Extending an integrated computational model of the time-based resource-sharing theory of working memory

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Abstract

The time-based resource-sharing (TBRS) model envisions working memory as a rapidly switching, serial, attentional refreshing mechanism. Executive attention trades its time between rebuilding decaying memory traces and processing extraneous activity. To thoroughly investigate the implications of the TBRS theory, we integrated TBRS within the ACT-R cognitive architecture. This allowed us to test the TBRS model against both participant accuracy and RT data in a dual task environment and in particular, determine the patterns in these data directly attributable to working memory limitations. In the current work, we extend the model to include articulatory rehearsal, which allows us to examine suppression effects. Additionally, we use the model to predict performance under a larger range of cognitive load. These predictions enable a stronger test of the TBRS model that would not be possible without our complete computational account of TBRS and the general assumptions of the ACT-R framework.