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Differentiating the Contextual Interference Effect from the Spacing Effect

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Interleaving, as opposed to blocking presentations of stimuli sets, can impair learning during training yet enhance retention after a delay or on transfer tasks (Battig, 1972; Shea & Morgan, 1979). Since the initial studies, these effects have been shown in diverse cognitive and motor tasks. These studies have in common that two or three stimuli sets were developed such that materials within each set were distinct yet shared features with the other set(s) (e.g. two ball toss patterns). The similarity was designed to create competition for the learner, such that the learner had to both learn the sequences and distinguish them. Battig (1972) described this competition as the contextual interference effect (CI).

While the CI effect has been widely documented, a natural confound has been integral to the studies. Interleaving materials also introduces spacing between the presentations of each set of learning materials.

The current experiment addresses the relationship between the CI effect and the spacing effect. The spacing effect is one of the most robust cognitive scientific findings (see Dempster, 1990); however, its relationship to contextual interference is less well understood. In this study, foreign language vocabulary words were used to test the prediction that CI is distinct from spacing, and that the CI and spacing effects are additive.

Eighty undergraduates were taught translations of eight English words into both Swahili and Estonian, in a task designed to maximize CI (materials from Pashler, UCSD). Subjects completed six anticipation trials, (prompted generation with feedback) and after a brief delay completed a transfer test. The test required subjects to discriminate between the two languages and present both translations for an English word. During training, the languages were either interleaved (I) or blocked (B) between subjects. The spacing between repetitions of a word was kept constant (CS) across the blocked and half of the interleaved stimuli (7-10 items between repetitions) to isolate the effect of interleaving. Spacing was doubled for the other half of words in the interleaving condition (DS) (15-18 intervening items).

Learning curves and final test accuracies are shown in Figure 1. An interaction between performance at trial six and performance on the transfer test revealed that while

accuracy during training was highest for B-CS items and lowest for I-DS items, the opposite was true on the test. Test performance was highest for I-DS items and lowest for B-CS items.

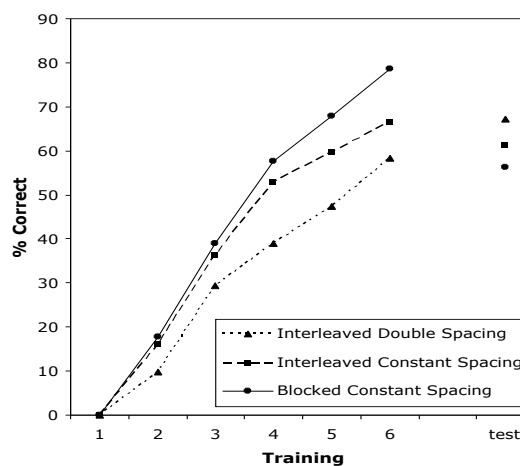


Figure 1. Interleaving and spacing effects during training and on a transfer test.

The data support the prediction that interleaving and spacing are distinct phenomena, and both impair performance during learning yet enhance retention and transfer. Further, the data suggest the effects are additive.

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