Minding the Gap: Understanding the Difference in Performance on Opacity and False Belief Tasks

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Two tasks have commonly been used to investigate the developing representations of children: false belief (FB) and opacity tasks (described in more detail below). While both tasks require tracking of another's representations, children consistently find opacity tasks harder. One possible reason for this—that the forced-choice nature of FB tasks makes them easier than opacity tasks—is the focus of the current study. Our research derives from a broader body of interdisciplinary research that includes issues in cognitive development (e.g., representational development), language development (e.g., syntax of complement clauses), and philosophy of language (e.g., propositional attitudes).

In false belief tasks participants must keep track of another's representations in order to predict her actions. For example, if Anna places an object in location A (cupboard), and then is absent while the object is moved to location B (fridge), she will represent the object as being in location A. Children who can monitor Anna's representations will correctly predict she will look for the object in location A.

Opacity tasks, like false belief tasks, also require participants to track another's representations, but in opacity tasks the same referent has more than one term. For example, a woman may be both Sue's mom and also a police officer. Each is correct, but replacing one term with its co-referential term can affect the truth value of the resulting sentence, setting up what is known as an 'opaque context' (Quine, 1995). Even if it is true, for instance, that "Mark believes the police officer rescued the cat from the tree", it may be false that "Mark believes Sue's mom rescued the cat from the tree" because Mark may not represent the woman as both Sue's mom *and* as a police officer. To succeed in an opacity task, participants must recognize that Mark's representation of the woman may not take in all possible representations.

As stated earlier, while both false belief and opacity tasks require attention to representation, children find opacity tasks harder. Kamawar and Homer (2000) claim this is due to the structure of the tasks. In false belief tasks, an object can be represented as being at location A or B, but not at "location AB"; i.e., the situation sets up a forced choice between the two possible representations. By contrast, in opacity tasks an object can be represented as both A *and* B—"The woman, who is both Sue's mom *and* a police officer"—and there is no forced choice required. To evaluate the above claim, we explicitly set up forced-choice situations in opacity tasks and then compared participants' performance on these tasks against their performance on standard false belief tasks. If the claim is valid, participants should perform equally well or better on the forced-choice version of the opacity task than on the standard FB tasks.

The planned total sample size for the study is 25 children 3-5 years old. To date, 15 children have taken part by completing three of each of the following four tasks: regular FB, forced-choice FB (e.g., "Where will Anna look for the object, in the cupboard *or* the fridge?"), opacity, and forced-choice opacity (e.g., "Does Mark think the cat was rescued by a police officer or by Sue's mom?").

Preliminary results support the claim that the forced-choice nature of false belief tasks helps to make them easier than opacity tasks. Children's mean performance (out of 3) was as follows: regular opacity = .40; forced-choice opacity = 1.33; standard FB = 1.88; and forced-choice FB = 2.40. As expected, children found the standard opacity tasks far more difficult than the standard FB tasks [t (14) = 5.36, $p < .001$]. There was also a significant difference between forced-choice opacity tasks and standard opacity tasks [t (14) = 3.51, $p < .01$]. However, performance on forced-choice opacity differed from standard FB only marginally [t (14) = 2.06, $p = .059$].

In conclusion, preliminary analyses suggest that Kamawar & Homer's (2000) claim has some merit. Making the options explicit improves performance on opaque contexts, but does not necessarily make it equal to standard FB. While the structural difference between opacity and FB may account for some of the difference in difficulty, it does not account for all of it.

References

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