

Reconfiguration and Inertial Processes in Attention Switching during Reading

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Introduction

Shifting or switching attention from one task to another involves a cost in cognitive processing (Rogers & Monsell, 1995). Different paradigms have been developed to investigate the mechanisms that may underlie such switch costs. For example, Rogers and Monsell (1995) developed the *alternating runs paradigm* requiring responses to two different tasks that alternate (...AABBA...) so as to create a predictable sequence of repeat trials and switch trials. They found reaction times on switch trials were slower than on repeat trials, even with a long delay between a response and the upcoming stimulus (residual switch cost). This result was hypothesized to be compatible with the existence of an endogenous "reconfiguration" process, a stage of preparation for the predictable, upcoming trial.

Wylie and Allport (2000) created a 3-phase version of the alternating runs paradigm. Phases varied according to whether stimuli were monovalent (affording performance of only one task) or bivalent (affording performance on either task even though only one was appropriate). In Phase 1, all trials were monovalent, in Phase 2 half were bivalent and half monovalent, and in Phase 3 all were bivalent. This design allowed comparison of performance on *dissimilar* switch trials following *similar* repeat trials (switch to monovalent versus bivalent trials from monovalent repeat trial), and performance on *similar* switch trials following *dissimilar* repeat trials (switch to bivalent from a monovalent versus bivalent repeat trial). Wylie and Allport found that performance on switch trials depended on whether the preceding repeat trial was monovalent or bivalent, and that performance on monovalent versus bivalent switch trials did not vary when the nature of the preceding repeat trial was held constant. They concluded that switch costs reflect inertial inhibitory processes persisting from the previous trial that interfere with and hence slow processing needed for the current trial.

Recently, Carrière (2002) in our lab found that both reconfiguration and inertial mechanisms may be implicated in switch costs involving simple, decontextualized stimuli. It is not known, however, whether these processes play a role in more complex activities. We studied this question using a reading activity involving sentence-like materials.

Method

Participants were 24 volunteer undergraduates ($M=22.6$ years). The experiment consisted of a 3-phase alternating runs paradigm involving two-alternative forced tasks, with trials alternating from repeat to switch in a predictable

fashion. In Phase 1 trials were monovalent. In Phase 2 half the trials were monovalent and half bivalent trials, and in Phase 3 all trials were bivalent. Stimuli consisted of target words embedded in sentence-like phrases. Targets had to be judged for their spatial-location meaning or their temporal meaning. Stimuli were appropriately counterbalanced for occurrence in the various sentence-like phrases across conditions. Stimuli were displayed on a computer screen and reaction times were collected by computer.

Results

Comparisons between appropriate switch and repeat trials from Phases 1 and 2 provided a test of the reconfiguration hypothesis, and between appropriate switch and repeat trials from Phases 2 and 3 of the inertial hypothesis. We found significantly greater switch costs in Phase 2 (switch from monovalent to bivalent) than in Phase 1 (from monovalent to monovalent), supporting the reconfiguration hypothesis. We found a significant difference in switch costs between Phase 2 (from monovalent to bivalent) and Phase 3 (from bivalent to bivalent), due to differences on repeat trials between Phase 2 and Phase 3, not on switch trials. The direction of this difference was consistent with a reconfiguration account, and contrary to an inertial account.

Discussion

The results supported the reconfiguration over the inertial interpretation of switch costs. Reconfiguration thus appears responsible for attention switch costs in linguistic judgment tasks involving complex, contextualized stimuli. The results also speak to the attention-directing functions of language as proposed by some cognitive linguists (e.g., Talmy, 2000).

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References

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