Development of the FUMIE Test for Measuring Implicit Association of Target Words with Negative Emotions

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Implicit Association Test (Greenwald et al., 1998)
Greenwald et al. (1998) developed an implicit association test (IAT) that measures the differential association of two target concepts with an attribute in the following procedure. The two target concepts (e.g., flower vs. bee) appear in a 2-choice task on a computer display, and the evaluation attribute (e.g., pleasant vs. unpleasant words) in a 2nd task. When the instruction is to share a response key for highly associated categories (e.g., flower and pleasant), performance is faster than when less closely associated categories (e.g., bee and pleasant) share a key. This performance difference implicitly measures the differential association of the two concepts with the attribute. Greenwald et al. (1998) found that there were about 100 to 200 milliseconds differences between the latencies of the compatible combined task (e.g., flower and pleasant) and the noncompatible combined task (e.g., flower and unpleasant).

The IAT is a useful tool for assessing the implicit emotions underlying certain types of social discrimination, such as racial discrimination, by measuring the differences in latencies. These implicit emotions cannot easily be assessed by an ordinary questionnaire because either holders unaware of their biases or they are hidden consciously by the holders. The IAT can reveal these unconscious or hidden prejudices against minorities or other forms of bias. Greenwald et al. (1998) reported that the IAT was successful in revealing hidden ethnic attitudes among Korean-American and Japanese-American subjects that were assumed to be mutually opposed. It also proved to be effective in revealing implicit attitudes of white subjects toward blacks and other white people.

Development of the FUMIE Test
The IAT measures miniscule differences between the latencies of each key-response in milliseconds. That is why it requires sophisticated equipment. However, if these small differences of latencies are totaled up in a series of similar task performances, the cumulative difference can be measured in seconds. The Color Stroop Test (CST) is an example that measures the accumulated time length of latencies impaired by cognitive conflicts between color naming and word reading. Performance speed can be measured in two ways; measuring time or measuring number of tasks accomplished within a limited time. Task amount measurement is advantageous because it can be utilized for a group performance test. The Uchida-Kraepelin Performance Test (UKPT) is an example that measures performance speed based on number of completed tasks. The FUMIE (Filtering Unconscious Matching of Implicit Emotions) Test is a paper-and-pencil test based on the IAT, measuring completed tasks in a similar way as the UKPT. In the first task of the FUMIE Test, subjects are instructed to make a circle (○) under one of the target words and pleasant words and a cross (×) under the other target and unpleasant words consecutively as quickly as possible within 30 seconds. In the second task, the target words and pleasant/unpleasant words are combined oppositely. The difference between the two task performances is a measure of cognitive impairment caused by unconscious matching of target words to pleasant or unpleasant words, or an equivalent measure to the IAT effect.


Methods
Subjects. Forty-seven junior high school students, 49 undergraduates and young adults in their twenties, and 52 adults of 30 years or older took the FUMIE Test with three pairs of Japanese target words. All of them were native Japanese.

Target words. Three pairs of target words were assessed and compared: white hair (白髪) vs. black hair (黒髪), white people (白人) vs. black people (黒人), and Heidi (ハイジ) vs. Sambo (サンボ). The main research objective was to compare the latter two pairs. Another target pair, white hair...
and black hair, was included to ascertain whether the word “black” itself would cause a negative association or not. Sambo is the hero of Helen Bannerman’s picture book, “The Story of Little Black Sambo (LBS).” Heidi is the white protagonist of a TV animation “Heidi, a Girl of the Alps.” A preliminary analysis assured that Heidi was well known to a wide age range of the Japanese people.

**Attribute dimension.** Evaluation (i.e., pleasant and unpleasant) was used. Sixteen pleasant concepts, such as 祝福 (希望) 和 平静 (平和), and 16 unpleasant concepts, such as 自杀 (自杀) 和 危险 (危险), were selected through preliminary analysis by assessing the word familiarity of 20 undergraduates. All the concept words were selected from those words usually written in two Chinese characters and having three syllables so that they could be written in three Japanese katakana letters so as to appear similar to the target words, Heidi and Sambo.

**Construction of the FUMIE Test.** The FUMIE Test booklet was composed of 18 test sheets and an additional sheet for the questionnaire. On each test sheet (210 x 297 mm, or A4 size), 13 rows of six words were printed. Each test sheet was preceded an instruction sheet. For each pair of target words, three test sheets were prepared: Concepts-only, Noncompatible Combination, and Compatible Combination. The Compatible Combination task was to mark a circle (○) under 白色 hair, 色人 (白人), Heidi, and pleasant words, and a cross (×) under “black hair,” “black people,” “Sambo,” and unpleasant words. In the Noncompatible Combination tasks the target words were combined oppositely. It should be noted that “white hair” was operationally grouped with “white people.” The 16 pleasant words and 16 unpleasant words appeared randomly twice or three times on the Concept-only test sheet. The target words were randomly interspersed among the concept words, appearing 15 to 16 times on each test sheet. The last sheet was a questionnaire asking the gender and age of the subjects, and whether they had read LBS or not. The tests were carried out in groups on three different occasions. It took about 15 minutes to complete the test sessions including answering the questionnaire.

**Results**

The Implicit Association Score (IAS) was calculated with the following equation: IAS = (performance score of Noncompatible Combination task) – (performance score of Compatible Combination task). The IAS would be a negative number if the target words, “black hair,” “black people,” and “Sambo”, were implicitly associated more strongly with unpleasant concepts. The IAS for “black people” and “Sambo” were negative whereas the IAS for “black hair” was rather positive (cf., Figure 1). There were age differences in the IAS for “black hair” and “black people.” Both young and elderly adults as well as undergraduate students showed a stronger negative IAS for “black people” than junior high school students. Additionally, elderly adults showed higher positive IAS for “black hair” than younger adults and junior high school students. There were no statistical age differences among the IAS for “Sambo.” It was also found that having read LBS had no effect on IAS. (See Mori, 2003 for detail.)

**REFERENCES**


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![Figure 1. Implicit Association Scores for the target words of the three age groups.](image)