Personality and Individual Differences 48 (2010) 940–944

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Personalizing the IAT and the SC-IAT: Impact of idiographic stimulus selection in the measurement of implicit anxiety

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ARTICLE INFO

Article history:
Received 22 October 2009
Received in revised form 11 February 2010
Accepted 17 February 2010
Available online 17 March 2010

Keywords:
Implicit Association Test
Single category implicit association test
Reliability
Explicit–implicit consistency
Anxiety
Personalization

ABSTRACT

Previous research on the Implicit Association Test (IAT) has almost completely neglected stimuli effects caused by individual differences in concept representations. The present study describes a more person-centered idiographic approach (i.e., individualized stimulus word selection) in which stimuli are either selected from a list or freely associated by the participants. To investigate whether this method can be used to reduce unexplained variance and ameliorate the IAT-family's psychometric properties, we conducted two experiments with a test–retest design using an anxiety–IAT as well as an anxiety- and a calmness–SC-IAT (a single category variant of the IAT). Personalizing stimulus selection had no effect on the measurement outcome, reliability, and correlations (implicit–explicit, implicit–implicit) of the IAT and SC-IAT when measuring implicit anxiety.

1. Introduction

In the last decade, implicit measurement techniques have proliferated in personality research. The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) has turned out to be the most widely used implicit measurement technique due to its robustness, reliability, and easy administration (e.g., Nosek, Greenwald, & Banaji, 2007). Because of the restriction of the conventional IAT to measure *relative* association strengths between two concepts (e.g., anxiety vs. calmness), recently a new variant of the IAT, the Single Category IAT (SC-IAT), has been introduced to overcome this restriction, showing strong evidence for validity and reliability as another implicit measure of social cognition (Karpinski & Steinman, 2006).

Although broadly applied, the IAT is still under development. Methodological research has established, for instance, that stimulus selection and category labeling may partly determine the magnitude and direction of the IAT-effect. De Houwer (2001) suggested that the IAT-effect might be mainly driven by attitudes toward concept labels rather than attitudes towards stimulus words. Other researchers emphasized that each stimulus word must be exclusively classifiable into one of the four category concepts (e.g., "*I*", "*other*", "*anxiety*", "*calmness*"). Any overlap of semantic representation across the target and attribute concepts (i.e., cross-category associations) is very likely to bias IAT-effects (Bluemke & Friese, 2006; Steffens & Plewe, 2001). Govan and Williams (2004) found that changing the affective valence of stimulus words (e.g., using "nettles" instead of "rose" for flowers and "butterfly" instead of "wasp" for insects in a standard flower/insect IAT procedure) can even lead to reversed IAT-effects. Thus, recent findings stress the crucial importance of the fit between concepts and stimuli. In this study, we seek to increase this fit by improving stimulus word selection. So far, effects of stimulus word selection on IAT-effects have been investigated only from a nomothetic perspective (i.e., the same stimuli words are used for all participants alike; for a review, see Nosek et al., 2007)—effects caused by individual differences in concept representation have been largely neglected. Due to inter-individual differences in the representation of concepts, a nomothetic approach might include stimuli that are only loosely related to the concept relevant to a particular individual. Consider an anxiety–IAT (e.g., Egloff & Schmukle, 2002) using the stimulus "uncertain." While several individuals would associate this word with the category "*anxiety*," the association strength might not be equally strong for all individuals. For some "uncertain" might even be loosely connected to both concept categories "*anxiety*" and "*calmness*," while others might not at all associate the word "uncertain" with the category "*anxiety*"—but rather the stimulus word "sleepless", which is not included in the anxiety–IAT. Therefore, the IAT-effect would reflect variance of irrelevant aspects while insufficiently reflecting variance in important aspects.

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doi:10.1016/j.paid.2010.02.027

One possibility of addressing this problem would be a more idiographic, person-centered approach that reflects individual differences by the use of individualized stimuli for each participant with maximum relevance for the attribute categories (Haynes, Mumma, & Pinson, 2009). In the past, a few attempts have been made to personalize the IAT. Greenwald and Farnham (2000) introduced an idiographic IAT and found somewhat higher correlations with explicit measures compared to a conventional IAT (average absolute values $|r| = .33$ vs. $|r| = .22$) but did not further elaborate on it. Mitchell, Nosek, and Banaji (2003) also used individualized stimuli but their aim was mainly to show that stimuli selection—and not only the contextual frame provided by the categories—affects IAT-effects. More recently, this issue has been taken up again by Ostafin, Marlatt, and Greenwald (2008) who suggested that "...future research may benefit by examining whether idiographic labels and stimuli improve the validity of the IAT" (p. 1217).

When developing an idiographic IAT, several precautions need to be taken. As Gawronski, LeBel, Peters, and Banse (2009) pointed out, an experimental approach without the subsequent investigation of correlations to a criterion measure in the different experimental conditions may be prone to misinterpretation. If the experimental manipulation leads to significant differences in the mean score, but does not influence its correlation to a criterion measure, it seems plausible that the experimental manipulation influenced measurement scores via alternative sources of variance. It is only when both differences in the mean score and in correlations are found, that there is reason to believe that the manipulation indeed influenced the measurement of the intended psychological attribute.

Prior research found that implicit–explicit relations vary systematically as a function of the psychological attribute under investigation (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). In the domain of anxiety, implicit–explicit correlations between the IAT and self-report measures have turned out to be rather low or even non-significant (e.g., Egloff & Schmukle, 2002, 2004; Gschwendner, Hofmann, & Schmitt, 2008). Egloff and Schmukle (2004) stress that these low correlations are not likely to be caused by methodological issues because both implicit and explicit measures usually show a good distribution and adequate reliability. A possible explanation for these unusually low correlations could be found in recent models of implicit–explicit consistency (Gschwendner et al., 2008) which assume two systematically related but distinct mental representations. Implicit–explicit correlations should therefore not be mistaken as indicators of convergent validity, and consequently, low correlations should not be interpreted as evidence against the IAT's validity. But this does not mean that implicit–explicit correlations cannot be utilized to make a statement about the validity of implicit measures. They can, but only if the validity is assessed by the theoretically expected strength of the relationship with explicit measures. As mentioned before, in the case of anxiety measurement, the expected correlations would be near zero, because implicit and explicit anxiety might be two distinct concepts.

As the psychometric properties of idiographic IATs have not been properly investigated, it is of particular interest to clarify whether there are differences in the results of traditional (nomothetic) and individualized (idiographic) IATs. If both forms yield the same results (i.e., same mean score while having comparable reliabilities and implicit–explicit/ implicit–implicit correlations), the potential benefits of the idiographic IAT may have been overestimated and the additional efforts inherent in an idiographic approach might be inefficient in cost–benefit terms. However, if both forms do not show the same results in terms of correlations and reliability (i.e., higher reliability), this may be interpreted as evidence for the idiographic IAT to be less influenced by irrelevant variance due to the higher accuracy of category representation.[1]

To throw light on these issues, we conducted two experiments examining possible effects of stimuli personalization following recent recommendations (Gawronski et al., 2009) to not only compare measurement outcomes but also changes in reliability (internal consistency, retest reliability) and implicit–implicit and implicit–explicit correlations of the anxiety–IAT, anxiety–SC-IAT, and calmness–SC-IAT.

2. Experiment 1

2.1. Method

2.1.1. Participants

Students were invited via e-mail to take part in an online experiment. In total, 426 individuals (41% women; $M_{age} = 29.2$ years, SD = 8.8) participated in the initial test and 390 in the retest five months later.

2.1.2. Materials

2.1.2.1. Implicit anxiety measure: Implicit Association Test (IAT). We used the anxiety–IAT as introduced by Egloff and Schmukle (2002). It is a reaction-time-based measure consisting of five blocks. In Block 1, the target concept is introduced (*self*: I, self, my, me, own; *other*: they, them, your, you, others). Individuals have to categorize stimulus words either on the left side (under the target category "*self*") or on the right side of the screen (under the target category "*other*") by pressing the keyboard keys "e" or "i", respectively. If a stimulus word is categorized under the wrong concept category, a red "X" appears on the screen, and the categorization of the stimulus word has to be rectified by pressing the correct key. In Block 2, the attribute concept is introduced (*anxiety*: nervous, anxious, fearful, afraid, uncertain; *calmness*: relaxed, balanced, at ease, calm, restful) following the same procedure as in Block 1. In Block 3 target and attribute concept categories are paired on each side of the screen ("*self* and *anxiety*" vs. "*other* and *calmness*"). Stimulus words belonging to different target and attribute concept categories are presented successively and need to be categorized by pressing the keys "e" or "i", respectively. Block 4 is a reversed version of Block 1. Block 5 also uses paired concept categories similar to Block 3, but the category pairs are reversed ("*self* and *calmness*" vs. "*other* and *anxiety*").

2.1.2.2. Implicit anxiety measure: Single Category Implicit Association Test (SC-IAT). The SC-IAT (Karpinski & Steinman, 2006) is based on the same principles as the IAT, but only one attribute category is presented at a time. Therefore it consists of three blocks instead of five (e.g., Block 1: "*self*" vs. "*other*"; Block 2: "*self* and *anxiety*" vs. "*other*"; Block 3: "*self*" vs. "*other* and *anxiety*"). To measure both anxiety and calmness, two SC-IATs (anxiety–SC-IAT, calmness–SC-IAT) were used.

2.1.2.3. Explicit anxiety measure: State-Trait Anxiety Inventory (STAI). We used the German version of the trait subtest of the STAI (Laux, Glanzmann, Schaffner, & Spielberger, 1981). This subtest comprises 20 questions about general feelings of anxiety that are rated on 4-point Likert scales (anchors: *(almost) never*, *sometimes*, *often*, *(almost) always*).

[1] Since the IAT is influenced by multiple construct-independent influences that may lead to greater or smaller IAT-effects (e.g., Fiedler, Messner, & Bluemke, 2006) a reduction of error variance can both lead to higher or lower mean IAT-effects.