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Signatures of Response Conflict Monitoring in Language Production

Acheson D.*

Neurobiology of Language Department, Max Planck Institute for Psycholinguistics and Donders Institute for Brain, Cognition and Behaviour

In order to speak fluently and without error, we constantly monitor ourselves. Traditional models of monitoring within speech production have hypothesized that we send output from various stages of production through the comprehension systems (i.e., the perceptual loop; Levelt, 1983). Recent evidence, however, suggests that signals within the production system itself may serve as cues to monitoring. One such cue is response conflict, a situation that arises when two responses are simultaneously active prior to responding. Response conflict monitoring has been well-studied outside of language, and replicable behavioral and physiological signatures of this process have been established (see Yeung, Botvinick, & Cohen 2004). Here I present results from bilingual picture naming and from an EEG study of the tongue twister task demonstrating that these signatures are also present in language production.

One signature of response conflict is behavioral adaptation following errors or high conflict trials. Previous research using non-linguistic, conflict-inducing tasks (e.g., the flanker task) has shown that people's responses to high-conflict, incongruent trials (>> < >>) is faster following and low-conflict, congruent trials is slower if the preceding trial was high-conflict (Gratton, Coles & Donchin, 1992). We used bilingual picture naming to assess whether people's picture naming performance is modulated by a preceding picture with similar names (i.e., responses) in two languages. English-Welsh and German-Dutch bilinguals named pictures that were cognates (e.g., *Haus*-German; *huis*-Dutch; *house*-English translation) or non-cognates (*Frosch*-German; *kikker*-Dutch; *frog*-English translation). Results demonstrate that participant's reaction times following non-cognate words were slower following the presence of cognate pictures.

A second signature of response conflict comes from electrophysiology. Here, two fronto-central ERP components in particular have previously been associated with high conflict in non-linguistic tasks: the N2 and the error-related negativity (ERN; Yeung. Botvinick, & Cohen 2004). We examined for the presence of these components in non-linguistic (flanker) and linguistic (tongue-twister) tasks. The flanker task contained congruent and incongruent trials, where in the tongue twister task, participants rapidly named nonwords in either a tongue twister (e.g. *tif deeb dif teeb*) or non-tongue twister (e.g. *tif teeb dif deeb*) order. Results showed classic N2 and ERN effects in the flanker task, and an ERN in the tongue twister task. Furthermore, there were correlations between electrophysiological markers in the flanker task and behavioral performance in the tongue twister task, suggesting a common locus.

These studies demonstrate that the process of response-conflict monitoring may be one of the mechanisms by which we monitor ourselves in speech production. In turn, these results suggest that

* Corresponding author.
E-mail address: Dan.Acheson@mpi.nl .

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there is much to be gained by considering the process of language production within a more general framework of action monitoring and selection.

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