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Lateralisation of self-esteem: An investigation using a dichotically presented auditory adaptation of the Implicit Association Test

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Abbreviated title: LATERALISATION OF SELF-ESTEEM

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Abstract

Introduction: Self-esteem is one of the most prominent and influential constructs in psychological science, yet very few neuropsychological/neuroscientific investigations have been undertaken in this area of research. The current study investigated the possibility of hemispheric lateralisation of self-esteem.

Methods: By creating an auditory version of the Implicit Association Test (IAT) for self-esteem, we were able to present stimuli dichotically and thereby compare left- versus right-hemispheric measurements of self-esteem in 46 healthy adults.

Results: Although left- and right-hemispheric self-esteem measurements were correlated, within-participant analysis revealed that self-esteem levels (as reflected by IAT score) were significantly greater when elicited under right-ear presentation (reflecting left hemispheric processing).

Conclusions: We interpret this asymmetry with reference to the approach-withdrawal model of emotion processing and suggest avenues for future research.

Keywords not in title: Self-concept, dichotic listening, implicit processing.
Self-esteem is among the most prevailing of all psychological constructs. According to Rhodewalt and Tragakis (2003) the concept ranks alongside negative affectivity and gender as one of “the top three covariates in personality and social psychology research” (p. 66). A range of definitions of self-esteem have been proposed (e.g. Branden, 2001; James, 1890), and a variety of forms have been investigated including global versus specific self-esteem (e.g. Rosenberg et al., 1995), contingent versus true self-esteem (Deci and Ryan, 1995), trait versus state self-esteem (e.g. Brewer and Miller, 1996), personal versus social self-esteem (e.g. Crocker and Luhtanen, 1990) and secure versus defensive self-esteem (Jordan et al., 2003). Given the level of interest in the concept it is surprising that there have been so few neuropsychological/neuroscientific investigations undertaken in this area. The present study sought to address this gap in the literature by examining the possibility of hemispheric lateralisation of self-esteem.

Self-esteem has traditionally been measured using explicit self-report instruments such as the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965). Such measures, however, are susceptible to demand characteristics and social desirability bias (Greenwald and Farnham, 2000). In recent years, a number of new paradigms have been devised that measure self-esteem indirectly and implicitly. The most prevalent of these is the Implicit Association Test (IAT; Greenwald et al., 1998) for implicit self-esteem (Greenwald and Farnham, 2000).

The IAT is a computerised procedure designed to measure the strengths of automatic associations between concepts. Faster responding to a particular pairing of concepts is assumed to index a stronger association between the two concepts. Empirical research has demonstrated that the IAT is reasonably robust against social desirability bias and that it taps cognitive representations not
assessed by self-report measures (Nosek et al., 2005). Greenwald and Farnham (2000) adapted the IAT for the measurement of implicit *self-esteem* by assessing automatic associations of the self with positive or negative valence. They demonstrated that the relative ease of making judgements when a *self* category and a *pleasant* category are combined can be used to index a participant’s implicit self-esteem (individuals with higher implicit self-esteem should find categorisations easier when *self* and *pleasant* are paired than when *self* and *unpleasant* are paired).

Given the theoretical importance of the *self-esteem* concept, it is surprising that the question of whether self-esteem might be lateralised has not, to date, been investigated. This seems a fruitful line of inquiry when one considers the large body of research pertaining to the cortical lateralisation of emotion. An influential model of emotion processing, the *approach-withdrawal model* (Davidson, 1995), postulates that left- and right-anterior brain regions process emotions associated with approach and withdrawal behaviours, respectively. Approach behaviours are elicited by most positive emotions (e.g. happiness, amusement) and withdrawal behaviours are elicited by most negative emotions (e.g. fear, disgust), although anger – a negative emotion eliciting approach behaviour - is an important exception (Demaree et al., 2005).

The empirical support for the approach-withdrawal model of emotion processing is extensive, and incorporates evidence from sodium amytal injection studies (Rossi and Rosadini, 1967; Silberman and Weingartner, 1986), studies of patients with brain damage (e.g. Adolphs et al., 1996; Heilman et al., 1975; Robinson et al., 1984), and neuroimaging studies (e.g. Passero et al., 1995; Canli et al., 1998). Perhaps the most robust evidence, however, comes from a range of
EEG investigations by Davidson and colleagues (e.g. Davidson et al., 1979; Davidson and Fox, 1982; see also Harmon-Jones and Allen, 1998). Such investigations have found positive emotional states (and anger; see Harmon-Jones and Allen, 1998; Harmon-Jones and Sigelman, 2001) to be associated with a left > right activation\(^1\) asymmetry, whereas negative emotional states (including depression; see Henriques and Davidson, 1990; 1991; Davidson and Henriques, 2000) are associated with the reverse: a right > left activation asymmetry.

The construct of self-esteem can be conceptualised within an approach-withdrawal framework (De Raedt et al., 2008). It seems reasonable to expect that higher self-esteem will be associated with approach behaviours and that lower self-esteem will be associated with withdrawal behaviours. Positive self-views, after all, have been found to be associated with positive affect states (Pelham and Swann, 1989), less depression (Tennen and Affleck, 1993) and greater persistence at difficult tasks, but also with aggression and violence (Baumeister et al., 1996). Moreover, Coats et al. (1996) demonstrated that individuals with more avoidance goals evaluated themselves more negatively on measures of self-esteem, optimism and depression.

In short, given the evidence that approach behaviours are left-lateralised, we wondered whether it would be possible to obtain greater measurements of self-esteem with stimuli presented to the left versus the right hemisphere. To our knowledge, this hypothesis has not been previously investigated. However, a recent study by De Raedt et al. (2008) did investigate whether the relationship between frontal EEG alpha asymmetry and depressive symptoms was mediated by self-esteem. Self-esteem was measured using both self-report (RSE) and indirect (IAT) methods. The results indicated that only self-reported (RSE) self-esteem mediated the path from EEG
alpha asymmetry to depression. An earlier study by Urry et al. (2004) investigated the relationship between self-reported well-being and idiosyncratic EEG alpha asymmetry, finding that higher levels of well-being were associated with greater left than right superior frontal activation. An important difference between these studies and our study is worth emphasising. De Raedt et al. administered participants measures of self-esteem and examined the relationship between performance on such measures and idiosyncratic alpha asymmetry. Similarly, Urry et al. administered participants measures of well-being and examined the relationship between performance on such measures and idiosyncratic alpha asymmetry. In each case self-esteem or well-being varied between participants. The present study, in contrast, was designed to investigate whether measurements of self-esteem would diverge as a function of which hemisphere the self-esteem measure was presented to - within participants. This was accomplished by presenting an auditory version of the IAT for implicit self-esteem under dichotic listening conditions.

Dichotic listening involves the simultaneous presentation of two competing auditory stimuli, one to each ear. Variants of this basic paradigm have proven particularly useful in investigations of functional brain asymmetries, owing to the facts that under dichotic conditions contralateral auditory pathways are enhanced and ipsilateral auditory pathways are suppressed (e.g., Wexler, 1988; Hugdahl, 2005). Among other techniques, neuroimaging and ERP studies have confirmed the effectiveness of dichotic listening as a method of investigating hemispheric processing (e.g., Eichele et al., 2005; Hugdahl et al., 1999; Thomsen et al., 2004).
The present study utilised the dichotic listening paradigm to enable the selective presentation of IAT stimuli to one ear (and thus to one hemisphere) or the other. This procedure required an adaptation of the IAT to the auditory modality. Whereas the IAT has been used extensively in the visual format (see Devine, 2001; Nosek et al., 2007), no previous published research has utilised the IAT in auditory format. It is worth noting that adaptation to the auditory modality is not as straightforward as simply recording auditory versions of the stimuli presented visually in the standard IAT paradigm. Rather, auditory adaptation requires careful matching on a number of additional lexical and acoustic variables known to affect speech perception.

In summary, the current study contributes to the literature by reporting on an auditory adaptation of the IAT and by presenting this auditory IAT under dichotic listening conditions in order to examine the hemispheric lateralisation of self-esteem. In accordance with previous research regarding the lateralisation of emotion, we predicted that, within participants, presentation of the auditory self-esteem IAT to the right ear (i.e., the left hemisphere) would result in a greater IAT effect (indexing higher implicit self-esteem) than presentation to the left ear (i.e., right hemisphere).

Methods

Participants:
Participants were 46 first-year psychology undergraduates (36 females, 10 males; 35 right-handers, 5 left-handers and 6 ambidextrous participants\(^2\)), who participated in partial fulfillment of course requirements. The age range of the sample was 18 to 46 years (mean age = 21.9 years,
Informed consent was obtained from all participants. The study was approved by the Ethics in Human Research Committee of Charles Sturt University (Protocol Number 2006/235) and was thus performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

**Materials/Apparatus:**

A standard lexical IAT incorporates 20 words – five in each of four categories. Specifically, we utilised the *evaluative*³ IAT for implicit self-esteem (Greenwald and Farnham, 2000), incorporating five positive trait adjectives, five negative trait adjectives, five *self* words and five *other* words.

**Recording of candidate words:** An initial pool of 60 personally descriptive trait adjectives (30 positive, 30 negative) was recorded, along with ten *self* and *other* words. All words were recorded by a female speaker using *Audacity*, a free open source software program available for download at [http://audacity.sourceforge.net](http://audacity.sourceforge.net). The resulting sound files were trimmed and normalised and the acoustic duration of each (in milliseconds) was measured. The 60 adjectives were taken from the Personal Profile Questionnaire (PPQ; Kinderman, 1994). A separate sample of 30 participants rated these words for imageability (the ease with which a mental image of the word can be brought to mind), using a 7-point Likert scale. As per the procedure of McKay et al. (2007), the ten *self* and *other* words were personal pronouns, comprising the five grammatical forms (subjective, objective, reflexive, first possessive and second possessive) of the first-person singular and third-person plural pronouns (i.e., *I, me, myself, my, mine; they, them, themselves, their, theirs*).
Selection of final adjective sets: Ten trait adjectives (5 positive and 5 negative) were subsequently drawn from the recorded set of 60, chosen such that the groups of positive and negative adjectives were matched on a series of lexical variables obtained from the Celex database (Baayen et al., 1995). The two word groups (positive words - capable, friendly, intelligent, successful, trustworthy; negative words - annoying, boring, foolish, obnoxious, weak) did not differ significantly on number of phonemes, $t(8) = 2.76, p = .025$, spoken word frequency, $t(8) = 1.43, p = .191$, number of syllables, $t(8) = 1.63, p = .141$, or phonemic neighbourhood density (the number of words that differ from the target by a single phoneme), $t(8) = 1.58, p = .152$. In addition, there was no significant difference in terms of imageability, $t(8) = .15, p = .883$, or acoustic duration, $t(8) = 1.86, p = .100$.

The final IAT word sets were thus as follows:

- “positive” words: capable, friendly, intelligent, successful and trustworthy.
- “negative” words: annoying, boring, foolish, obnoxious and weak.
- “self” words: I, me, myself, my and mine.
- “other” words: they, them, themselves, their and theirs.

Preparation of words for dichotic presentation: As in Arciuli and Slowiaczek (2007) we utilised acoustically reversed versions of targets as the competing auditory stimuli. Thus, four versions of each sound file were prepared – a left-forward version (a standard version of the target word outputting solely through the left channel), a right-forward version (a standard
version outputting solely through the right channel), a left-backward version (an acoustically reversed version of the target word outputting solely through the left channel), and a right-backward version (an acoustically reversed version outputting solely through the right channel). Two final stimulus versions of each word were subsequently created – a left-ear version (comprising the left-forward version of that target word combined with its right-backward version) and a right-ear version (comprising the right-forward version of that target word combined with its left-backward version). We then created two different IAT tasks. The left-ear task involved presentation of the left-ear versions of each target word, whereas the right-ear task involved presentation of the right-ear versions of each word. In all other respects the two tasks were identical and utilised identical words.\(^5\)

**IAT structure and presentation:** The two IATs for implicit self-esteem were programmed and presented using the stimulus presentation software *Inquisit* (http://www.millisecond.com/). We utilised a within-subject design in that each participant completed both IATs. Participants wore headphones in order that the components of each stimulus (target and competitor) could be presented to the left or right ear as appropriate. Each IAT consisted of seven blocks of categorisation trials, as per the procedure outlined in Greenwald et al. (2003; see Table 1). In each block participants pressed either a left or right key on the keyboard to categorise each of a series of stimuli presented auditorily through the headphones (throughout each block target categories remained labeled visually in the top left and right corners of the computer screen). Button presses were made bimanually, i.e. the index fingers of the left and right hands were used to press the left and right keys, respectively.
In the first block of the congruent-incongruent condition (see below) participants categorised words into pleasant (i.e., positive) and unpleasant (i.e., negative) categories, by pressing the right key for pleasant words and the left key for unpleasant words. In the second block presented items were categorised into self (right key) and other (left key) categories. In the third and fourth blocks participants categorised items into two combined categories, consistent with the key-concept pairings of the first two blocks (i.e. self or pleasant for the right key and other or unpleasant for the left key). The fifth block involved participants pressing the right key for other words and the left key for self words. This block provided practice for the reversed key assignment of the sixth and seventh blocks (other or pleasant for the right key and self or unpleasant for the left key). In the incongruent-congruent condition the positions of the second, third and fourth blocks were swapped with those of the fifth, sixth and seventh blocks, respectively.

At the commencement of each IAT participants were informed that all target stimuli for that task would be presented to either their left or right ear (as appropriate). Participants were instructed to respond as quickly as possible in categorising each stimulus, but not so fast that they made many errors (they were told that occasional errors were okay). The order in which the two IAT tasks (left- and right-ear) were completed was counterbalanced across participants, as was the order in which the congruent (self paired with pleasant and other paired with unpleasant) and incongruent (self paired with unpleasant and other paired with pleasant) blocks were presented within each IAT, i.e., half of the participants in each of the IAT tasks completed the congruent-incongruent condition (detailed above - congruent blocks first, incongruent blocks second) and the other half completed the incongruent-congruent condition (incongruent blocks first, congruent blocks
second). The accuracy and latency (in msec) of each response was recorded. A new stimulus word was presented 500 msec after a response key was depressed.

Results

For each participant two IAT scores were computed – one for the left-ear IAT and one for the right-ear IAT. It is important to note that each of these two IAT scores incorporates responses to two different trial types (congruent and incongruent). This differs from more traditional utilisation of the dichotic listening technique and cannot be compared with previous studies where the left ear measure is derived in a straightforward way from a single type of response and the right ear measure is derived from a single type of response.

We used the improved IAT scoring algorithm developed by Greenwald et al. (2003): The mean of correct latencies for each of Blocks 3, 4, 6 and 7 was computed, as were two pooled SDs –
one for all trials in Blocks 3 and 6, and one for all trials in Blocks 4 and 7. Each error latency was subsequently replaced with the mean of the relevant block plus a penalty of 600 msec, and then the resulting values for each of the four blocks were averaged (see Table 2). Two differences were computed: The mean of Block 6 minus the mean of Block 3, and the mean of Block 7 minus the mean of Block 4. Each difference was then divided by its associated pooled-trials SD, and the resulting quotients were averaged to arrive at the final IAT score.

Positive IAT scores indicate a response advantage for the congruent blocks (where self is paired with pleasant and other with unpleasant) relative to the incongruent blocks (where self is paired with unpleasant and other with pleasant), whereas negative IAT scores indicate the opposite pattern. Thus, an IAT score incorporates two kinds of responses and a higher IAT score reflects a greater level of self-esteem. In the absence of an IAT effect, IAT scores should not differ significantly from zero. Single-sample t-tests (test value = 0) indicated a significantly positive IAT score for both the left-ear IAT (Mean = .41, SD = .38, t(45) = 7.30, p < .001, d = 1.08, two-tailed) and the right-ear IAT (Mean = .54, SD = .40, t(45) = 9.26, p < .001, d = 1.35, two-tailed). The correlation between the left- and right-ear IATs was significant and positive, r = .40, p < .05.
A paired-samples t-test revealed that, as predicted, the IAT effect for the right-ear (left-lateralised) IAT was significantly greater than that for the left-ear (right-lateralised) IAT, \( t(45) = 2.07, p < .05, d = .34, \) one-tailed.\(^8\)

**Discussion**

Self-esteem is one of the most widely investigated of all psychological constructs. Despite its theoretical importance, however, no previous study has investigated whether, within participants, self-esteem is lateralised. Given the considerable evidence for the left-lateralisation of approach-related emotions (see Demaree et al., 2005, for a review), we predicted that higher self-esteem (which can be conceptualised as an approach construct; De Raedt et al., 2008) would be associated with the brain’s left hemisphere. To test this prediction we adapted the most widely used indirect measure of self-esteem, the self-esteem IAT (Greenwald and Farnham, 2000), to the auditory modality. This adaptation enabled us to then present the IAT task under dichotic listening conditions and thus to examine hemispheric lateralisation.

Our results supported our hypothesis. As might be expected, left- and right-ear self-esteem measurements were correlated. Importantly, however, we found that, within participants, self-esteem levels were significantly higher (as indexed by a greater IAT effect) when the IAT was presented to the left hemisphere (via the right ear) than when presented to the right hemisphere (via the left ear). In addition to its methodological contribution, therefore (a successful modality adaptation of one of experimental psychology’s most established measurement tools), our study indicates that levels of self-esteem diverge as a function of hemisphere. It should be noted that
the result we report here cannot be attributed to left hemispheric specialisation for the processing of linguistic stimuli. This is because IAT scores incorporate responses to two different trial types. Thus the greater IAT effect under right-dichotic presentation cannot simply reflect superior linguistic processing in the left hemisphere, but rather reflects a greater response advantage in that hemisphere for congruent trials (where self is paired with pleasant and other with unpleasant) relative to incongruent trials (where self is paired with unpleasant and other with pleasant).

An important limitation of our study stems from the fact that we employed the standard IAT (albeit in auditory format). An inherent limitation of this standard version is that it cannot reveal participants’ evaluative associations with a single target concept (Karpinski and Steinman, 2006). Because it utilises complementary pairs of concepts and attributes, the standard IAT is limited to measuring the relative strengths of pairs of associations (e.g. the strength of the association between self and pleasant relative to the strength of the association between other and unpleasant) rather than the absolute strengths of single associations (i.e. it cannot measure only evaluative associations with the self with no complementary category; Greenwald and Farnham, 2000; Karpinski and Steinman, 2006). This feature of the IAT means that an IAT adapted for the measurement of self-esteem will conflate positive attitudes toward the self with negative attitudes toward others (and vice versa).

Despite this conceptual limitation of the IAT, however, there is considerable evidence that the standard self-esteem IAT is a valid measure of self-esteem (see, for example, Bosson et al., 2000; Greenwald et al., 2002; Meagher and Aidman, 2004). Nevertheless, it is worth noting that a new
IAT methodology has been developed - The Single Category Implicit Association Test (SC-IAT; Karpinski & Steinman, 2006) - that overcomes the above limitations by using only a single attitude category (e.g. self) rather than pairs of complementary attitude categories (e.g. self vs. other). Future attempts to replicate our findings might profitably employ this new version of the IAT in an effort to eliminate some of the ambiguity in the interpretation of IAT scores and in order to better clarify what is driving the IAT effects in our experiment.

Although the current study contributes to our understanding of self-esteem, additional neuropsychological/neuroscientific studies are required to provide a more comprehensive overview of what is likely to be a multi-faceted construct. For example, it would be valuable to undertake lesion studies using the methodology presented here. Imaging techniques would also be useful in providing a more fine-grained assessment of the relative activation of the left versus the right hemisphere in the representation and processing of self-esteem (the results we report here do not rule out right hemisphere involvement – our correlational analysis indicates a relationship between the hemispheres) and in providing detail concerning anterior/posterior and cortical/subcortical involvement. Recent studies have indicated an important role for the medial prefrontal cortices in decisions related to self-referential judgements (Kelley et al., 2002; Vogeley et al., 2004; Mitchell et al., 2005) and future research could undertake to reconcile such findings with research concerning the lateralisation of emotion and self-esteem. Finally, replications of our results with non-linguistic stimuli (perhaps utilising presentation of Picture IAT stimuli to alternate visual hemifields) would be valuable.
The methodology we have developed here might be extended in a number of other directions. Our findings replicated the standard *visually presented* IAT effect for implicit self-esteem (Greenwald and Farnham, 2000) - overall, participants responded much more rapidly when associating *self* with *pleasant* items. Although this was the case for both left- and right-ear presentation, the magnitude of the effect was greater under right-ear (left-hemispheric) presentation. In view of this asymmetry, it may be worth exploring the utility of the auditory dichotic IAT in other (non self-esteem) domains. For example, Gray et al. (2005) used the standard (visually presented, “bilateral”) IAT to demonstrate that paedophiles have an implicit association between children and sex (for non-paedophilic offenders the implicit association is between adults and sex). Might this association be stronger with stimuli presented to one hemisphere than to the other? Mendez et al. (2000) described two cases of late-life paedophilia, each of whom showed right temporal lobe hypometabolism on positron emission tomography (PET). These authors concluded that bilateral temporal lobe disturbances with a right sided predominance result in hypersexuality (see Baird et al., 2007 for further discussion). Whereas the present study utilised an auditory dichotic adaptation of the self-esteem IAT to examine hemispheric lateralization of self-esteem, auditory dichotic adaptations of other IAT tasks might well shed further light on these and related issues.
1 Not to be confused with alpha asymmetry. Alpha power is inversely correlated with activation (see Davidson et al., 1990), so a right > left alpha asymmetry indicates greater left than right activation.

2 Handedness was assessed with the Edinburgh Handedness Inventory (Oldfield, 1971), using the following cut-offs: below -40 = left-handed; between -40 and +40 inclusive = ambidextrous; above +40 = right-handed. See footnote 8 for a description of the results with only right-handers included.

3 Evaluative self-esteem IATs measure the associations of self versus other with positive and negative trait adjectives, whereas affective versions measure associations with words of positive and negative affective valence such as freedom and vomit (Greenwald and Farnham, 2000). Greenwald and Farnham (2000) utilised both affective and evaluative versions of the self-esteem IAT and found no difference between them.

4 A Bonferroni-corrected alpha level of .008 was adopted for these comparisons.

5 We are happy to share our dichotic listening stimuli with other researchers – please contact the first author (ryantmckay@mac.com).

6 At this point the data for incongruent-congruent IATs (incongruent blocks presented first, congruent blocks presented second) were realigned and relabeled such that data from the incongruent blocks (3 and 4) were swapped with data from the congruent blocks (6 and 7).

7 The Greenwald et al. (2003) scoring algorithm requires that any trials with latencies in excess of 10,000 ms be eliminated, and also that any participants for whom more than 10% of trials had latencies less than 300ms be eliminated. In the present data set, however, there were no trials with latencies in excess of 10,000 ms (less than 1% of trials had latencies in excess of 3,000 ms) and no participants for whom more than 10% of trials had latencies less than 300 ms, so no exclusions were made on these bases.

8 The pattern of results was virtually identical with all non-right-handers excluded, which is to be expected given that most non-right-handers (~70%) have language lateralisation equivalent to that of right-handers (Rasmussen and Milner, 1977; Josse and Tzourio-Mazoyer, 2003). In particular, our key finding was unchanged: The right-ear IAT effect (Mean = .54, SD = .43) remained significantly greater than that for the left-ear (Mean = .39, SD = .39), t(34) = 1.87, p < .05, d = .36, one-tailed.
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Table 1

Sequence of Trial Blocks in the Congruent-Incongruent\(^a\) Condition of an IAT for Implicit Self-Esteem

<table>
<thead>
<tr>
<th>Block</th>
<th>No. trials</th>
<th>Function</th>
<th>Items left-key</th>
<th>Items right-key</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>Practice</td>
<td>Unpleasant</td>
<td>Pleasant</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>Practice</td>
<td>Other</td>
<td>Self</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>Practice</td>
<td>Oth/Unpl</td>
<td>Self/Pleas</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>Test</td>
<td>Oth/Unpl</td>
<td>Self/Pleas</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>Practice</td>
<td>Self</td>
<td>Other</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>Practice</td>
<td>Self/Unpleasant</td>
<td>Other/Pleasant</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>Test</td>
<td>Self/Unpleasant</td>
<td>Other/Pleasant</td>
</tr>
</tbody>
</table>

\(^a\) In the incongruent-congruent condition the positions of Blocks 2, 3, and 4 are switched with those of Blocks 5, 6, and 7, respectively.
Table 2

*Averaged Mean Post-penalty Latencies (ms) and Averaged Pooled-trials SDs (ms) for the Crucial IAT Blocks (Standard Deviations in Parentheses)*

<table>
<thead>
<tr>
<th>Left Ear Presentation</th>
<th>Right Ear Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean of Block 3 (congruent)</td>
<td>908 (219)</td>
</tr>
<tr>
<td>Mean of Block 4 (congruent)</td>
<td>883 (176)</td>
</tr>
<tr>
<td>Mean of Block 6 (incongruent)</td>
<td>1099 (338)</td>
</tr>
<tr>
<td>Mean of Block 7 (incongruent)</td>
<td>1025 (293)</td>
</tr>
<tr>
<td>Pooled-trials SD Blocks 3 and 6</td>
<td>378 (230)</td>
</tr>
<tr>
<td>Pooled-trials SD Blocks 4 and 7</td>
<td>360 (239)</td>
</tr>
</tbody>
</table>