Response to McQueen *et al.*: Theoretical and empirical arguments support interactive processing

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McQueen *et al.* [1] continue to argue against interactive processes in speech perception, but we suggest that their arguments are unconvincing. Theoretical and empirical arguments support the interactive account. Concerning their theoretical points, a rational analysis is consistent with interactive models because they can produce optimal information integration [2]. We argue that interactive, rather than feedforward, processing is the algorithm that the brain uses to accomplish optimal information integration. Interactive processing provides a more parsimonious algorithm than the feedforward approach of McQueen *et al.*, which requires an additional decision level and a specialized feedback mechanism that affects learning but not processing.

We suggest that the empirical arguments offered by McQueen *et al.* are also unconvincing. The failure to find lexically mediated compensation for coarticulation in Ref. [3] is not problematic; the lexically mediated effect will necessarily be smaller than the effect that is produced by an unambiguous phoneme (Figure 2 in Ref. [4]) and might [Au: 'may' is ambiguous and can imply 'can', 'could' or 'might'. Is 'might' OK here?] be too small to be detected reliably. Furthermore, one failure to replicate cannot outweigh three independent successful replications that were based on 16 different lexical contexts (reviewed in Ref. [4]). Regarding the 'higher-order transitional probability' argument of McQueen *et al.*, there is no definition of 'higher-order transitional probability' that can account for the full set of data [5].

Perceptual learning cannot explain lexically induced selective adaptation as neatly as McQueen *et al.* claim. They cite audiovisual recalibration data from the ambiguous condition in Ref. [6] that showed learning followed by adaptation-driven unlearning. However, the lexically mediated selective-adaptation data (Figure 3 in Ref. [6]) correspond more closely to the unambiguous condition (Figure 1 in Ref. [6]), showing selective adaptation relative to baseline. This correspondence suggests that lexically mediated selective adaptation operates in the same way as perceptually mediated selective adaptation (the unambiguous condition in Ref. [6]), as predicted by interactive processing.

In sum, McQueen *et al.* [1] have provided neither a theoretical basis nor a sufficient argument to bring into doubt the evidence that supports interactive processes in speech perception. Lexically guided learning is not a special case for which feedback must be introduced; it is just one of many benefits of interactive processing.

References

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