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

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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.

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.

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.

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

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WEAVER++ at https://www.nici.ru.nl/~ardiroel/weaver++.htm

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

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

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.