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The Impact of Stroop Interference and the Simon Effect on Implicit Association Test Performance

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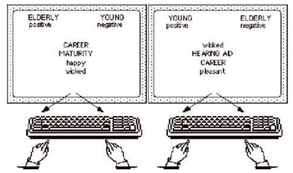
Summary

The implicit association test (IAT) is a method used to examine associations individuals make between concepts and evaluations (Greenwald & Banaji, 1995). The typical finding with the IAT is that RTs are faster when the concepts and evaluations share the same response key. While the IAT has been used to examine a variety of associations, factors influencing these associations are still under consideration. For instance, Klauer et al. (2010) examined aspects of cognitive control in the IAT. They included measures related to switching mental sets, inhibition of responses, and working memory capacity. They found that switching between mental sets was related to IAT performance. In this experiment, participants completed a Simon task, Stroop task, and the flower-insect IAT. Participants showed typical Simon effect and Stroop interference. IAT results were consistent with Greenwald, McGhee, and Schwartz (1998). While covarying Simon performance had no impact on the IAT, covarying Stroop performance did reduce the size of associations found between flowers and insects across conditions. These results suggest that the ability to inhibit one response in favor of another contributes to IAT findings.

Objectives

The implicit association test (IAT) examines thoughts and feelings that occur automatically, outside of conscious awareness and control, within social cognition. Items from a concept are presented in pairs. RTs are faster when items that are typically associated together share the same response key.



Two aspects of the IAT paradigm are examined in this study, one dealing with presentation and response options and the other with the underlying cognitive process. First, stimuli are presented on the right and left side of the display and participants make either a right or left hand response. Therefore, it is possible that the Simon effect could contribute to the IAT effect. The stimuli are related within a particular concept with some items more strongly associated than others. Different blocks of trials are presented. The IAT effect is the difference between the “non-compatible” block and the “compatible” block. This is similar to congruent and incongruent trials in a Stroop task.

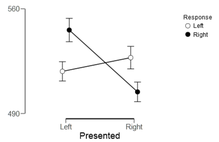
In this study, 46 introductory psychology students participated for class credit. They completed a standard Simon task, Stroop task, and flower-insect IAT. Order of the tasks was randomized across participants.

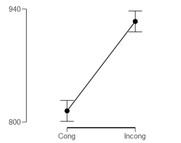
Results

Three effects were included in this study. A two-way repeated measures ANOVA was used to determine If there was a relationship between stimulus location and response location. There was a significant interaction between stimulus location and response location ($F(1, 45) = 10.85$, $p < .002$; $\eta^2 = .19$). Participants were faster responding to stimuli on the right side of the screen when a right-hand response was required and faster responding to stimuli on the left side of the screen when a left-hand response was required.

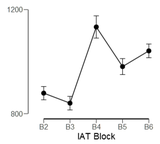
Presented	Response	Mean	SD	N
Left	Left	518.2	96.96	46
	Right	545.8	103.26	46
Right	Left	527.4	98.33	46
	Right	504.5	108.85	46

	N	Mean	SD	SE
Cong	46	813.8	126.5	18.66
Incong	46	924.6	138.9	20.47



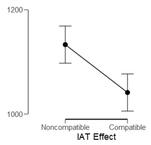


A repeated measures t-test was used to compare congruent and incongruent trials on the Stroop task. The difference between the conditions was significant ($t(45) = 12.20$, $p < .001$; $d = 1.80$) indicating Stroop interference.



A repeated measures ANOVA was used to examine differences on the IAT trials. Similar to the results from Greenwald, McGhee, and Schwartz (1998), we found a differences between the initial, pleasant/unpleasant, non-compatible combined, reversed target, and compatible combined blocks ($F(4, 180) = 14.79$, $p < .001$; $\eta^2 = .25$).

Of particular interest is the difference between the non-compatible and compatible blocks since the difference between those blocks is the IAT effect. When the Simon effect served as a covariate, the IAT effect persisted ($F(1, 44) = 5.46$, $p < .03$; $\eta^2 = .11$). However, when Stroop interference served as the covariate the Simon effect was eliminated ($F(1, 44) = .03$, NS).



Discussion

The IAT has been an extremely useful task for advancing our understanding of implicit memory in social contexts, examining associations made across a multitude of different groups, identifying specific biases during clinical training, and facilitating the conversation on implicit prejudice (e.g., racism, sexism, ageism). However, there have been some criticisms regarding the validity of the task. For instance, Siegel, Dougherty, and Huber (2012) and Storbeck, (2012) have questioned the impact of cognitive control. Wright and Meade (2012) have also noted that unrelated IATs are correlated possibly suggesting cognitive ability as a contributing factor to the IAT effect.

The present study examined the role of location (Simon effect) and inhibition (Stroop effect) on IAT performance. Participants showed significant Simon, Stroop, and IAT effects. Although covarying the Simon effect only produced a minor reduction in the IAT effect, controlling for Stroop interference eliminated the IAT effect. This finding suggests that the IAT may not only examine implicit associations but also the ability to inhibit those associations. It is important to note that the IAT in this study was a relatively non-threatening flower-insect task. The ability to inhibit associations may be even more important for threatening items (e.g., Booth, Mackintosh, and Sharma, 2017).

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