
Monica Bucciarelli (2000) Reasoning by Categories in the Wason Selection Task. *Psychology*: 11(055)
Reduced Wason Task (2)

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PSYCOLOQUY (ISSN 1055-0143) is sponsored by the American Psychological Association (APA).

REASONING BY CATEGORIES IN THE WASON SELECTION TASK

Commentary on Margolis on Reduced-Wason-Task

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Abstract

Margolis (2000) explains subjects' superior reasoning with the reduced array selection task (RAST) compared to the classical Wason selection task in terms of selecting cards by category. We report some experimental support (Bucciarelli & Johnson-Laird, 2000) for this explanation. We had children aged three, four, and five, plus adults, perform both a factual and a deontic (obligation-based) version of the full Wason Selection task. Children's most common error was selecting cards according to the semantic categories of the elements represented. We conclude that, at least for children, a semantic category response might indeed be responsible for the facilitation of performance with the RAST.

Keywords

cognitive illusions, modus tollens, reasoning, selection task, Wason

1. In this commentary we provide evidence that there is responding by category in selection tasks. We report a study where the most common error by young children in the Wason Selection Task was selecting cards by semantic category (Bucciarelli & Johnson-Laird, 2000).
2. We investigated the ability of children (3, 4, and 5 year olds) and adults (over the age of 21 years) to deal with one factual and one deontic (obligation-based) version of the selection task. We tested

whether participants found it easier to reason with the deontic version and, in both versions, within a context of non-compliance. Thus, for each version of the task, participants were first invited to select the cards in a context of compliance (i.e., they had to check whether or not a character was telling the truth/obeying an order) and then in a context of non-compliance (i.e., they had to check whether a character was lying/disobeying an order).

3. The experimenter acted out two stories with puppets. Both stories were about two sorts of animals and their possible locations. Both versions of each story ended with a critical assertion. For example, the factual story might have ended with the following statement of fact:

Therefore, all the hens are in the house

and the corresponding deontic story ended with the following statement of obligation:

Therefore, all the hens must be in the house.

4. The four cards depicted a hen (p), a pig (not-p), the house (q), the yard (not-q). The participants were told that by turning over a card with an animal on it, they would discover its location, and that by turning over a card with a location on it they would discover the animals in that location. After the factual story, the participants carried out the selection task described as a test of whether the protagonist was telling the truth, and described as a test of whether the protagonist was lying. After the deontic story, the participants carried out the task described as a test of whether the animals obeyed the stipulation and as a test of whether they disobeyed it. The order and contents of the two kinds of stories were counterbalanced. We will not go into the details of the hypotheses that originally motivated our experiment. For present purposes, we briefly summarize the results.

5. There was a reliable improvement in performance with age. Also, the results by age groups showed that children did not perform better overall on the deontic tasks, but, as mental-model theory (Johnson-Laird 1983) would predict, they did tend to be more accurate when asked to test for violations than to test for compliance. There was no such effect for the adults. However, on the assumption that a participant will always choose at least one card and never choose all four cards, only the five year-olds and adults were more accurate in the tasks than one would expect by chance.

6. The outcomes relevant to Margolis's (2000) claim are concerned with patterns of cards' selection. Children's selections were indeed driven by the main semantic categories in the experiment, that is, they tended to select pairs of cards that corresponded either to the two sets of animals or to the two locations (see TABLE 1).

<ftp://www.cogsci.soton.ac.uk/pub/psychology/2000.volume.11/Pictures/btab.htm>

TABLE 1. Selection patterns for the four groups (pooled over tasks)

Age groups	Card Selection Pattern			
	p, not-p	q, not-q	p, q	p, not-q
3 year olds	25	20	4	5
4 year olds	22	28	8	5
5 year olds	23	13	14	15
Adults (>21)	1	5	23	59
Mean global %	18	12	7	21

Three- and five-year-old children erred mainly by selecting the cards p and not-p. Four-year-olds erred mainly by selecting the cards q and not-q. Nearly two-thirds of the children made at least one selection of this sort. We concluded that the results cast doubt on the classical interpretation of the results with children on the RAST.

7. The response pattern depending on semantic category obviously cannot be detected by a RAST, because there the children merely choose between the two locations. However, one implication of the results summarized above is that children could select the potentially falsifying instance in a RAST

without any genuine insight into their selection. In line with Margolis's hypothesis, we suggest that they could make a choice only within one category. In particular, young children interpret the question as being about any cards with either an animal or a location on one side. Margolis's hypothesis is more general than ours. In his view, the question in the experiment is misread by the participants 'as being about which categories of cards should be examined; for example, any cards with a "D" on either side; rather than about the particular card shown with a "D" on its upside.'

8. Adults' performance differed from the performance of children. Their most common responses were the selection of p and q, and the (correct) selection of p and not-q. For these response patterns, not involving to selection by category, we suggested an interpretation in terms of the participants' point of view (see Manktelow & Over, 1991; Politzer & Nguyen-Xuan, 1992). In our tasks, the 'obey' condition (i.e. a complying condition) could focus the reasoner on the animals' point of view, and thus lead them to select pair, p and q. In contrast, the 'disobey' condition (i.e. a non-complying condition) could focus the reasoners on the owner's point of view, and thus lead them to select p and not-q. Adults were indeed more likely to select p and q in the complying conditions (see FIGURE 1). The children too were more likely to select p and q in the complying conditions (FIGURE 2).

FIGURE 1. Card selection patterns in adults (percentages)

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An explanation in terms of point of view, however, does not in itself account for the mental processes underlying the choice of cards. Following mental-model theory, we suggest that a specific perspective focuses reasoners on the construction of examples or counterexamples relevant to a biconditional interpretation.

FIGURE 2. Card selection patterns in children (percentages)

<ftp://www.cogsci.soton.ac.uk/pub/psychology/2000.volume.11/Pictures/bc2.htm>

9. In the light of the evidence in favour of the existence of a response by category, we suggest that the RAST is not appropriate for testing young children's ability to identify cases that potentially falsify assertions. Many studies in fact support specific claims about the ability to reason which are grounded in the experimental results obtained with the RAST. Girotto, Light, and Colbourn (1988), for example, found that children can get the RAST right if it is framed deontically; these authors interpret this as support for the existence of a module for reasoning deontically. Light, Girotto, and Legrenzi (1990) used the RAST to demonstrate the effects of point of view in children. More recently, Cummins (1996) has found that children as young as three years of age could deal with the RAST. She showed that they are more likely to adopt a violation-detection strategy when testing a deontic rule than when testing an indicative rule; she concluded that a distinction between reasoning about factual and deontic matters is already evident in children's reasoning strategies by the age of three.

10. Perhaps it is time to devise new experimental tasks to measure young children ability to test the truthfulness of assertions.

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