

Manson, G, & B 101 Study 1

Should say #1 exp

(10) D14 - load, p3 1

(11) single (7), p3 3

(12) att (1), p3 3

(13) att (1), p3 3

(14) not (0), p3 3

(15) self-ref p3 1 p3 3

(16) logs (1), p4

(17) words (0), p3

(18) ONZ (1)

(19) 3rd (3)

(20) 2nd (2)

(21) 1st (1)

(22) after (2)

(23) after (2)

(24) same (0)

(25) same (0) p3-4

error: page 3 - Cited
Sub + ob as atts
thus done

p3 3

(26) sd-1, p3

(27) sd-1, p3

(28) con-9, p3

(29) spec-5, p3

(30) spec-5, p3

(31) comp-1, p3

(32) not (0), p1

(33) dual (2), p3

✓

Mason G, & B '01 - study 2 of should say exp 2

p/4 food, ~~1/15~~ p/6

shouldn't aug(2), p/5

error - says single (1 - data full)

12 att(1), p/6

~~13 att(1), p/5-6~~ ~~att(1),~~

find 7 bet att(1), p/13

~~14 4 (not rep since no rep), p/5-6~~

13 4 (not rep)

EM/CM overl. issue
C maybe (no EGCS) really

13 att(1), p/5-6

14 not(0), p/5-6

15 s-rep part (1), p/5-6

16 log ~~1~~(1), p/5-6

17 words(0), p/6

18 one lat(1), p/6

19 3rd(3)

20 2nd(2)

21 Beh ~~1st~~(1)

p/5

22 after(2)

23 alt(2)

24 same(0)

p/5

25 same(0)

26 1-sd-p/6

27 1-sd, p/5-6

28 control - 9 } p/5-6

29 spec - 5 } p/5-6

30 spec - 5

31 corp - 3, p/6

32 ~~first~~ not(0), p/5

33 dual(2), p/6

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The Implicit Association Test as a measure of implicit consumer attitudes

Multiple Studies

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Abstract This article reports two experiments that sought to determine if the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), a method for assessing strengths of automatic associations, can be applied to measure consumer attitudes. The first experiment compared implicit attitudes toward juices and sodas. Analysis revealed significant correlation between IAT-measured implicit attitudes and

explicit measures of attitudes and behavior toward these product categories. The second experiment investigated implicit attitudes of female Ss toward low calorie products and high calorie products. The IAT attitude measure correlated with dieting activity: Ss who had eating habits restricting high calorie food intake showed implicit attitudes favoring low calorie products.

Introduction

During the last 20 years, social psychologists have increasingly appealed to automatic processes (Greenwald & Banaji, 1995; Bargh, 1996; Pratto, 1994; Bargh, Chaiken, Govender & Pratto, 1992; Bargh, 1989) in understanding social judgment and behavior. Associated with this trend is the increasing use of reaction time as an indicator of automatic or implicit processes (Bargh, 1996; Zarate & Smith, 1990; Lalonde & Gardner, 1989; Fazio, Sanbonmatsu, Powell & Kardes, 1986; Gaertner & McLaughlin, 1983).

One method of researching automatic processes that has become very popular over the last 5 years is the Implicit Association Test (Greenwald et al. 1998; Dasgupta, McGhee, Greenwald, Banaji, 2000; Brendl, Markman, Messner, 2001). The method consists of doing a computerized categorization task. The task lets Ss categorize stimuli into four different categories: two contrasted target concept categories (in the study of Greenwald et al., 1998, experiment 1, flowers and insects), and two contrasted attribute categories (pleasant and unpleasant). The categorization task consists of presenting the Ss with a stimulus which the Ss are to categorize quickly in one of two groups (presented as labels on the left and on the right of the computer screen).

task where soda brands are paired with pleasant words, this would indicate that S has a positive implicit attitude toward fruit juices than toward sodas.

Predictions were that in case of attitudes toward fruit juices and sodas implicit attitude (reflected in IAT effect) will be correlated with: a) Ss' explicit ratings of fruit juices and sodas, and b) with (self-reported) behavior.

Method

Participants

A total of 71 persons participated: 55 female and 16 male. All Ss were undergraduate students of the Department of Psychology at the University of Warsaw (age 19–25). For their participation in the experiment Ss were paid 5 PLN (at the time the equivalent of 1.33 US\$).

Materials

Explicit measures

Subjects completed a set of questionnaire measures of behavior and attitude toward the two product categories. The questionnaire contained the following questions:

— (Self-reported) behavior: frequency of drinking of sodas and juices (one question about sodas, one about juices, 5-point frequent/infrequent scale);

— Affect: liking of sodas and juices (one question each, 10 cm like-dislike scales);

— Separate evaluation of sodas and juices on 6 different bipolar dimensions (healthy/unhealthy, natural/artificial, tasty/not tasty, good against thirst/not good against thirst, I try to have it at home/I don't try to have it at home, I try to drink it often/I don't try to drink it often) – total of 12 questions (6 for sodas, 6 for juices), each rated on a 5-point agree/disagree scale. These dimensions were on an a-priori basis grouped into the following scales:

— behavioral intention (try to have at home, try to drink often);

— subjective beliefs (tasty, quenches thirst well);

— objective beliefs (healthy, natural).

— Knowledge of brands and preferences for the soda and fruit juice brands used as target stimuli in the study. These questions were only used to ensure that all Ss knew all the brands used in the IAT task (see below); no Ss participated who did not know all the brands.

Implicit measures

Subjects completed an IAT task measuring their implicit attitudes toward two groups of beverages: fruit juices and sodas. The list of Polish pleasant and unpleasant words was created based on the list of English stimuli used in previous experiments (Greenwald et al. 1998). The original set of stimuli was modified in order to control the length of the words and to avoid the use of (Polish) words with a negation prefix (e.g. "unhappy" – see Maison & Bruin, 1999 for a further discussion of the stimuli used). The following list of

stimuli was used in the experiment: (pleasant words) sun, luck, love, fun, happiness, pleasure, holiday, friendship; (unpleasant words) disease, death, murder, accident, poison, war, tragedy, vomit.

Much attention was paid to the issue what types of product-related stimuli would be used. Because the main purpose of the experiment was to verify if the IAT could be used to consumer behavior and attitudes toward product categories, we tried to find comparable categories for which it could be assumed that people have a clear preference for one over another, while some prefer one category, and some the another. Finally, the choice was made to use fruit juices and sodas as categories in the task.

Another concern was choice of exemplars of the target category. It was decided that potential interference from strong brand images should be avoided. Therefore categories had to be chosen such that all of them were more or less comparable in terms of amount of advertising (all chosen brands, at least in the time of conducting the study, were not strongly advertised). Brand names were chosen based of the Polish list of best known brands in each category. In order to create higher comparability between the two categories only fruit flavored drinks were chosen, intentionally avoiding cola flavor brands (Coca-Cola, Pepsi), because these are strong brands with a very large amount of advertising. The list of target stimuli was: (soda brands) Fanta, Sprite, 7up, Mirinda; (fruit juices brands) Hortex, Fortuna, Clippo, Tymbark.

The IAT task was completed on PC-type desktop computers, on which the Inquisit program (Footnote 1) was installed. In the center of the computer screen the stimuli were randomly presented; the Ss' task was to assign each stimulus to one of two categories. Ss responded to the categorization task by pressing either the "A" key with the left index finger or the "5" key on the numeric keypad with the right index finger.

Procedure

Upon entry in the laboratory, Ss were asked to complete the questionnaire that measured explicit attitudes toward different type of drinks (sodas and fruit juices). Immediately after completing the questionnaire the Ss conducted the IAT task. The entire study was conducted individually. Each participant completed a total of 5 classification tasks: 1 – single categorization for the attributes (pleasant/unpleasant – 30 trials); 2 – single categorization for the target concept (Sodas/Juices; 30 trials); 3 – combined categorization task – practice and data collection trials (Sodas+pleasant/Juices+unpleasant – 20 trials practice and 40 trials data collection); 4 – single categorization for the target concept (as block 2) but with reversal of the side of the screen on which was presented the category to which the words needed to be categorized (30 trials); 5 – combined categorization task – practice and data collection trials (as block 3) but reversed categorization of target categories (Juices+pleasant/Sodas+unpleasant – 20 trials practice and 40 trials data collection). Half of the Ss did the task in the order presented above; for the other half tasks 2 and 3 were interchanged with tasks 4 and 5. Only the data from tasks 3 and 5 were used for analysis.

Table 1. Evaluation of sodas and juices - explicit attitudes toward drinks (Soda vs. Fruit Juices - Experiment 1).
Note: judgements were made on a 5-point scale. A higher value means a more positive judgment. All differences statistically significant, $p < 0.005$.

| | Sodas | Juices |
|-----------------------|-------|--------|
| Frequency of drinking | 3.23 | 4.07 |
| I have at home | 2.71 | 4.32 |
| I often drink | 2.39 | 4.50 |
| Good for thirst | 3.13 | 3.90 |
| Tasty | 3.54 | 4.68 |
| Natural | 1.88 | 4.58 |
| Healthy | 1.84 | 4.71 |

Results and Discussion

Data reduction

The first trial of each experimental task was excluded from analysis because these response latencies were typically longer. Also trials that had latencies longer than 3000 ms and shorter than 300 ms were recoded to 3000 ms and 300 ms respectively, to control for inattention or anticipation (as suggested by Greenwald et al., 1998). Of each experimental task, the first trial was excluded from analysis because these response latencies were typically longer. Latencies were log-transformed to reduce skewness before computing means. One S was excluded from the analyses because of an error rate higher than 30%, and the suspicion that (s)he either misunderstood the task, or did not carry it out seriously (the average error rate of the other Ss was 6.0%). All analyses reported here involve the remaining 70 Ss.

Explicit attitudes toward sodas and juices

In the questionnaire, the Ss rated juices more positively than sodas. They expressed greater liking, and evaluated them as more natural, healthier, tastier, and better against thirst than sodas. Moreover Ss declared to drink juices more often than sodas (Table 1).

Although juices were on all dimensions evaluated more positively than sodas, the largest discrepancy between the evaluations of these two types of drinks concerned only two dimensions: natural and healthy, for which sodas received extremely negative ratings.

Implicit attitudes toward sodas and juices - IAT effect

Comparison of the reaction times in the task in which one category was paired with positive words with those obtained in the task in which the other category was paired with positive words, provides a measure of implicit attitudes toward the two categories. Faster reaction times for one category together with pleasant words indicates a more positive implicit attitude toward that category.

In the present experiment, on average Ss had significantly

shorter reaction times (RT) when the category juices was paired with positive words, as compared to the pairing sodas with positive words: Soda+unpleasant/ Juices+pleasant task RT=698 ms; Juices+unpleasant/ Soda+pleasant task RT=783 ms; $t(69)=5.63$, $p < 0.0001$ (Footnote 2). This finding indicates that Ss, in general, had more positive implicit attitudes toward juices than toward sodas.

Correlation between explicit and implicit attitudes

In order to analyze the correlation between IAT effect (implicit attitudes) and explicit ratings of sodas and juices, the explicit ratings were on an a priori basis reduced into five variables that were expected to be related to different aspects of the attitude/behavior complex: self-reported behavior (1 item only), behavioral intention (items "drinking", "having at home"), liking (general preference for one type of drink), "objective" beliefs (healthy, natural), and "subjective" beliefs (tasty, quenches thirst well). The calculation of these 5 variables was a two-stage process: first, difference scores were computed for all the individual ratings in such a manner that higher scores indicated a more favorable rating of sodas (i.e., the juices rating was subtracted from the soda rating). Next - the resulting difference scores were added up, according to the combinations of items shown above. For the resulting data, low values indicate a favorable rating of juices, and high scores a favorable rating of sodas.

The IAT effect for each subject was calculated by computing the mean latency for the Soda+unpleasant/Juices+pleasant task minus the mean latency for the Juices+unpleasant/Soda+pleasant task. Thus, higher positive values of the IAT effect indicate a more favorable implicit attitude toward sodas. Significant positive correlation between IAT effect and the explicit measures were significant for 4 out of 5 explicit measures (Table 2). Implicit attitude was correlated with behavior ($r=0.20$; $p < 0.047$), behavioral intention ($r=0.29$; $p < 0.008$), liking ($r=0.38$; $p < 0.001$), and subjective beliefs ($r=0.40$; $p < 0.0001$). The correlation with objective beliefs was not significant. The correlation between IAT and the individual items showed the same pattern of results.

Discussion

This experiment provides evidence that the IAT can be used successfully to assess consumer behavior. First, the IAT revealed significant differences between Ss' reactions to different beverage categories, and second, these differences were positively related to Ss' explicit ratings of the two beverage categories (self-reported behavior, intention, liking and beliefs). Interestingly, the only explicit variables that show no correlation with the IAT effect are the "objective" beliefs (healthy and natural). This observation parallels the insight that consumers' "objective" beliefs about fmcg products are often at best only weakly related to their market behavior.

Experiment 2

Experiment 1 showed that the IAT effect can be correlated with some aspects of explicit attitudes: level of liking products, beliefs about those products and behavior

| Implicit attitude (n=70) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|-----|-------|--------|--------|--------|--------|
| | Beh | IBeh | Pref | SB | OB | |
| 1. IAT effect (log[RT]) | — | 0.20* | 0.29* | 0.38** | .40** | 0.04 |
| Explicit measures | | | | | | |
| 2. Beh - (Self reported) behavior | — | | 0.70** | 0.66** | 0.49** | 0.18 |
| 3. IBeh - Behavioral intention | | | | | | |
| 4. Pref - Liking (preference) | | | — | 0.75** | 0.53** | 0.32** |
| 5. SB - Subjective beliefs (tasty, good for thirst) | | | | — | 0.71** | 0.18 |
| 6. OB - Objective beliefs (healthy, natural) | | | | | — | 0.18 |

Table 2. Correlation between Implicit and Explicit measures (Soda vs. Fruit Juices - Experiment 1).

Note: table shows results of one-tailed significance tests. * — $p < 0.05$; ** — $p < 0.001$; bold** — $p < 0.0001$.

A positive correlation between explicit and implicit measures indicates that a more positive score of one category as expressed in explicit measures is related to an IAT effect which shows a more positive implicit attitude toward the same category.

connected to it (having at home, drinking). In that experiment the area of the research focussed on non-ambivalent attitudes and therefore there was no reason to expect discrepancy between explicit and implicit measures. However, the promising value of the IAT method lies in its potential to shed more light on situations in which there is inconsistency between people's explicit beliefs about, and attitudes toward different characteristics of the target object, and, consequently, behavior is likely to follow one but not the other.

In order to explore this line of thinking, Experiment 2 involved an area of consumer behavior in which it could be expected that the explicit attitude toward the researched category would be ambivalent (with positive and negative aspects at the same time) and therefore its relations with implicit attitudes and behavior would also be more complex. For the study were chosen two groups of products: high-calorie foods (which, it was assumed, are eaten because they are tasty though people may feel guilty about this), and low-calorie foods (eaten because they are good for your health, but not always tasty). It was assumed that these products are most "conflicting" for women. Therefore only female Ss participated in the study.

High and low calorie products create many ambivalent feelings and approach-avoidance conflict (Shiv & Fedorikhin, 1999; Percy & Lautman, 1994). On the one hand the media generally stress the concept of a healthy life style, and a lot is said about the importance of low calorie food for health. On the other hand marketers of high calorie products are often stressing taste in their advertising. Another function of high calorie food is as gratification; to help to cope with bad mood. This situation creates in our culture very ambivalent feelings toward high calorie products, which – in extreme cases – can result in eating disorders (Percy & Lutman, 1994). For women this ambivalence toward high calorie products is further strengthened by the "beauty ideal", which stresses that in order to be attractive, women should be slender.

In the experiment, Ss completed an IAT attitude measure that involved classifying low and high calorie products. Predictions were that: (1) Ss' explicit ratings of both product categories would reveal the conflict between tasty and healthy products discussed above (high calorie products: more tasty, less healthy and low calorie products: less tasty, more healthy); (2) implicit attitude toward low vs. high calorie products would be correlated with explicit attitude

toward those products; (3) implicit attitude toward low vs. high calorie products would be correlated with (self-reported) avoidance behavior toward high calorie products ("though they are tasty, I avoid them because they are not healthy").

Method

Participants

A total of 51 females participated in the experiment. All Ss were undergraduate students of the Department of Psychology at the University of Warsaw (age 19–25). For the participation in the experiment Ss were paid 5 PLN (at that time the equivalent of 1.33 US\$).

Procedure

The procedure in this second experiment was similar to that of Experiment 1, except that the list of stimuli in the IAT task was different, as was the questionnaire filled in at the beginning of the study (for further descriptions of both, see below).

Materials

Explicit measures

Subjects completed a questionnaire consisting of two parts: evaluation of high and low calorie products (explicit attitudes) and several rating scales about (i) concerns about eating food, (ii) guilty feeling after eating tasty/ high calorie food, and (iii) attitude toward the own body.

This questionnaire contained the following parts:

Separate ratings of both product categories on four characteristics (7 – point semantic differentials, scored from 1 to 7): 1 – not tasty/7 – tasty, 1 – not healthy/7 – healthy, 1 – not nice/7 – nice, 1 – not fashionable/7 – fashionable; Concerns about eating food (habits and behavior; 6 – point scale 1 – disagree/6 – agree): "I especially eat low calorie food", "I always eat what I want", "When I buy something, I am always concerned about calories", "I often deny myself

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116

116
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30 26-28

9

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Table 3. Evaluation of low and high calorie products (Experiment 2).

Note: judgements were made on 7-point scale (semantic differential, e.g. not tasty – tasty). Higher values mean stronger agreement with the keyword mentioned in the table.

| | Low calories | High calories | t | p |
|-------------|--------------|---------------|-------|--------|
| Tasty | 4.39 | 5.35 | -2.54 | 0.014 |
| Nice | 4.75 | 5.20 | | ns |
| Healthy | 6.25 | 2.27 | 15.37 | 0.0001 |
| Fashionable | 6.16 | 2.47 | 11.7 | 0.0001 |

Table 4. Correlation between implicit and explicit measures (low vs. high calories – Experiment 2).

Note: table shows results of one-tailed significance tests. * — $p < 0.05$; ** — $p < 0.001$; **bold**** — $p < 0.0001$.

A positive correlation between explicit and implicit attitudes indicates that a more positive attitude to one category as expressed in explicit attitudes is reflected by IAT effect which expresses a more positive implicit attitude toward the same category.

| n=50 | 1 | 2 | 3 | 4 | 5 |
|---------------------|---|------|---------------|-------|-------|
| Implicit attitude | | | | | |
| 1. IAT effect (log) | — | 0.22 | 0.44** | 0.30* | 0.10 |
| Explicit measures | | | | | |
| 2. Tasty | | — | 0.72** | 0.12 | -0.04 |
| 3. Nice | | | — | 0.15 | 0.10 |
| 4. Healthy | | | | — | 0.30* |
| 5. Fashionable | | | | | — |

15 13 9 14 10 12 17 29 31 33 26-28 30

eating what I like"; "I avoid sweets";

Guilty feelings about food (6 – point scale, 1 – disagree/6 – agree): "After eating something I often regret eating it", "I often feel guilty when I eat sweets"; Attitudes toward the own body (6 – point scale 1 – disagree/6 – agree): "In order to look best, I should loose weight"; "If I would be jogging in a swimming suit I would look attractive"; "I like to dress in revealing clothes".

Implicit measures

Subjects completed an IAT task measuring implicit attitudes toward two groups of food products: high and low calories, chosen based on pilot study. The list of stimuli included: (high calorie stimuli) chocolate, nuts, candy bars, cookie, chips and (low calorie stimuli) fruits, lettuce, juice, yogurt, salad. The list of Polish pleasant and unpleasant words was the same as in Experiment 1.

The IAT task was completed on IBM-compatible desktop computers, using the Inquisit program. In the center of the computer screen the stimuli which the participants had to ascribe to one of two (or four) categories were randomly presented. Subjects responded to the categorization task by pressing either the "A" key with the left hand finger or the "S" key on the numeric keypad with the right hand finger.

Results and discussion

Data reduction

To the data from the second experiment the same data reduction procedure was applied as in Experiment 1: the first trial of each experimental task was removed before analysis and latencies longer than 3000 ms and shorter than 300 ms were recoded to 3000 ms and 300 ms respectively, and latencies were log-transformed. Of each experimental task, the first trial was excluded from analysis because these response latencies were typically longer. Also in this study one person was excluded from analysis because of an error rate higher than 30% (the average error rate of the other Ss was 6.5%). All analyses reported here involve the remaining 50 Ss.

Explicit attitudes toward low and high calorie products

As expected (prediction 1), Ss answers to the questionnaire showed ambivalent attitudes toward low and high calorie products. On the one hand low calorie products are perceived as healthier and more fashionable than high calorie products, on the other hand they are perceived as less tasty and less nice (however the latter difference was not statistically significant) than high calorie products (Table 3).

Implicit attitudes toward low and high calorie products – IAT effect

Comparison of the task when one category is paired with positive words with task when second category is paired with positive words provides the measure of implicit attitude toward those categories. A shorter reaction time for one category when paired with positive words indicates a more positive implicit attitude toward that category.

Subjects had significantly shorter reaction times when the category "low calorie" was paired with positive words, than when "high calorie" was paired with positive words (high calories+unpleasant/ low calorie+pleasant task RT=729 ms low calories+unpleasant/ high calorie+pleasant task RT=996 ms; $t(49)=8.22$, $p < 0.0001$). This finding indicates that the subjects, on average, had more positive implicit attitudes toward low calorie products than toward high calorie products.

Correlation between explicit and implicit attitudes toward low and high calorie products

As previously explained, it was expected that a more positive explicit evaluation of a particular category of products would coincide with a more positive implicit attitude toward the same category. In order to test this hypothesis, the correlation between the IAT effect and the explicit measures was examined. The IAT effect for each subject was calculated by computing the latency for the high calorie+unpleasant/ low calorie+pleasant task minus the latency for the low calorie+unpleasant/high calorie+pleasant task. Higher positive scores for the IAT effect therefore indicate a more