REVIEWER A

This paper reports an experiment investigating the figural effect in syllogistic reasoning, e.g., the tendency for participants to infer A-C conclusions from premises in the figure: A-B, B-C, but to infer C-A conclusions from premises in the figure B-A, C-B. The experiment shows that when both premises are presented on a single line, then the proportion of A-C conclusions increases over all four figures. The experiment is well-designed and executed, and its results are convincing. They are of theoretical importance. Hence, I recommend the publication of this paper in PSICOLOGICA provided that the authors make the following amendments to it.

Matters of substance

1. Those theorists who find the results of the experiment uncongenial are likely to argue that the participants may not have been reasoning properly. One way to rebut this charge is to compare the accuracy of the performance in the two groups with the results of another comparable study that included the same syllogisms. If the levels of performance are similar then the argument of the paper will thereby be strengthened – perhaps, data in J-L and Bara would be appropriate. No need for any statistics – just the overall percentage of valid conclusions in the present study and for (the same syllogisms) in a comparable study in the literature.

2. Table 1: the sums of A-C and C-A conclusions are less than 100%. I suppose that the balances consisted of "no valid conclusion" responses, invalid conclusions, and conclusions that by mistake included a middle term. In any case, the legend of the Table should explain what these balances were. Likewise, the authors need to say why they excluded invalid conclusions about the two end terms from their statistical analyses. The standard figural effect affects both valid and invalid conclusions.

3. Scholarship: Early studies of the syllogism used multiple-choice tasks or the evaluation of given conclusions framed according to Scholastic logic, and so they couldn't have detected the figural effect. The first study (as far as I know) that examined all 64 possible pairs of premises and allowed participants to generate their own conclusions was one that Janellen Huttenlocher and I carried out in 1971 at Teachers College, Columbia University, NYC. The resulting figural bias was outlined on p. 153 et seq of Wason, P.C., & Johnson-Laird, P.N. (1972). *The Psychology of Reasoning*. London: Batsford. This account was quite similar to Stenning's and Oaksford & Chater's subsequent account! A later paper described the experiment in more detail and coined the term "figural" effect -- see p. 40 of Johnson-Laird, P.N. (1975). Models of deduction. In Falmagne, R. (Ed.) Reasoning: *Representation and Process*. Springdale, NJ: Erlbaum. Pp. 7-54. This same paper introduced the theory of mental models for syllogisms because the figural effect didn't seem explicable in terms of formal rules of inference (see pp. 41 et seq.). The experiment with Huttenlocher was finally published in full [in Johnson-Laird, P.N., & Steedman, M.J. (1978). The psychology of syllogisms. *Cognitive Psychology*, *10*, 64-99]. This same year Dickstein published his paper, and so some people suppose that he discovered the effect – even though it first appeared in print six years before! The present paper should include at least some of this history. Perhaps the key point is that the discovery of the figural effect led to the introduction of mental models (because it was hard to see how to explain it using formal rules of inference).

4. More scholarship. To refer to Ford (1995) as using "formal rules of inference" is misleading. It suggests an account compatible with, e.g., Rips (1994). In fact, her rules are tailor-made for syllogisms. A recent meta-analysis of theories of syllogistic reasoning shows that her rules are just a special case of set-theoretic principles [see Khemlani, S., & Johnson-Laird, P.N. (2012). Theories of the syllogism: A meta-analysis. *Psychological Bulletin*, 138, 427-457].

5. Final point of scholarship: The mental model theory over the years has vacillated in its account of the figural effect. At first, it had an explanation in terms of the semantics of quantified assertions, see the Johnson-Laird & Steedman paper (cited above). Later, as the present authors know, it espoused the FIFO explanation. Most recently, it has reverted to an explanation akin to the semantic one (in Wason and J-L). As far as the present paper is concerned, it should not refer to "the" mental model explanation, but to the "FIFO explanation" – just to be safe!

Matters of style

1. The paper needs to be edited by a native speaker of English. Its prose is clear, but there are sufficient minor solecisms to irritate readers, e.g., in the Abstract, the authors write: "We report one experiment, which study the influence …". The verb, "study" should be singular in number, i.e., "which studies the influence …".

2. The numbering of Figures. Scholastic logicians included the conclusions and numbered the Figures in the way that the authors do. My colleagues and I use a different numbering, which we think is more perspicuous in elucidating the figural effect. It would be helpful to readers, at least to cite this different numbering, especially as they refer to the results of Johnson-Laird and Bara, who use the different numbering.

3. To refer to a single line presentation as the "joint paragraph" presentation is opaque and misleading. Please use "single-line presentation" and "two-line presentation" throughout. It's much clearer, and it avoids cluttering up the paper with labels in parentheses, which detract from its readability.

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REVIEWER B

In one experiment, authors try to evaluate how the format of the presentation of the premises (shown together in one line or separately in two lines) of a syllogism induces a preference in the order of the terms of the conclusion drawn (A-C or C-A). Some explanations of the figural effect were reviewed. Authors explain that only the Mental Model Theory, with the FIFO principle, can explain the effect of the presentation format. They predict that the strategy of renewing the order of the premises is facilitated in the two-line format but not in the joint-paragraph presentation in which

the A-C conclusions will be more frequent. Results show that in figure 1 (B-A;C-A) the C-A conclusions were more frequent only when premises were shown in separate lines.

This study provides an interesting contribution in the field of reasoning. The study is well introduced; the experimental design is clear, simple and methodologically correct. Also the discussion is appropriate. However, I think that the results are not completely inconsistent with alternative explanations, as I will show below.

I propose that the present version of the article be accepted. However I recommend to the author some ideas to be considered in the discussion. Also I am going to add some minor points.

1. The main effect of the format of presentation is not given in the Results section. It should be reported because it is the main factor in this study, even if the result is not significant (which does not invalidate the interpretation of the results).

2. The authors make an explicit prediction: " In consequence, we predict that the reasoners should present more A-C than C-A conclusions for the one-line presentation format" (p.10, line 10). Readers will expect to find a result of interaction between Presentation Format and Direction of Conclusion but it was not significant. I do not think that this is a problem, because what authors predict (and find) is a change in just one of the three figures. The magnitude of the effect does not allow the interaction to be shown. However, this should be mentioned or discussed.

3. I do not agree that the mental model theory gives the only possible explanation of the results. Presenting the premises in two lines instead of just one could make the second premise more salient. With two lines of presentation instead of one, participants could easily re-read the syllogism starting from the second premise, and then read the first one. If this is what is happening, the results are not inconsistent with the relatum-given principle (or the given-new principle –which is not distinguishable in this study). The authors do not demonstrate that this is not happening (they do not use reading time of premises such as in Oberauer et al.). Authors could include this fact in the discussion (or justify why it is not happening). One possible way (for the future) to discard the relatum-given principle in favour of the FIFO principle with the format of presentation could be to include just the comparative or temporal relation with backward directionality together with syllogisms (forward relation), which should influence the relatum-given principle but not the FIFO one.

4. Some of the results seem difficult to explain from the author's hypothesis. For example: why Figure 4 gave more C-A conclusions with two line presentations but no more errors. To reach this conclusion, participants had to carry out one operation of renewing and two operations of switching around (one for every premise). If so, an increase in the number of errors for that condition would be expected because the number of operations would be increased compared to the online-presentation. But there are no more errors in that condition (see table 2). Maybe the reason is that the one-model problems are so easy that even with these operations there were very few errors. However, the authors could discuss this result.

Minor points

p.2 l.12 "…participants generate more A-C conclusion" > change conclusion to conclusions

p.8 (last line): "figure" instead of "figure 3".

p.12 (line 10) the "F" symbol is missing before the parenthesis.

p.13. after "It is worth mentioning that in previous studies in which separate-premises format was used no directionality effect was found for figures 2 and 3. " citations are expected.

p.19. In the caption for Table 2, it should be mentioned that the data correspond to the percentage of "correct" or "valid" conclusions.

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