Temporal Exposure to Semantic Concepts and Corresponding Stroop Responses: Does Being in College Make You Less Attached to College?

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Abstract

Previous literature has indicated that personal familiarity with words increases emotional interference when responding to those salient words on versions of the Stroop task, as indicated by longer response times. We hypothesized in our current experiment that this effect could be demonstrated based solely on the increased emotional attachment that newer students to Pomona College felt towards Pomona-related words compared with older students who were more familiar with and potentially less excited about these words. First-year and fourth-year Pomona students were presented with a Stroop task featuring both Pomona-related and non-Pomona related neutral words and their response time and accuracy were recorded. We found no significant difference in the relative speed of processing or response accuracy for Pomona-related versus neutral words between the two groups, indicating that the results elicited in the previous studies may have been found only because of the particularly strong emotional attachments they tested for in their experimental groups.

Introduction

Variations on the Stroop task, in which participants must code correctly and rapidly the ink color of a presented word regardless of the semantic meaning of the word itself, have been used for over seventy years. Most commonly, these tasks involve testing subjects' ability to inhibit attention towards the meaning of a word when it is in direct competition with the nature of the task (i.e. ignoring the written word "red" in favor of processing and responding to the ink color of green). However, it is only in more recent years that forms of the Stroop task have turned away from the classic color word vs. ink color paradigm and been used more generally for testing how quickly and accurately people will respond to the ink color of a word when the word relates strongly in some way to their own life that it may not to others (MacLeod, 1991). For example, Erblich et al. (2003) found that women with a history of breast cancer in their family took longer to respond correctly to cancer-related words in a Stroop paradigm due to the personal emotional interference familiarity with these words presented. In another experiment, Zetteler et al. (2006) had similar results when presenting alcohol-related words to adolescents who had alcohol-dependent parents. In both cases, the attentional bias towards words that had particularly powerful semantic connections with the subjects' own lives was strong enough to elicit slower responses on the Stroop task.

Despite these more recent revelations, there is still no body of work that finely assesses the importance, or lack thereof, of the emotional attachment of words within groups of people that are similarly aware of these words but who have differing levels of familiarity with them. That is, while the studies cited above have shown that the effect of differing life experiences can be demonstrated through Stroop tasks, in this experiment we investigated whether groups with similar life experiences might respond differently solely based on the amount of time they had

been exposed to those shared experiences. Being situated within a college proved inherently helpful in designing a study within those parameters.

We hypothesized that first-year students who had recently arrived to Pomona College would feel that Pomona-related words were novel, special, and emotionally exciting. By contrast, fourth-year students would experience less emotional interference in response to Pomona-related words due to longer temporal durations of being exposed to these words. This psychological difference in familiarity could be detected through a Stroop task that presented both Pomona-related and neutral (i.e. not related to Pomona) words and recorded the accuracy and response times for each group. While we held no belief specifically about whether neutral or Pomona-related words would be responded to faster within groups, we expected, given the previous studies described above, that the fourth-year students with equal levels of familiarity but less novel emotional attachment to Pomona College would respond relatively quicker and more accurately to the Pomona words compared with the neutral words than the first-year students would.

Methods

Participants – The participants for this experiment were all drawn from the student population of Pomona College. There were two experimental groups, first-year students (n = 10) who had matriculated approximately six weeks prior and fourth-year students (n = 10) who had been students at the college for over three years. Within these two groups participants were selected randomly via social media advertising without reference to other demographic information.

Materials – The Stroop task used in this experiment was designed using E-Prime 2 software. The trials were run on 21.5-inch iMac computers. Participants were provided with a keyboard featuring blue, green, yellow and red stickers on the corresponding keys (blue-z, green-x,

yellow-m, red-n). The Stroop task, not including a test phase of 10 words, contained 28 words, each of which was presented four times in four different colors throughout the trial phase of the experiment. Of the words used in the test trial, 14 were related to Pomona College and the other 14 words were matched for number of letters, syllables and frequency with the Pomona related words (see Table 1). A Google survey was also used asking participants to rate the Pomona related words as familiar or unfamiliar.

Procedure – The participants were asked to come into the computer lab where the experiment was run. They were first given the instructions that told them to identify the color of the word and press the right key according to the color as quickly as possible. First, the program presented them with a practice phase of 10 unrelated words. Following this, subjects were prompted to begin the test phase of the experiment that consisted of the 28 words, half of which were Pomona-related, in the four different colors presented randomly. After completing the Stroop task, they were asked to fill out the Google survey assessing semantic knowledge of the Pomona-related words tested.

Results

Among first-year students, the mean response time was 649.239 milliseconds (ms) for Pomona related words at 95.94% accuracy and 649.955 ms for non-Pomona related words at 97.36% accuracy (Table 2). Among fourth-year students, the mean response time was 580.310 ms for Pomona related words at 95.48% accuracy and 586.620 ms for non-Pomona related words at 93.57% accuracy (Table 3).

There was no significant difference between response times for Pomona- and non-Pomona related words within either group. However, fourth-year students responded more quickly to both sets of words than first-year students: for Pomona related words, fourth-year

students responded 10.63% more quickly, while for non-Pomona related words, students responded 9.74% more quickly.

All of the participants, both first-years and fourth-years, said that they knew what all of the Pomona related words referred to in the following Google survey.

Discussion

By any measure our hypothesis failed to be demonstrated in the current experiment. There was no significant effect of time spent in college on how quickly or accurately participants responded to words related or not related to Pomona College. The only result of note was that fourth-year students responded more quickly to all words than did first-year students. This could be attributable to a number of factors including prior familiarity with the Stroop task, years of completing similar psychological experiments, or a general speed of processing advantage garnered by more experience in classrooms of higher education. Discovering the exact mechanism behind, or even just the replicability of, this result could be grounds for a future experiment.

Given the Zetteler and Erblich results indicating slower response times to emotionally salient words, it would be reasonable to assume, prior to this experiment, that subjects completely unattached or unaware of the Pomona-related words would respond more quickly to those words than students who had spent some time in Pomona College. Even this assumption would be unfounded given the current results, though, because there was not even a difference in either group between how fast they responded to Pomona and non-Pomona related words: being familiar with and/or attached to the words meaningful in the context of college had no effect in the Stroop task paradigm here. It may very well be the case that the results elicited in the previous studies were found only because of the particular strength of the life experience in

question. Having a parent who is an alcoholic or knowing a loved one who went through cancer treatment forms neural connections to information semantically-related related to that experience that far outweigh those fostered by merely being familiar with an institution.

References

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MacLeod, Colin M. (1991). Half a century of research on the Stroop effect: an integrative review. *Psychological Bulletin, 109.2,* 163-203.

Zetteler, J., Stollery, B., Weinstein, A., & Lingford-Hughes, A. (2006). Attentional bias for alcohol-related information in adolescents with alcohol-dependent parents. *Alcohol & Alcoholism, 41,* 426-430. doi: 10.1093/alcalc/agl026

Tables

	Pomona related words	Neutral words	Word-length	Syllables
1	Frary	Civil	5	2
2	Sagehen	Session	7	2
3	Chirp	Round	5	1
4	Spibling	Thousand	8	2
5	Coop	Tall	4	1
6	Frank	Shape	5	1
7	Forty-seven	Application	11	4
8	Sponcest	Platform	8	2
9	Skyspace	Contrast	8	2
10	Oxtoby	Poetry	6	3
11	Feldblum	Conflict	8	2
12	Pomona	Animal	6	3
13	Doms	Fair	4	1
14	Marston	Chapter	7	2

Table 1 – Pomona related and non-Pomona related (neutral) words presented in the experiment

First-year Students	Response Time (ms)	Accuracy
Pomona-related words	649.2385712	95.94%
Non-Pomona related words	649.9554411	97.36%

Table 2 – Response time and accuracy results for first-year students (n = 10)

Fourth-year Students	Response Time (ms)	Accuracy
Pomona-related words	580.3102768	95.48%
Non-Pomona related words	586.6206044	93.57%

Table 3 – Response time and accuracy results for fourth-year students (n = 10)