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Adapting the Theory of Visual Attention (TVA) to model auditory attention.

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Mathematical and computational models have provided useful insights into normal and impaired visual attention, but less progress has been made in modelling auditory attention. We are developing a Theory of Auditory Attention (TAA), based on an influential visual model, the Theory of Visual Attention (TVA). We report that TVA provides a good fit to auditory data when the stimuli are closely matched to those used in visual studies. In the basic visual TVA task, participants view a brief display of letters and are asked to report either all of the letters (whole report) or a subset of letters (e.g., the red letters; partial report). For the auditory task, we used dichotic, concurrently-presented synthesised vowels. These auditory stimuli are closely-matched to the visual stimuli, in that they are simultaneous, separated in space, and unchanging over time. We found that TVA could successfully model the auditory data, producing good estimates of the rate at which information is encoded (C), the minimum exposure duration required for processing to begin (t0), and the relative attentional weight to targets versus distractors (α). Future work will address the issue of target-distractor confusion, and extend the model to accommodate stimuli that vary in their spectro-temporal profile.

1. Bundesen, C. (1990). A theory of visual attention. Psychological Review, 97, 523-547.