Interference Effects

A phenomenon in which mental processing is made slower and less accurate by competing mental processes.

Interference effects occur when two or more perceptual or cognitive processes are in conflict. Human perception and cognition involve many different mental systems that parse and process information independently of one another. The outputs of these systems are communicated to working memory, where they are interpreted. When the outputs are congruent, the process of interpretation occurs quickly and performance is optimal. When outputs are incongruent, interference occurs and additional processing is needed to resolve the conflict. The additional time required to resolve such conflicts has a negative impact on performance. A few examples of interference effects include:[1]

Stroop Interference—an irrelevant aspect of a stimulus triggers a mental process that interferes with processes involving a relevant aspect of the stimulus. For example, the time it takes to name the color of words is greater when the meaning and color of the words conflict.

Garner Interference—an irrelevant variation of a stimulus triggers a mental process that interferes with processes involving a relevant aspect of the stimulus. For example, the time it takes to name shapes is greater when they are presented next to shapes that change with each presentation.

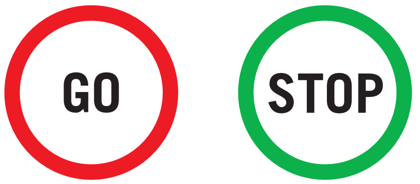
Proactive Interference—existing memories interfere with learning. For example, in learning a new language, errors are often made when people try to apply the grammar of their native language to the new language.

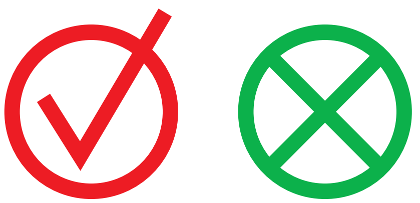
Retroactive Interference—learning interferes with existing memories. For example, learning a new phone number can interfere with phone numbers already in memory.

Prevent interference by avoiding designs that create conflicting mental processes. Interference effects of perception (i.e., Stroop and Garner) generally result from conflicting coding combinations (e.g., a red *go* button, or green *stop* button) or from an interaction between closely positioned elements that visually interact with one another (e.g., two icons group or blend because of their shape and proximity). Minimize interference effects of learning (i.e., proactive and retroactive) by mixing the presentation modes of instruction (e.g., lecture, video, computer, activities), employing advance organizers, and incorporating periods of rest every thirty to forty-five minutes.

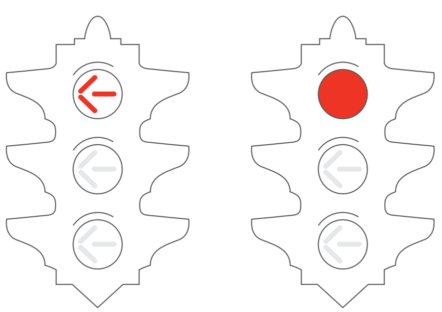
See also Advance Organizer, Performance Load, Errors, and Mapping.

[1] The seminal works on interference effects include "Studies of Interference in Serial Verbal Reactions" by James R. Stroop, *Journal of Experimental Psychology*, 1935, vol. 28, p. 643–662; "Stimulus Configuration in Selective Attention Tasks" by James R. Pomerantz and Wendell R. Garner, *Perception & Psychophysics*, 1973, vol. 14, p. 565–569; and "Characteristics of Word Encoding" by Delos D. Wickens, in *Coding Processes in Human Memory* edited by A. W. Melton and E. Martin, V. H. Winston, 1972, p. 191–215.

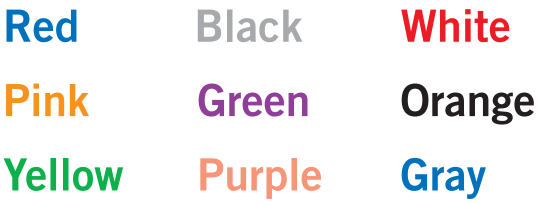




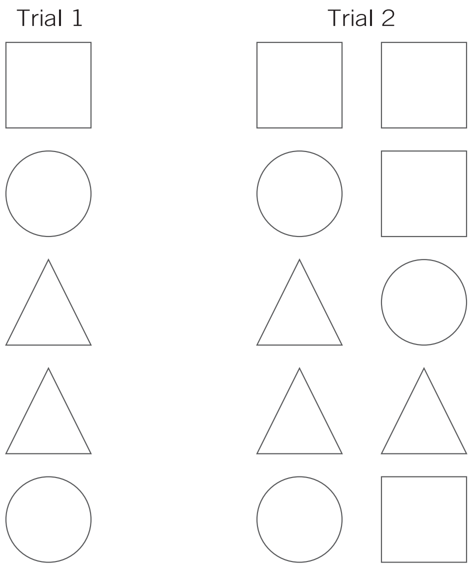
In populations that have learned that green means *go* and red means *stop*, the incongruence between the color and the label-icon results in interference.



In populations that have learned that a traffic arrow always means *go*, the introduction of a red arrow in new traffic lights creates potentially dangerous interference.



Reading the words aloud is easier than naming their colors. The mental process for reading is more practiced and automatic and, therefore, interferes with the mental process for naming the colors.



Naming the column of shapes that stands alone is easier than naming either of the columns located together. The close proximity of the columns results in the activation of mental processes for naming proximal shapes, creating interference.