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The reverse Stroop effect in switching between color naming and word reading

Esther Aarts [1,2], Martijn Lamers [1], Kim Verhoef [1], & Ardi Roelofs [1,2,3]

[1] Nijmegen Institute for Cognition and Information, [2] F. C. Donders Centre for Cognitive Neuroimaging, [3] Max Planck Institute for Psycholinguistics
Nijmegen, The Netherlands

Introduction

When speakers either name the color or read the word of Stroop stimuli, incongruent words interfere with color naming but incongruent colors do not affect word reading. However, when speakers switch between tasks, incongruent colors interfere with word reading: the reverse Stroop effect. Several models assume that the reverse Stroop effect arises because of "task-set inertia". After a task switch, the color naming task set is still active on a word reading trial, yielding the interference (Gilbert & Shallice, 2002; Yeung & Monsell, 2003). Alternatively, the reverse Stroop effect arises because of the reading route that is adopted. In the WEAVER++ model (Roelofs, 2003), word reading may include lemma retrieval or not (**Fig. 1**). Stroop effects occur when lemma retrieval is involved.

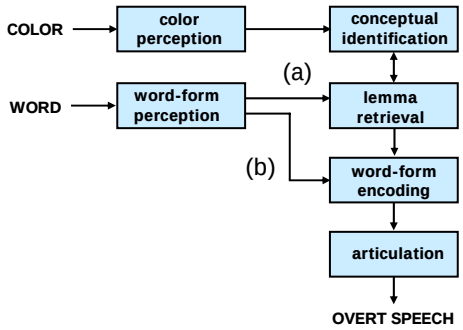

Fig. 1. Architecture of the WEAVER++ model of Stroop task performance. Word reading may include lemma retrieval (route a) or may not (route b).

Predictions

The task-set inertia account predicts that a reverse Stroop effect should occur only on switch trials and only when a switch cost is present. The reading-route account predicts that reverse Stroop effects should occur on both switch and repeat trials, regardless of the presence of a switch cost. We tested these predictions in two experiments.

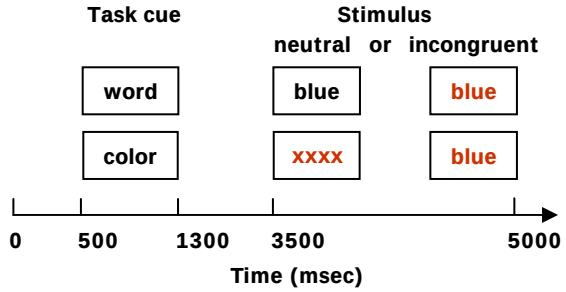

Fig. 2. Illustration of the structure of a trial.

Methods

In each experiment, 16 participants named the color or read aloud the word of color-word Stroop stimuli. The task was cued by the word 'color' (color naming) or 'word' (word reading). **Fig. 2** shows the structure of a trial. The task switched randomly (Exp. 1) or predictably every two trials (Exp. 2). The experiments included incongruent and neutral trials.

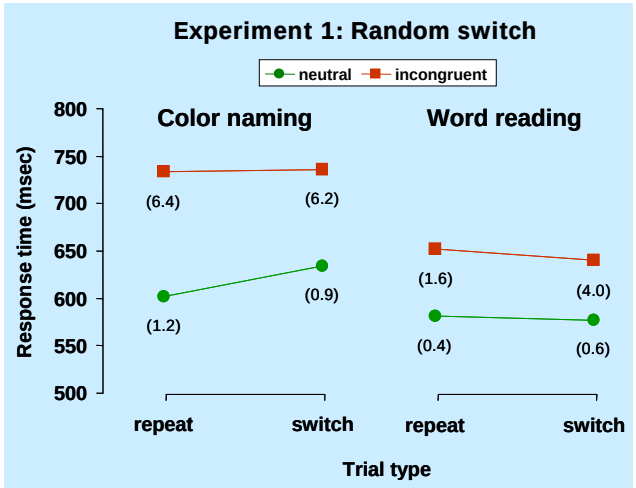

Fig. 3. Response times for color naming and word reading. Error rates are given between parentheses.

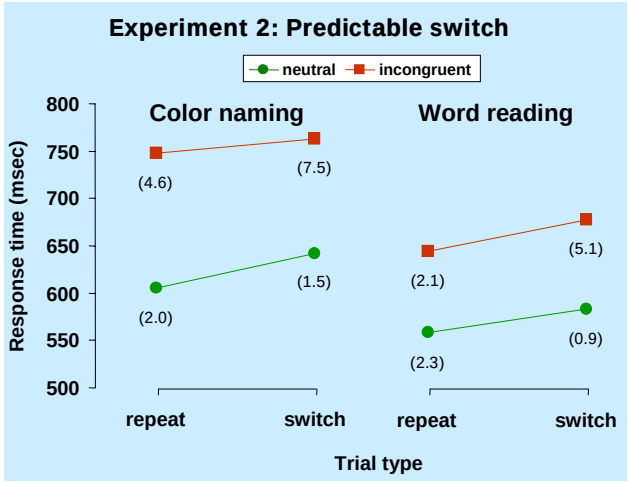

Fig. 4. Response times for color naming and word reading. Error rates are given between parentheses.

Results

There were Stroop effects (i.e., slower responding on incongruent than neutral trials) for both color naming and word reading (**Fig. 3** and **Fig. 4**). The magnitude of the effects did not differ between switch and repeat trials. Responding was slower on switch than on repeat trials in Exp. 2, but not in Exp. 1. Thus, for random as well as for predictable switches, we observed reverse Stroop effects, regardless of the presence of a switch cost.

Conclusion

Our results challenge the task-set inertia account of the reverse Stroop effect (Gilbert & Shallice, 2002; Yeung & Monsell, 2003) and they support the reading-route account (Roelofs, 2003).

References

S. Gilbert, T. Shallice, *Cognit. Psychol.* **44**, 297 (2002)
A. Roelofs, *Psychol. Rev.* **110**, 88 (2003)
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WEAVER++ at http://www.nici.ru.nl/~ardiroel/weaver++.htm

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Email: e.aarts@nici.ru.nl