

## Implicit Association Test

Colin Tucker Smith and Brian A. Nosek

University of Virginia

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When waiting for a movie to begin, it is common to see advertisements for the soda, popcorn and candy you passed by (or bought) in the lobby. Whether you are paying attention to the advertisement or are talking to a companion, the pairing of ice-cold containers of soda with other attractive images and sounds establishes an association between “soda” and “good” in your mind. In the theater and beyond, the mind is constantly gathering information from the social environment and creating, revising, and reinforcing associations in memory. The mind is so prolific at forming these associations that it may do so even if you would rather not have them.

The Implicit Association Test (IAT) is a procedure for measuring implicit associations - feelings and thoughts that exist outside of conscious awareness or control. The IAT measures the strength of associations that accumulate through everyday experiences, whether or not the person is aware of holding those associations, and whether or not the associations are believed to be valid or true. The IAT is a sorting task predicated on the assumption that it is easier to make the same response to two things when they are related than when they are unrelated. For example, someone who has negative associations about old people might have a more difficult time linking pictures of old people with concepts like “nice,” “warm,” and “wonderful” compared with concepts like “awful,” “terrible,” and “horrible.” In an IAT measuring associations with age, participants quickly categorize young and old faces and words whose meanings are “good” or “bad” using two keys on a computer keyboard. In one part of the task, participants categorize pictures of young people and “good” words with one response key, and pictures of old people and “bad” words with another key. In a second part of the task, the key assignments change. Participants categorize pictures of old people and “good” words with one response key, and pictures of young people and “bad” words with another. People with more positive associations for young versus old people are able to complete the task more quickly when young and “good” share the same key compared to when old and “good” share a key. Another way of saying this is that they have an automatic preference for young people relative to old people. Importantly, people are not deciding how they feel in the IAT – they are simply categorizing words and faces as quickly as possible. As a consequence, even someone who honestly reports liking old people as much as young people may show evidence of having comparatively negative associations about old people in their memory (try it yourself: <https://implicit.harvard.edu/>).

The IAT is a flexible tool. The previous example measures age associations, but it can be adapted to measure positive or negative associations about any types of concepts. Also, the “evaluative” concepts in the IAT can be changed to measure stereotypes and self-concepts. This flexibility has made the IAT a popular tool for a variety of applications such as measuring fear and threat associations with spiders among people with spider phobia; personality characteristics such as associations of shy with oneself; and positive and negative associations for consumer products, social groups, and political candidates.

Importantly, how people behave is predicted by both automatic associations and self-reported, deliberate thoughts and feelings. For example, a recent review suggests self-reported feelings are more related to behaviors controlled by the actor (such as what someone says during an interview), whereas the IAT is more predictive of relatively uncontrolled behaviors (such as seating position, speaking time, amount of smiling and

eye contact in that same interview context). Further, although self-reported feelings are important predictors of behavior, the IAT appears to be a better predictor for situations or topics that are socially sensitive such as racial prejudice and stereotypes.

Just over ten years after its initial publication, the IAT has been used in more than 500 scientific publications. This has promoted rapid learning and refinement of the IAT's features and limitations. As with any measurement tool, there are extraneous influences that interfere with its effectiveness as a measure of associations. For example, while the IAT is more reliable than related association measures, it is not perfectly reliable. It is somewhat akin to measures of blood pressure by showing some consistency over time but fluctuations from moment-to-moment. Also, some features of the procedure influence performance on the task. The most prominent influence is the order of the categorization tasks (i.e., whether Old People and "good" share a response key before or after Young People and "good"). The first task performed interferes with performance on the second. Likewise, people who respond more quickly on average tend to show smaller IAT effects than people who respond more slowly. Identification of extraneous influences such as these provides an opportunity to reduce or remove their influence. The "order effect" and "average response time" influences have been reduced with procedural and analytic innovations, respectively. The coming years of research will continue to refine the methodological features of the IAT for association measurement.

There are also a number of open questions about interpreting IAT scores. For example, should mental associations different from a person's expressed beliefs be considered something that belongs to them, or something belonging to their culture? If someone disagrees with associations revealed by their IAT score, does that mean they are lying? The answer to the latter question is "no." People can possess associations they honestly disagree with, but that still exist in their minds and may even influence their behavior.

The thoughts and feelings people consciously experience and endorse are integral to understanding human life. However, much of mental processing occurs outside of conscious awareness and understanding automatic reactions is also important for gaining insight into the workings of the human mind. Tools such as the IAT offer windows into portions of the mind people are unable to express, either because they do not want to, or because they do not even know they possess them.

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