognized that theory of mind (ToM) is not an all-or-none achievement. Around the age of four years, when children begin to master ignorance and false belief tasks, their understanding of knowledge and belief formation is still quite limited: They understand, in principle, that perceptual access leads to knowledge, but they have difficulty distinguishing between different sensory modalities (such as sound or touch) in identifying the source of their knowledge (O'Neill et al., 1992). They acquire knowledge through instruction, but they fail to represent the learning event as the source of their knowledge (Taylor et al., 1994). While they understand that knowledge is acquired through perception and communication, they fail to understand inference as a source of knowledge (Sodian & Wimmer, 1987).

How Does PAR Differ from Traditional Accounts of Theory of Mind Development?

The standard interpretation of these findings is that young children acquire a basic understanding of knowledge and belief as mental representations before they begin to understand the formation of knowledge and beliefs as an interpretive and constructive process (Wimmer et al., 1988; Carpendale & Chandler, 1996). This standard interpretation is challenged by Fabricius, Gonzales, Pesch, and colleagues (2021) in their monograph, *Perceptual Access Reasoning (PAR) in Developing a Representational Theory of Mind*. The authors claim that children have a strictly *non-representational* view of the mind until well into middle childhood. In their view, young children do not attribute memory to the knower. Knowing is based on current perceptual contact (e.g., seeing). Seeing occurs when there is an unobstructed line of sight between an observer and an entity; knowing is the product of seeing. Knowledge exists as a result of perception in the here and now. If the situation changes so that a person no longer has perceptual access, then this person does not have knowledge and will commit a mistake (see Chapter I, Fabricius et al., 2021).

PAR theory leads to the following analysis of young children's mastery of false belief tasks such as the location false-belief task. When asked the test question "Where will Maxi look for the chocolate?", children derive their correct answer from *only* the current situation (chocolate is in location B, a fact unbeknownst to Maxi), not from remembering Maxi's previous experience of having placed the chocolate in location A. PAR-users reason that Maxi does not see the chocolate in B, therefore he does not know that the chocolate is in B. and he will thus search in the wrong location. In a two locations task, there is only one incorrect option, and therefore Maxi will search in A (see Fabricius et al., 2021, p. 19).

The PAR interpretation just described differs from traditional analyses of young children's false belief reasoning which assume that children who answer the test questions correctly do so because they have access to their stored representation of the *past* situation. That is, Maxi saw that his mother placed the chocolate in location A, and Maxi did not see his mother later move the chocolate to B because Maxi was absent from the scene. Maxi earlier had perceptual access to the past (now obsolete) situation, but not to the present situation; therefore, the child will reason that Maxi will search for the chocolate in location A. This reasoning also relies on Maxi's perceptual access, and I will therefore label this reasoning as PAR*. To be operating with PAR* does not necessarily imply that the child has metarepresentational understanding. Reductionist interpretations have analyzed this form of reasoning in terms of the application of behavior rules. Applying the behavior rule "people will search for objects where they last *saw* them" leads to the same output as a high-level representational theory of mind (RTM) (see Perner, 2010). PAR* has a number of advantages over PAR. First, it is intuitive, whereas PAR is not. To assume—as PAR does—that children will derive an answer to the test question "where will Maxi look for the chocolate?" solely from Maxi's present lack of perceptual access is counterintuitive, especially because the prediction that Maxi "will get it wrong" does not provide a straightforward answer to the test question. In contrast, the prediction derived by PAR* ("Maxi will search in location A") does provide an answer.

Second, children's own justifications for their answers to the test question almost always rely on Maxi's past situation (e.g., "because he put it in A"), not on Maxi's present lack of perceptual access (see Chapter VIII). Thus, PAR* focuses the reasoner on Maxi's *past*, rather than solely on Maxi's *present* perceptual access and its potential relevance for Maxi's present action. PAR* may not be guided by an RTM from the start, but it selects the behavioral and situational cues (i.e., what Maxi *saw* in the past) that are specifically relevant for constructing an RTM (how Maxi represents the present situation). In contrast, one of the weaknesses of PAR is that it is hard to see how children—taken to be limited to a non-representational concept of knowledge up to middle childhood—are ever supposed to grasp the concept of a mental representation that is temporally and situationally stable.

Scrutinizing the Evidence for PAR

The present monograph presents an impressive body of several interconnected series of experimental studies that systematically test predictions derived from PAR theory. On the whole, the patterns of results are consistent with PAR predictions and thus they present a challenge to traditional accounts of ToM development. I focus on three major sets of findings: (1) Children fail some types of true-belief tasks at about the same age at which they begin to pass false belief tasks. (2) When the standard false belief task is changed into a three-option task—with one irrelevant option—young children who pass two-option false belief tasks sometimes choose the irrelevant option. (3) Young children, who pass false belief tasks, often do not distinguish between agents who have false beliefs and agents who are ignorant.

(1) Maxi places the chocolate in A. Then his mother transfers it to B, while Maxi is present and watching. Subsequently, Maxi leaves and returns (while nothing changes in his absence). "Where will Maxi look for the chocolate?" Surprisingly, many 4-year-olds answer incorrectly (see Fabricius et al., Chapter II), thus failing to distinguish false belief (FB) from true belief (TB) conditions. This observed data pattern is consistent with PAR, because it can arise from focusing solely on the last event (Maxi is outside and does not have perceptual access, thus he does not know, and will get it wrong). However, it can also be argued that memory

demands are higher in the TB than in the FB condition because Maxi's leave-and-return must be remembered independently of the earlier object transfer. If Maxi's past perceptual access is highlighted, success rates improve. This finding suggests that 4-year-olds may neglect past perceptual access under high memory demands, but that they understand, in principle, its relevance for Maxi's present representation of the situation. Such an interpretation is, however, inconsistent with a strong version of PAR which claims that young children fail to understand knowledge as a stable mental representation. Thus, the observed patterns of findings might reflect a young child's difficulty in meeting task-related processing demands rather than a conceptual deficit.

(2) The introduction of an irrelevant option into the false belief task is important for testing PAR theory because of the prediction that the protagonist, who did not have perceptual access in the final scene, does not know and "will get it wrong," that is, he will avoid the reality-based choice, and choose randomly between the other two options. On the other hand, a third response option also raises the processing demands of the false belief task. The data presented in Chapter III suggest that the third option, when combined with other processing demands, may confuse young children which may lead them to random responding. Perner and Horn (2003) introduced an irrelevant third option and found very low frequency of children choosing this option. Fabricius and colleagues (Chapter III) replicated Perner and Horn (2003) when using these authors' exact procedures. However, they found higher preferences for the irrelevant option in some (apparently) superficially-different versions of the task. For instance, children chose the irrelevant option more often when the protagonist watched the second character manipulate the object than when the protagonist himself did. This may be due to increased memory demands of the protagonist-as-observer condition. It can be generally assumed that three-option tasks are more challenging for young children than two-option tasks, and that performance may break down under additional processing demands. This interpretation is directly supported by the finding that the choice of the irrelevant option peaked in Study 5 (Location condition) which differed from Study 4 solely in that the procedure was administered without memory prompts.

(3) In Chapter V, Fabricius et al. report a study of reasoning about ignorance (what they label "no belief reasoning") in which children were presented with a scenario in which Maxi had neither seen the chocolate being placed in A, nor had seen it being transferred to B. Where will Maxi look for the chocolate? The authors predicted that young children would apply PAR Rule 2 to this case. In other words, children were expected to reason that Maxi does not have current perceptual access and would therefore give the wrong answer—that is, predicting that Maxi will search in A. The observed pattern of answers corresponded to this prediction (see also Chen et al., 2015): Among those children who passed two false belief tasks, about 70% gave the same answer to the "no belief tasks." The authors argue that therefore young children's responses on the false belief task should be classified as false positives. However, other interpretations are possible. For instance, the pragmatic demands of the test question ("where will he look for the object?") may be misleading in the "no belief" condition, because the question presupposes that the protagonist has some reason to prefer one possibility over the other (and if so, to prefer location A).

Summary

After four decades of ToM research, Fabricius and colleagues have ventured the shattering proposal that the widely accepted description of ToM development in young children is fundamentally

wrong. In their view, four- to six-year-old children's correct responses to false belief tasks are not indicative of an understanding of mental representations, but instead reflect false positives that result from applying the general-purpose rule that ignorant people will make mistakes. I have suggested that alternative interpretations of the present findings are possible, considering young children's tendency to use error-prone heuristics when they are operating under especially difficult processing and pragmatic demands. Clearly, many intriguing findings in the present monograph deserve additional research. ToM-development from four to six years is an under-researched area that has not received much attention since the 1990s. The present findings certainly highlight some serious limitations of four-year-olds' reasoning on ToM tasks.

To fully evaluate the authors' theoretical proposal, we need to consider research findings of ToM and metacognition research more broadly. The present authors argue, for instance, that young children, in their justifications for their judgments in false belief tasks almost never refer to mental states, but rather to behaviors or states of the world. But there is ample evidence from spontaneous speech data indicating an early, rich verbal understanding of epistemic states. Not every child explicitly comments on representational change as clearly as a 32-month-old who spontaneously said: "Before I thought it was a crocodile, but now I know it is an alligator." (Shatz et al., 1983). Recent studies revealed that children begin to use mental state language to refer to mental states earlier than was previously assumed. Shortly after their second birthday, children use "know" and "not know" to affirm, query, or deny knowledge in themselves or in their partner, even though they do not yet spontaneously contrast their own and others' knowledge or ignorance of a certain fact or event (Harris et al., 2017). Even more importantly, around their fourth birthday, children begin to spontaneously inquire about *how* people know something, which suggests "that they acquire an information theory of knowledge, rather than just using knowledge to explain behavior" (Perner, 1991, p. 158).

Consistent with these observations, recent experimental research by Fedra and Schmidt (2019) indicates that three- and four-year-olds scrutinize epistemic claims and protest against unjustified knowledge claims, such as somebody claiming to possess knowledge without having had perceptual access. These findings seem to indicate that young children do represent the causal link between informational access and knowledge, rather than identifying knowing with acting correctly, and not knowing with making mistakes. The protest paradigm might lend itself to a critical test of claims made by the PAR theory: When current access is blocked, would a young child protest against another person's knowledge claim based on that person's *past* perceptual access? When a child's own knowledge claim is challenged, would the child back up their knowledge claim by referring to their own past perceptual access?

Above, I have criticized PAR as a theory of conceptual development that proposes a fundamental conceptual deficit in young children's understanding of the mind. There is, however, an alternative reading of PAR as a rule and strategy choice model, much like models proposed by Siegler and other information-processing theorists of cognitive development (Klahr, 2017). In such models, different rules (e.g., PAR and PAR*) could coexist at the same time and would be applied in an adaptive way in different task environments. Some inconsistent response patterns could be accounted for by processing demands that lead children to temporarily choose a lower-level strategy. Importantly, just because children resort to lower-level strategies under *some* task conditions need not imply that *all* correct responses to false belief tasks across *all* task environments must be interpreted as false positives.

In sum, there is much need for further discussion of the multifaceted PAR theory.

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