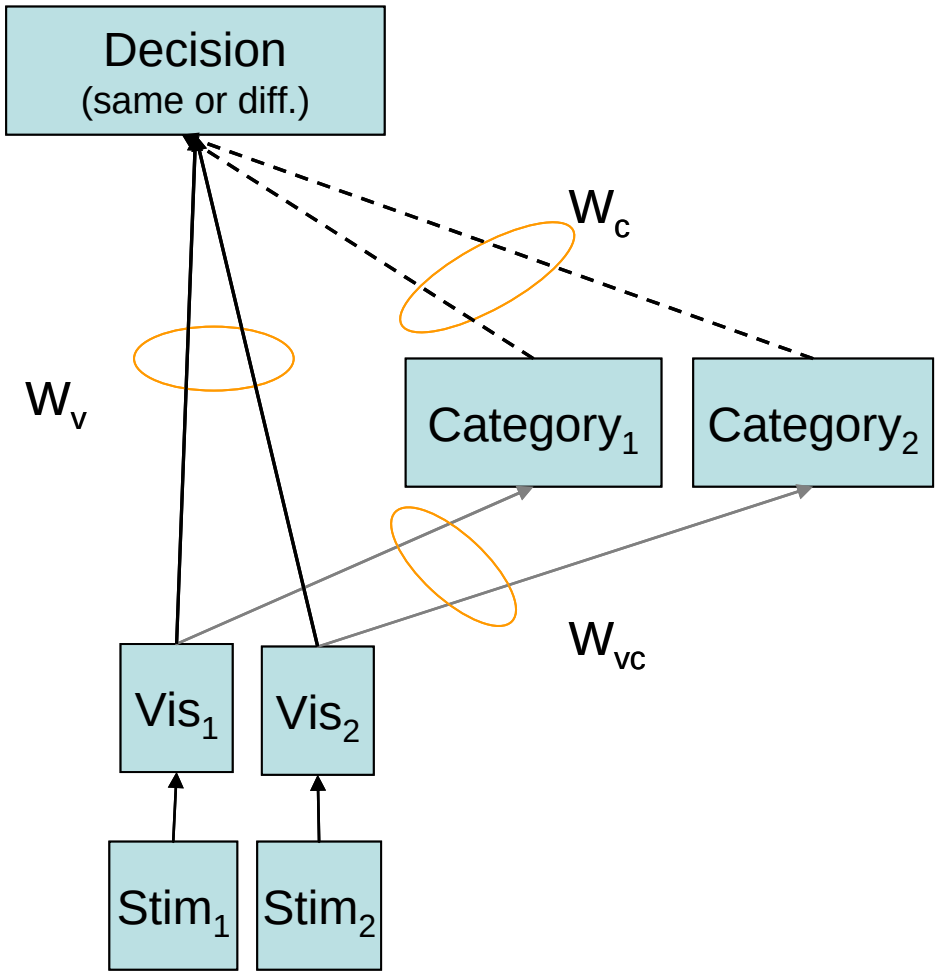
A further explanation of why a decision-level model cannot account for a category effect that varies with the onset delay of the second stimulus.



Consider the model above (fashioned after the Merge model of Norris, McQueen, & Cutler, 2000; see also Mitterer, Horschig, Musseler, & Majid, 2009). On this model, the category effect – slower responses for within-category than between-category trials – is modeled in terms of competition between a response based on a comparison of the visual features (solid black lines) and the response based on a comparison of the category membership (dashed lines). That is, in this model visual representations are *not*

penetrated by conceptual factors. A greater category effect can be produced by increasing W_c, and/or decreasing W_v. Critically, neither the visual weights nor the category weights contribute meaningfully to the decision until *both* stimuli are present.

Now, let us run through this model for the simultaneous presentation case. Let $Stim_1$=B and $Stim_2$=b. After a visual feature analysis, the stimuli activate their appropriate category representations, which are identical for these two stimuli. A decision based on the visual features would produce a "different" response, while a decision based on the conceptual features would produce a "same" response. The degree to which the final decision is affected by the (misleading) information from the category layer depends on the relative contributions of W_v and W_c. In Experiment 1, no reliable effect was found for simultaneous presentations, so let us set W_v and W_c to values that yield a minimal contribution of the category layer to the final decision. The question now is whether there is any way to increase the influence of the category layer on the decision for sequential judgments.

Let us run through a sequential trial. $Stim_1$ is presented and automatically categorized. Sometime during or after the categorization process (depending on the length of the SOA and strength of W_{vc}), $Stim_2$ is presented and starts being categorized. Critically, the SOA is irrelevant for the category effect because neither the visual layers nor the category layers can inform the decision until *both* letters are present. The categorization process can be slowed down/inhibited by decreasing $W_{vc.}$ The category effect will be appropriately decreased: the decision will now be reached based on the visual features

because the category information has not had a chance to propagate. But notice that this decrease would affect simultaneous and sequential trials equally because in this model, a single item (categorized or not) does not affect the decision process.

A purely feed-forward model can be made to work by adding an additional layer (call it V-C) which combines inputs from both the visual and category information. V-C would in turn feed into the decision layer. Note, however, that this is no longer a decision-level model because category-level representations are altering visual representations rather than decision-level representations

References:

Mitterer, H., Horschig, J. M., Musseler, J., & Majid, A. (2009). The Influence of Memory on Perception: It's Not What Things Look Like, It's What You Call Them. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*(6), 1557-1562.

Norris, D., McQueen, J. M., & Cutler, A. (2000). Merging information in speech recognition: feedback is never necessary. *The Behavioral and Brain Sciences*, *23*(3), 299-325; discussion 325-370.