

## Summary

The development of sensitive and simple tests for the assessment of the negative priming effect has theoretical relevance to the elucidation of selective attention models, and also practical and potential clinical implications. The negative priming effect has been regarded as an index of inhibitory attentional processing and was proposed for the detection of syndromes that involve cognitive impairment. Diminished negative priming was reported in studies of individual differences, developmental stage, and clinical populations. However, evidences suggest that tasks requiring responses to the color feature, location or object identity of the stimuli may comprise distinct types of negative priming tasks. The following studies presents data for computerized and paper-and-pencil tasks to examine negative priming for Stroop color-word, location and identity distractors. All four studies take into account aging effects across the tasks. For comparisons between age-groups, proportional performance scores (ratio) were used. A first study employed a reading-sheet Stroop-color-word task, in which the participant is asked to name the colors of the ink in which words with incongruent color names have been printed. Color-word interference is indicated by increased time to complete the conflicting color-word condition compared with a nonconflicting condition with patches of color or strings of Xs. The greater strength of the interference, when the target ink-color of the present stimulus is the distracting color name of the previous stimulus, is attributed to the negative priming effect. A pilot experiment showed that the order of the list conditions containing unrelated and related stimuli affected the negative priming index. The analysis of data demonstrated that a practice trial in color naming of conflicting color-words before the color-word conditions eliminated the effect of the order of the lists. In addition, there was a reliable

Stroop reverse interference after practice in color naming, as indicated by the fact that the incongruent color-ink affected post-test word-reading, whereas it had no effect in the pretest word-reading. With practice procedure, older and younger subjects did not differ in their proportional interference scores, whereas the negative priming and reverse effects were increased for older adults. Study 2 examined the negative-priming effect in a spatial localization task under single- and dual-task conditions. The task required the subject to detect the location of a target letter, 'O', while ignoring a distractor letter, 'X', when it was present. Significant negative-priming effects were observed under both task conditions, with increased response times for trials in which target location had matched the location of the distractor on the preceding. The magnitude of the negative priming effect was not different for older and younger adults. The performance in the single-task condition showed laterality effects with a right visual field advantage for control and target-alone trials, but not for related trials. In consequence, in the single-task condition, negative priming was observed only for targets displayed in the right hemifield. However, a concurrent digit span task, with a load level that had shown no affect on the dual-task coordination capacity, eliminated the laterality effects, but the negative priming effect remained. These results are considered as neuropsychological evidence that interhemispheric processes may operate under more controlled conditions. Studies 3 and 4 examined negative priming by using an identity-based task that required participants to select the greater of two-digits display or the digit that was paired with an asterisk. Study 3 presents data for a computerized version of the task. Negative-priming was expressed as a slowing in the time to name the digit that had been ignored in the preceding trial, compared to control trials with consecutive targets and distractors always different. Analysis of data revealed that negative priming was reliable only for younger adults, and

only when target probe and distractor prime appeared at the same location, suggesting that suppression for location of distractor was underpinning the negative priming effect. However, response latencies for the control trials were facilitated when the target probe and the distractor prime shared the same location. Thus, local suppression affected negative priming for attended distractors with a cost in the response latency for ignored-repetition trials and with a gain in response latency for control trials when the locus of target-probe and distractor-prime was the same. In contrast, older adults' performance showed local suppression for both ignored-repetition and control trials. This may explain the lack of negative priming for older adults in the digit-comparison task. Study 4 presents data for a new paper-and-pencil version of the digit-comparison task to obtain a practical measure of negative priming that do not require cumbersome technical equipment. In that task, subjects were asked to circle digits that were paired with asterisks and the greater of two digits in a series of digit pairs listed on a sheet of paper. For younger participants, but not for older participants, the time to complete the sheet with related pairs was slower than for unrelated pairs. In addition, the reduced scores of negative priming in older adults were associated with the lowest sustained attention scores from Toulouse-Piéron test. These results suggest that older adults' performance in the digit-comparison task were mainly related to flexibility and sustained attentional scores, and the lower sustained attentional coefficient seemed to be the best predictor of diminished or reversed negative priming in older adults. Younger adults showed reliable negative priming across all tasks. In contrast, older adults showed negative priming in Stroop and spatial tasks, when compared with younger subjects performance, but reduced negative priming in identity suppression tasks. The findings are consistent with neurophysiological and behavioural evidence that identity and location suppressing may rely on separate inhibitory

mechanisms, and that not all of these processes are weakened by factors associated with age.