

Public Abstract

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Title:BOUNDARY CONDITIONS FOR A VISUAL WORKING MEMORY CAPACITY MODEL

Cowan's K (Cowan, 2001) is an effective measure of visual working memory capacity and has been widely accepted by working memory researchers in recent years. However, one fundamental assumption of this measure, so called the all-or-none assumption (i.e., an observer either remembers everything or nothing about a visual stimulus), could be over-simplified and thus impose validity boundaries for Cowan's K. Little has been done to examine the potential limitations of the assumption in terms of its impact on Cowan's K. As an attempt to fill this gap in the literature, the present project explored the boundary conditions of Cowan's K through addressing the following questions: 1) whether the all-or-none assumption can survive different types of visual working memory test procedures and 2) whether the all-or-none assumption is still viable with complex visual stimuli. The results suggest that the all-or-none assumption is fairly robust across different test procedures, as long as the visual stimuli are simple and familiar. When complex and novel stimuli were used, however, the all-or-none assumption led to significant discrepancies across different test procedures. In addition, it was found that the validity of the all-or-none assumption could be compromised (when articulatory suppression was imposed during visual presentation of English consonants) or enhanced (when extra time was given during visual presentation of Chinese characters). In conclusion, the all-or-none assumption can be extended to visual working memory test procedures other than the conventional change detection paradigm, provided that features of a visual object can be encoded into an abstract representation in visual working memory. Reasons for the failure of the all-or-none assumption were discussed and a revision of Cowan's K formulation was proposed to account for visual working memory performance with both simple and complex stimuli. An interesting observation of experiment participants' non-rational strategy use was also reported.