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# Free Associations as a Measure of Stable Implicit Attitudes

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*Abstract: Two studies explored the psychometric properties of free association methods for the assessment of attitudes. Even though the stability of the actual associations was rather low, psychometric properties of the valence estimates of the free associations were highly satisfactory. Valence estimates of associations were provided by independent judges who rated the valence of the associations that were generated by participants. Valence estimates of the associations showed satisfactory internal consistencies and retest reliabilities over three weeks. Additionally, valence estimates of the associations were significantly and independently related to both explicit self-reported attitudes and implicit attitudes that were assessed with an Ossi–Wessi Implicit Association Test. Free association methods represent a useful complement to the family of implicit measures and are especially suitable for the assessment of non-relative attitudes towards single attitude objects. Copyright © 2012 John Wiley & Sons, Ltd.*

Key words: free associations; automatic associations; automatic attitudes; social cognition; implicit measures

When Freud developed free association methods as a psychoanalytical technique, he wanted the patient to talk freely about a symptom, dream, feeling or whatever came to the patient's mind (Freud, 1995). Freud considered free associations as a way to transcend the censors of psyche and to gain access to unconscious desires, fears and neuroses that cause psychological harm if they remain undiscovered. There is also a long history of using more standardised and objective ways of exploring word associations in cognitive psychology (e.g. Nelson, McEvoy, & Schreiber, 2004) and cognitive neuroscience (e.g. Goshen-Gottenstein, Moscovitch, & Melo, 2000; Ivanitsky, Nikolaev, & Ivanitsky, 2001). Current social cognition research is particularly interested in the identification and assessment of unconscious or automatic cognitions that nevertheless have important influences on social behaviour. However, free association techniques were rather neglected by research in social and personality psychology in the last decades in general and remained almost unexplored within the field of implicit social cognition research in particular. This is even more evident when it comes to the scarce research on individual differences in associations and psychometric properties of free association methods (Stacy, Ames, & Grenard, 2006).

## CHARACTERISTICS OF FREE ASSOCIATIONS

Most research on free associations has been concerned with the identification of specific words that are normatively associated to certain stimuli, and the probability or strength with which specific associations are generated as a response to different stimuli (Nelson, McEvoy, & Dennis, 2000). Thus, research mainly explored the influence of different stimuli on association processes and neglected the influence of individual differences on the generation of associations with reference to a specific stimulus. For instance, previous research was interested in exploring the stability of certain indices of word association (e.g. the number of associations that are generated within a confined time span) rather than in studying the stability of the associations themselves. Preece (1978) examined stability indices of word associations to mechanic concept words in physics students. Over a time span of 3 years, results showed highly stable individual differences (reliability coefficients $>.75$) for the number of associations per stimulus word and for the degree to which responses were consecutively related to fundamental equations of mechanics. However, these results are rather silent about the stability of the specific associations themselves and whether they are, for instance, able to predict expertise and understanding of mechanic concepts.

In marketing research, free association techniques are used to identify specific characteristics of certain brands that differentiate the products from direct competitors (McDowell, 2004). Likewise, this approach tells more about differences between products than about individual differences in attitudes to the products. Within one of the most comprehensive research projects on free association techniques, Szalay and Deese (1978) explored the stability of word associations to various stimuli and found that the percentage of recurrence of associations to a given stimulus was usually about 32%. Probability of recurrence was higher for words that were generated in the first position (61%) than for words that were generated in the 11th position (13%) of association tasks. A recurrence probability of 61% for the first association is

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relatively high considering the open-response format of free association tasks. As a consequence, most research on free associations uses only the first or the first two responses. With respect to the assessment of larger association networks, results for free association techniques suggest that the stability of these networks is somewhat limited. In a more recent study, Rozin, Kurzer, and Cohen (2002) obtained a mean recurrence probability of 37% for three associations to the word 'food' over an interval of 2 months. If the associations were assigned to 15 different categories (e.g. cooking, healthy foods, unhealthy foods), 55% of the associations of the second measurement point matched the association categories of the first measurement point. If associations were classified as positive, negative, neutral or ambivalent, stability of associations between measurement points was even with 67% of participants matching the valence of their previous responses.

A recent meta-analysis by Rooke, Hine, and Thorsteinsson (2008) compared the predictive validity of word association tasks for the prediction of substance abuse with the predictive validity of seven other implicit measures. Mean uncorrected predictive validity of word association tasks was 0.40 and showed the strongest effect size as compared with all other implicit measures. In a study by Stacy, Ames, Ullman, Zogg, and Leigh (2006), word association tasks predicted HIV risk behaviour tendencies from participants in drug diversion and drug treatment programmes. Word associations were assessed by means of a letter-completion task, a behaviour-completion task and an event-completion task and were then combined as an indicator of spontaneous cognition. Each task comprised between 7 and 20 items and consisted of single letters, situations, or social events that had to be completed with the very first words that came to the mind of participants. Responses were coded as sex related or not sex related by two independent coders that reached satisfactory intercoder consistency with Cohen's $\kappa$ ranging between 0.60 and 0.86. Importantly, word associations were an independent predictor of HIV risk behaviour tendencies even in competition with variables such as drug use, ethnical background and the personality trait sensation seeking.

## MEASURING ATTITUDES WITH FREE ASSOCIATIONS

Interestingly, free association methods have almost never been used for the assessment of attitudes. A study by Shevitz and Cofer (1952) showed that participants generated more associations to words that were related to attitudes than to evaluatively neutral words. However, the study did not find clear effects of individual differences in attitudes on the amount of words that were generated. To our knowledge, a study by Szalay, Windle, and Lysne (1970) is the only study that used free associations for the assessment of attitudes to various social, political and ethical issues. Judges categorised the associations of participants as positive, negative or neutral. Subsequently, an attitude index was calculated by subtracting the amount of negative associations from the amount of positive associations. This Evaluative Dominance Index was correlated with direct questionnaire measures that assessed attitudes towards the stimulus words. Correlations ranged between .17 and .52 and indicated the validity of the Evaluative Dominance Indexes that were calculated from the free associations of participants. However, more research that explores whether free association methods are a useful complement to traditional questionnaire methods for the assessment of attitudes is necessary. Valence of free associations might not only be influenced by individual attitudes but also by contextual factors and group differences. Rozin et al. (2002) explored the effects of age, culture and gender on content and valence of free associations to 'food'. Results showed that older participants were more concerned about health effects of food than younger participants and that American participants were more concerned about fat food than participants from other countries whereas effects of gender were relatively small. These results illustrate the role that contextual factors may play in the generation of free associations and indicate influences on the valence of free associations as a measure of attitudes.

## THE IMPLICIT ASSOCIATION TEST AS A MEASURE OF IMPLICIT ATTITUDES

In the last decades, social cognition research developed another group of measurement procedures as an alternative to traditional questionnaire methods. Traditional explicit questionnaires were criticised because of their susceptibility to self-presentational biases and introspective limits of participants (Greenwald & Banaji, 1995). Therefore, implicit assessment procedures were developed that allow for the assessment of attitudes in socially sensitive domains and for the assessment of spontaneous and automatic representations that are not accessible with explicit questionnaire methods. The most prominent implicit measurement procedure is the Implicit Association Test or IAT (Greenwald, McGhee, & Schwartz, 1998). The IAT measures the speed with which two target concepts are combined with two attribute concepts. Stimuli representing the target concepts (e.g. 'Black' versus 'White' in a race attitude IAT) and the attribute concepts (e.g. 'pleasant' versus 'unpleasant') have to be categorised by the use of a left and a right response key. In two different phases of the IAT, the two possible target-attribute pairings are mapped on the two response keys. For instance in the race IAT, the category pairs 'Black' + 'pleasant' and 'White' + 'unpleasant' are assigned to different keys in the one phase, whereas the category pairs 'White' + 'pleasant' and 'Black' + 'unpleasant' are assigned to different keys in the other phase. Response latencies should be shorter when associated categories share the same response key. As a consequence, IAT scores are based on the difference in mean response latencies between the two phases. In the aforementioned example, the IAT score indicates the relative strengths of associations of Black versus White race with positive versus negative valence. This IAT represents an implicit measure of relative preference for Blacks relative to Whites. Meta-analyses on the correlation between explicit questionnaire measures and IAT measures in various domains typically reveal small to moderate, sometimes even large explicit–implicit consistencies (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Nosek, 2005). Large



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explicit–implicit correlations are found in the domain of political attitudes, weak correlations in socially sensitive domains, for instance attitudes towards overweight people (Nosek, 2005). It is also in the socially sensitive domains of stereotypes and prejudices where IAT measures show better predictive validity than explicit measures for the prediction of behaviour (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

## AIMS OF THE PRESENT RESEARCH

The current studies aimed to have a closer look at individual differences in free associations and the psychometric properties of free associations. The studies intended to explore the stability of free associations to different stimuli and, more importantly, to examine whether free associations are suitable for the assessment of individual differences in attitudes. Therefore, independent raters judged the valence of associations that were generated by the participants, and these valence estimates were used as an indicator of the participants' attitudes. Different from Szalay et al. (1970), the raters in the present studies used a more fine grained 7-point scale in order to judge the valence of participants' associations rather than a simple dichotomous positive–negative scale. Additionally, the studies explored differences between the valence estimates of the associations and explicit self-reports of the participants' attitudes as well as correlations between these attitude measures.

We explored attitudes towards East and West Germans because previous research showed clear attitudinal differences between East and West Germans in their group-relevant attitudes that we assumed to be reflected also in their free associations. For instance, Kühnen et al. (2001) used the IAT in order to show ingroup favouritism of East and West Germans in two studies. Results revealed that East German participants were quicker in pairing East German city names with positive attributes and West German city names with negative attributes than in the reverse pairing. The opposite was true for West German participants. Additionally, ingroup favouritism increased for West German participants and decreased for East German participants after they had been primed with an East–west topic by simply asking them how East and West Germans would respond to several ambiguous questions. The authors explained this contextual effect on the IAT by a more negative East-German stereotype relatively to the West-German stereotype that was activated by the East–west priming. As a consequence, the more negative attitude towards East Germans was also evident in the IAT scores of East and West Germans. Unfortunately, Kühnen et al. did not collect any self-reported attitudes towards East and West Germans in their studies. Therefore, no conclusions can be drawn for ingroup favouritism of East and West Germans on explicit attitude measures from these results.

The current studies used 'Ossi' and 'Wessi' (colloquial description for a person from East and West Germany) and several distractor words as stimuli for the free association tasks. Study 1 explored the stability (i.e. the recurrence percentage) of the associations across four repetitions of the association task within a telephone interview, and the stability of associations across the repetition of the whole interview after 3 weeks. Additionally, Study 1 examined the psychometric properties of the valence estimates of the associations that were provided by two independent raters. Thereby, we studied the internal consistency, the test–retest reliability and the convergent and discriminant validity of the valence estimates with explicit self-reports of the participants' attitudes. Finally, Study 1 tested group differences between East and West German participants on explicit attitude measures and on the valence estimates of the participants' associations. Study 2 explored psychometric properties and group differences of the free associations in a larger internet sample. Additionally, Study 2 examined the convergent validity between the valence estimates of the free associations and an Ossi–Wessi attitude IAT.

## STUDY 1: MEASURING ATTITUDES WITH FREE ASSOCIATIONS

Study 1 explored the stability of free associations to the stimuli 'Ossi' and 'Wessi' and the psychometric properties of the valence estimates of the associations. Additionally, Study 1 tested group differences between East and West German participants on the valence estimates and on explicit attitude measures.

### Methods

*Participants*

A total of 52 participants with a mean age of 24.71 years ($SD = 2.89$) and an age range from 20 to 31 years participated in this study. Twenty-nine of the participants were East Germans (11 women, 18 men), 23 were West Germans (13 women, 10 men). Because the analyses did not show any significant sex differences, no sex effects are reported in the Results section. Most of the participants (75%) were students. Participants were acquaintances of the four experimenters and received €5 for their participation in two telephone interviews, each of which took about 45 minutes. For the second interview, one participant was unavailable, and another participant did not provide explicit attitude ratings. Therefore, analyses for these variables were calculated with $n = 51$ and 50, respectively.

*Overview of procedure and design*

All participants were called twice on the phone with an interval of 20 to 27 days between the two calls. During the first call, participants (i) responded to some demographic questions; (ii) answered to a questionnaire that assessed attitudes towards East and West Germans; and (iii) completed the association task. The second phone call repeated (ii) and (iii). The sequence of (ii) and (iii) was counterbalanced across sex and origin of participants (East and West Germans) but was always identical for the first and the second call. Because there were no significant effects of different order of (ii) and (iii), we do not report any order effects.



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*Explicit questionnaire measures*

At the beginning of the telephone interviews, participants were asked for their age, their highest degree of education, their current job, their city of birth, their city of residence and how long they have lived in their city of residence. Additionally, participants indicated their attitudes towards 'Ossis' and 'Wessis' (colloquial for East and West Germans) on a list of 10 positive and negative attributes that were selected as items with the highest item-scale correlations from a study by Hofmann (2003). Positive attributes were reliable, firm, likeable, successful and tolerant; negative attributes were bossy, reckless, conceited, clumsy and slow. Attributes were rated on a scale from 1 (not true at all) to 7 (totally true), and items were coded such that high scores reflected more positive attitudes. Internal consistencies were calculated across the 10 items and are reported in the Results section.

*Continued free association task*

Instructions for the continued free association task were adapted from Marx (1988). The task is called *continued* because all associations should be given with reference to a certain key word. As an instruction the experimenter said: 'We want to explore how fast you can name different words within short time. You will now get several key words and you will be asked to name 15 words as fast as possible that come to your mind due to the key word. After naming the 10th word I will say "five more". After naming the 15th word I will say "stop". The key words are repeated in a random order. You may then repeat words that you have already named. Any questions?' The relevant key words were 'Ossi' (colloquial for East German) and 'Wessi' (colloquial for West German). Within each session, these key words were presented four times together with two parallel words (Trabi[1] and VW Beetle) and two distractor words (mountains, sea) over a total of four blocks. Because of the complexity of data evaluation, we only explored associations to the key words 'Ossi' and 'Wessi'. Each block presented the six key words in a different fixed random order and internal consistency could be evaluated across these four blocks (Results section). In order to evaluate the stability and content of the associations, phone calls were recorded, and the associations were later typed in Excel spreadsheets. Two independent observers re-checked the association lists in alphabetical order in order to avoid that typos or very small differences (e.g. plural versus singular or compound words that were written as separate words) were treated as different associations. In these cases, the singular or the compound words were used as a basis for data analyses. More specific details concerning data reduction are given in the Results section.

## Results

*Stability of associations*

Stability of associations was first estimated at an individual level for each participant as the proportion of repeated associations relative to the amount of all associations that were generated each time a stimulus word was presented. Individual stabilities were then aggregated in order to obtain an overall stability indicator. Because participants had to generate 15 associations for each stimulus word, stabilities of associations between two blocks were calculated as the amount of repeated associations (i.e. the associations that were generated in both blocks) divided by 15. Within measurement points, stabilities of associations were calculated separately across all possible combinations of the four blocks and then aggregated. That means, the stabilities within measurement points were based on a total of six stabilities across Block 1 and 2, 1 and 3, 1 and 4, 2 and 3, 2 and 4, and 3 and 4 that were averaged. Across measurement points, stabilities were estimated across all associations of measurement points one and two. That means, stabilities were calculated as the amount of repeated associations divided by the total number of associations that were generated within the second measurement point. The total number of associations of the second measurement point reached a maximum of 60 associations if no associations were repeated within the different blocks of the second measurement point and an accordingly smaller number if associations were repeated within the second measurement point. Mean stabilities are reported in Table 1. Stabilities of associations to 'Ossi' and 'Wessi' were almost identical. On average, participants repeated about 43% of their associations each time the stimulus 'Ossi' or 'Wessi' was presented within the first or second measurement point. In other words, more than half of the associations were generated newly with each repetition of the stimulus. Across measurement points, stability of associations was even smaller. At the second telephone interview, participants repeated on average only 35% of their associations that they had already mentioned during the first telephone call.

*Attitude ratings*

The internal consistencies of the attitude ratings to 'Ossis' were $\alpha = .55$ and $\alpha = .62$ for the first and second measurement point, respectively. For attitude ratings to 'Wessis', internal consistencies were $\alpha = .40$ and $\alpha = .73$ for the first and second measurement point, respectively. Mean differences in the attitude ratings were tested by a 2 (origin: East versus West Germans) $\times$ 2 (group: Ossis versus Wessis as attitude objects) mixed analysis of variance with Origin as the between subjects factor and Group as the within subjects factor separately for both measurement points. Results for the first measurement point showed a significant effect of origin, $F(1, 50) = 8.92$, $p < .01$, $\eta^2 = 0.151$, a significant effect of group, $F(1, 50) = 4.93$, $p < .05$, $\eta^2 = 0.090$ and no interaction effect, $F(1, 50) = 2.29$, *n.s.*, $\eta^2 = 0.044$. Single comparisons revealed that East Germans rated Wessis

Table 1. Mean stabilities of associations in Study 1

| | Associations to 'Ossi' | | Associations to 'Wessi' | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| First measurement point | 0.41 | 0.19 | 0.42 | 0.21 |
| Second measurement point | 0.45 | 0.22 | 0.42 | 0.23 |
| Across measurement points | 0.36 | 0.15 | 0.33 | 0.18 |

[1]Car brand and most common vehicle of the German Democratic Republic.



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($M = 4.33$, $SD = 0.38$) less positively than East Germans rated Ossis ($M = 4.68$, $SD = 0.50$), $t(28) = 3.17$, $p < .01$, $d = 0.85$. In contrast, West Germans did not rate Wessis ($M = 4.20$, $SD = 0.46$) differently than they rated Ossis ($M = 4.28$, $SD = 0.56$), $t(22) = .42$, *n.s.*, $d = 0.13$.

For the second measurement point, results showed no significant effect of origin, $F(1, 48) = 2.37$, *n.s.*, $\eta^2 = 0.047$, a marginal effect of group, $F(1, 48) = 3.10$, $p < .10$, $\eta^2 = 0.061$ and no interaction effect, $F(1, 48) = .56$, *n.s.*, $\eta^2 = 0.012$. Single comparisons revealed that East Germans rated Wessis ($M = 4.39$, $SD = 0.50$) less positively than East Germans rated Ossis ($M = 4.69$, $SD = 0.44$), $t(27) = 2.33$, $p < .05$, $d = 0.62$. In contrast, West Germans did not rate Wessis ($M = 4.32$, $SD = 0.55$) differently than they rated Ossis ($M = 4.44$, $SD = 0.69$), $t(21) = 0.56$, *n.s.*, $d = 0.17$.

When attitude ratings of the first and second measurement point were aggregated, results showed a significant effect of origin, $F(1, 50) = 7.16$, $p < .05$, $\eta^2 = 0.125$, a significant effect of group, $F(1, 50) = 4.75$, $p < .05$, $\eta^2 = 0.087$ and no interaction effect, $F(1, 50) = 1.38$, *n.s.*, $\eta^2 = 0.027$. Single comparisons revealed that East Germans rated Wessis ($M = 4.36$, $SD = 0.40$) less positively than East Germans rated Ossis ($M = 4.69$, $SD = 0.45$), $t(28) = 3.01$, $p < .01$, $d = 0.79$. In contrast, West Germans did not rate Wessis ($M = 4.25$, $SD = 0.44$) differently than they rated Ossis ($M = 4.35$, $SD = 0.56$), $t(22) = 0.57$, *n.s.*, $d = 0.17$. Mean differences for the aggregated scores are depicted in the left panel of Figure 1.

*Valence ratings of associations*

The valence of all associations was judged on a scale from 1 (very negative) to 7 (very positive) by two independent raters and then aggregated over the two raters. The raters judged the valence of all associations that were generated in the study in the same random order. Afterwards, the valence estimates were assigned to the associations of the participants in each individual case. Inter-rater agreement of the valence estimates was satisfactory, $\alpha = .75$. Additionally, the internal consistencies of the valence estimates for the 60 associations per measurement point could be analysed. Internal consistencies (Cronbach's $\alpha$) were .87 and .99 for valence estimates of associations to 'Ossi', and .92 and .98 for valence estimates of associations to 'Wessi' for the first and second measurement point, respectively.

Mean differences in the valence of associations were tested by a 2 (origin: East versus West Germans) × 2 (stimulus: Ossi versus Wessi) mixed analysis of variance with origin as the between subjects factor and stimulus as the within subjects factor separately for both measurement points. Results for the first measurement point showed no significant effect of origin, $F(1, 50) = 0.09$, *n.s.*, $\eta^2 = 0.002$, a significant effect of stimulus, $F(1, 50) = 7.07$, $p < .05$, $\eta^2 = 0.124$ and a significant interaction effect, $F(1, 50) = 4.98$, $p < .05$, $\eta^2 = 0.104$. Single comparisons revealed that associations of West Germans to 'Wessi' ($M = 4.33$, $SD = .41$) were more positive than to 'Ossi' ($M = 3.87$, $SD = .44$), $t(22) = -3.45$, $p < .01$, $d = -1.02$. In contrast, associations of East Germans to 'Wessi' ($M = 4.14$, $SD = .44$) did not differ significantly in valence to associations of East Germans to 'Ossi' ($M = 4.11$, $SD = .52$), $t(28) = -0.18$, *n.s.*, $d = -0.04$.

Similarly, results for the second measurement point showed no significant effect of origin, $F(1, 48) = 0.36$, *n.s.*, $\eta^2 = 0.007$, a significant effect of Stimulus, $F(1, 48) = 13.85$, $p < .001$, $\eta^2 = 0.224$ and a marginal interaction effect, $F(1, 48) = 3.75$, $p < .10$, $\eta^2 = 0.073$. Single comparisons revealed that associations of West Germans to 'Wessi' ($M = 4.36$, $SD = .40$) were more positive than to 'Ossi' ($M = 3.86$, $SD = 0.55$), $t(21) = -3.57$, $p < .01$, $d = -1.07$. In contrast, associations of East Germans to 'Wessi' ($M = 4.25$, $SD = 0.44$) did not differ significantly in valence to associations of East Germans to 'Ossi' ($M = 4.09$, $SD = 0.46$), $t(27) = -1.41$, *n.s.*, $d = -0.38$.

When valence ratings of the first and second measurement point were aggregated, results showed no significant effect of origin, $F(1, 50) = 0.32$, *n.s.*, $\eta^2 = 0.006$, a significant effect of stimulus, $F(1, 50) = 12.07$, $p < .01$, $\eta^2 = 0.194$ and a significant interaction effect, $F(1, 50) = 4.98$, $p < .05$, $\eta^2 = 0.091$. Single comparisons revealed that associations of West Germans to 'Wessi' ($M = 4.34$, $SD = 0.38$) were more positive than to 'Ossi' ($M = 3.86$, $SD = 0.45$), $t(22) = -3.70$, $p < .001$, $d = -1.09$. In contrast, associations of East Germans to 'Wessi' ($M = 4.20$, $SD = 0.40$) did not differ significantly in valence to associations of East Germans to 'Ossi' ($M = 4.10$, $SD = 0.45$), $t(28) = -0.96$, *n.s.*, $d = -0.24$. Mean differences for the aggregated scores are depicted in the right panel of Figure 1.

## CORRELATIONS BETWEEN ATTITUDE RATINGS AND VALENCE OF ASSOCIATIONS

Even though the internal consistencies of the explicit ratings of attitudes towards Ossis and Wessis were rather unsatisfactory (as mentioned previously), the correlations of the ratings across

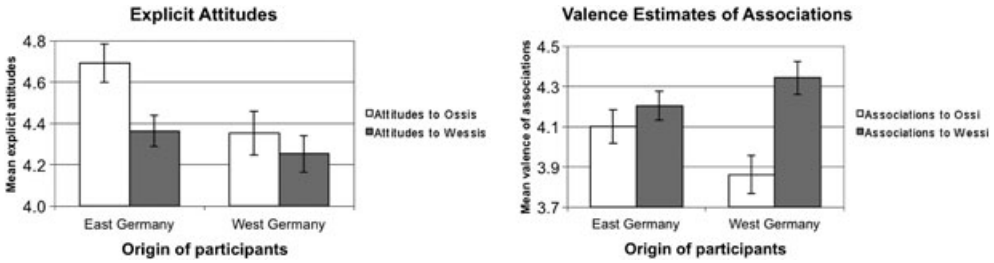


Figure 1. Mean explicit attitude ratings and mean valence ratings of associations to Ossi and Wessi for participants from East and West Germany in Study 1. Ossi, colloquial for East German; Wessi, colloquial for West German; error bars represent standard errors.



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the measurement points were relatively high. Test–retest correlations of attitudes towards Ossis and Wessis were .73 and .63, respectively. Similarly, test–retest correlations of the valence of associations to 'Ossi' and 'Wessi' were .76 and .70, respectively. Because of this high test–retest correlations and because the correlational patterns within the two measurement points were virtually identical, the correlations between these variables are reported for mean scores that were aggregated over the two measurement points. Correlations of the aggregated scores and internal consistency estimates are depicted in Table 2. Additionally, Table 2 contains relative measures that were calculated as the difference between explicit attitudes to Ossis minus explicit attitudes to Wessis, and valence of associations to Ossi minus valence of associations to Wessi, respectively. The significant correlations of the aggregated scores—that was also true for the correlations of the non-aggregated scores within the measurement points—were the correlations of the relative difference scores and the correlation between explicit attitudes towards Ossis and the valence of associations to 'Ossi'. Participants who reported positive attitudes towards Ossis also generated more evaluatively positive associations to the stimulus 'Ossi', $r = .46$, $p < .001$. In contrast, there was no such relationship between explicit attitudes towards Wessis and the valence of associations to 'Wessi', $r = .16$, *n.s.*. The difference between those two correlations was marginally significant, $z = 1.70$, $p < .10$ (two-tailed). Additionally, explicit attitudes towards Ossis did not show a significant negative correlation with explicit attitudes towards Wessis, and the same was true for the valence of associations to 'Ossi' and 'Wessi'. This illustrates that attitudes to Ossis and Wessis were rather independent from each other. Nevertheless, there was a high positive correlation between the relative explicit attitude measure and the relative measure for valence of associations to Ossi minus valence of associations to Wessi, $r = .51$, $p < .001$. This illustrates the high convergent validity between the valence estimates of the free associations and the self-reported explicit attitudes of participants. We also explored these correlations separately for participants from East and West Germany but could not find even marginally significant differences.

## Discussion

On one side, the results of this study showed that the stabilities of free associations that were generated with reference to certain stimulus words were rather low. When the stimulus words were repeated within one session, only about 43% of the associations were re-generated. Only 35% of the associations recurred when the stimulus words were repeated after 3 weeks. This result corresponds closely to the 32% of recurrence of associations that was found by Szalay and Deese (1978). On the other side, the stabilities of the valence of associations that were rated by two independent judges were very high. Within measurement points, the internal consistencies of the valence estimates were .87 and higher. Across measurement points, test–retest correlations of the valence estimates were .76 and higher. Thus, whereas the specific content of associations was rather unstable both within and across measurement points, their evaluative meaning was highly stable both within and across measurement points.

An interesting dissociation was evident between the explicit ratings of attitudes towards East and West Germans and the valence estimates of associations to 'Ossi' and 'Wessi'. Whereas East German participants explicitly reported more positive attitudes towards East Germans than towards West Germans, the valence estimates of their associations to 'Ossi' and 'Wessi' did not differ from each other. In contrast, West German participants did not report any explicit preferences for West Germans over East Germans but generated much more ($d > 1$) evaluatively positive associations to 'Wessi' than to 'Ossi'. Thus, the implicit preference of West German participants for their own group was evident only in the association measure, whereas the explicitly indicated preference of East German participants for their own group was not mirrored by the more implicit association measure. The fact that East Germans did not show ingroup favouritism in the valence estimates of the associations is different from the results by Kühnen et al. (2001) that showed ingroup favouritism for both West and East Germans in an attitude IAT. However, in the studies of Kühnen et al. in group favouritism of East Germans was reduced when the East–west topic was primed prior to the IAT. Because the current study explicitly asked for attitudes and associations to East and West Germans, this priming effect may have also decreased ingroup favouritism of East Germans in the current study.

For both East and West German participants, valence of associations to 'Ossi' correlated with explicit attitudes to Ossis, whereas explicit attitudes to Wessis were uncorrelated with valence of associations to 'Wessi'. A possible reason for this difference could be that the Ossi–Wessi stereotype is

Table 2. Correlations between explicit attitude ratings and valence of associations in Study 1

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| (1) Explicit attitudes to Ossis | *.85* | −.10 | .81** | .46** | −.20 | .47** |
| (2) Explicit attitudes to Wessis | | *.76* | −.67** | −.23 | .16 | −.27* |
| (3) Explicit attitudes to Ossis–Wessis | | | *.88* | .48** | −.25* | .51** |
| (4) Valence of associations to Ossi | | | | *.86* | −.04 | .77** |
| (5) Valence of associations to Wessi | | | | | *.82* | −.67** |
| (6) Valence of associations to Ossi–Wessi | | | | | | *.88* |

*Note*: The Table contains correlations between attitude ratings and valence estimates of associations that were aggregated over the first and second measurement point. Internal consistency αs across first and second measurement point are depicted in italics along the diagonal. $N = 52$,
*$p < .10$,
**$p < .001$.



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more focused on East Germans rather than on West Germans. Moderators of implicit–explicit consistency that were discussed with respect to other implicit measures are representational strength and social distinctiveness (Hofmann, Gschwendner, Nosek, & Schmitt, 2005; Nosek, 2005). It may very well be that attitudes towards East Germans are characterised by greater representational strength because they are subjectively more important and more frequently processed than attitudes towards West Germans. Higher subjective importance and greater frequency of attitudes towards East Germans may stem from the fact that East Germans represent only one fifth of the German population and are therefore a more salient minority group than West Germans (cf. Mummendey, Klink, Mielke, Wenzel, & Blanz, 1999). Similarly, attitudes towards East Germans may also be more socially distinct in a way that individuals experience their specific attitudes to be different from other individuals. This may not be the case for the rather diffuse attitudes towards the majority group of West Germans. Together, this may explain why explicit attitude ratings and valence estimates of associations were correlated for attitudes towards the minority group of East Germans but not for attitudes towards the majority group of West Germans.

In order to examine whether the group differences on the explicit attitude measures and the valence estimates of associations can be replicated in a larger sample, Study 2 was completed. Additionally, Study 2 aimed to replicate the correlational pattern between explicit attitudes and valence estimates of associations and extended the study of convergent validity between different attitude measures by including an implicit attitude measure, the Ossi–Wessi IAT.

## STUDY 2: RELATIONSHIP OF FREE ASSOCIATIONS WITH EXPLICIT AND IMPLICIT ATTITUDES

Study 2 examined psychometric properties and group differences of the valence estimates of the free associations in a larger internet sample. Additionally, it explored the relationship between the valence estimates of the free associations, explicit attitude measures and an Ossi–Wessi attitude IAT.

### Methods

*Participants*

A total of 284 participants with a mean age of 28.31 years ($SD = 10.20$) and an age range from 13 to 66 years participated in this study. One hundred of the participants were East Germans (70 women, 30 men), 184 were West Germans (109 women, 75 men). Because the analyses did not show any significant sex differences, no sex effects are reported in the Results section. Most of the participants (49%) had a university degree or were students, 43% had a high school degree (German Abitur) and 8% had no high school degree.

*Overview of procedure and design*

Data were collected online on the German demonstration page of Project Implicit (https://implicit.harvard.edu/implicit/germany). Participants were informed that the study explored attitudes towards East and West Germans and that it contained questionnaire measures and an IAT. All participants completed an explicit attitude measure, the association task and the Ossi–Wessi IAT. The sequence of these measures was counterbalanced. Because there were no significant sequence effects, we do not report any results for procedural variables in the Results section. Finally, all participants were thanked and received feedback on their results in the Ossi–Wessi IAT.

*Explicit questionnaire measures*

Participants rated their feelings towards 'Ossis' and 'Wessis' on a scale ranging from 0 'very cold' to 10 'very warm'. The separate ratings for feelings towards 'Ossis' and 'Wessis' allowed for an independent analysis of these attitudes. Additionally, participants had to indicate the extent to which they preferred 'Ossis' over 'Wessis' on a scale from 1 to 7 with 1 indicating a strong preference of 'Wessis' over 'Ossis', 4 indicating no preference and 7 indicating a strong preference of 'Ossis' over 'Wessis'. In order to obtain a relative measure, feelings towards 'Wessis' were subtracted from feelings towards 'Ossis'. Finally, this difference score and the preference rating were z-transformed and aggregated as an indicator of the explicit attitude towards 'Ossis' as compared with 'Wessis'. Cronbach's $\alpha$ across the two items was .88 and highly satisfactory.

*Continued free association task*

Procedures of the continued free association task were similar to Study 1 with the differences that only the targets 'Ossi' and 'Wessi' were used; each target was presented only once, and only 10 words had to be associated for each target. Participants typed their associations using the keyboard of their computer. Similarly to Study 1, the instruction read: 'We want to explore how fast you can name different words within short time. Please type into the lines below as fast as possible 10 words that come to your mind due to the key word. There are no correct or wrong answers. Please respond without reflecting for too long. Just name spontaneously 10 words that come to your mind due to the key word'. Two independent raters judged the valence of all associations on a scale from 1 (very negative) to 7 (very positive). Interrater agreement of the valence estimates was satisfactory, $\alpha = .75$. In order to obtain a relative measure, the 10 valence scores for associations to 'Wessi' were subtracted from the 10 valence scores for associations to 'Ossi' and then averaged. Internal consistency across the 10 difference scores was .78 and satisfactory. Concerning separate analyses for associations to 'Ossi' and 'Wessi, internal consistency across the 10 valence scores was satisfactory for associations to 'Wessi' and less satisfactory for associations to 'Ossi', .78 and .55, respectively.

*Implicit Association Test*

The Ossi–Wessi IAT used a standard seven-block procedure (Greenwald et al., 1998). Participants started with single discriminations (20 trials each) of the target concepts ('Ossi' versus 'Wessi' represented by East and West German cities) and the attribute concepts ('good' versus 'bad' represented



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by evaluatively positive and negative words). This was followed by the combined discrimination of these concepts (divided in one block of 20 and one of 40 trials) and the reversed single discrimination of the target concepts (40 trials). Finally, the second combined discrimination employed the reversely paired discrimination of target and attribute concepts (again divided in one block of 20 and one of 40 trials). Sequence of the combined discriminations was counterbalanced across participants such that half of participants completed the 'Ossi-good' versus 'Wessi-bad' discrimination first and the 'Ossi-bad' versus 'Wessi-good' discrimination second. The other half of participants completed the combined discriminations in the opposite order. Because the order variable did not show any significant main or interaction effects, it was omitted from the analyses.

Implicit Association Test scores were based on the difference in mean response latencies between the two combined blocks of different target-attribute pairings. Scores were calculated as using the D algorithm (Greenwald et al., 2003) without error penalties because participants had to self-correct erroneous responses. Scores were coded such that high scores represent more positive attitudes towards East Germans than towards West Germans. Internal consistency was estimated over separate scores for the two sub-blocks of the combined discriminations (i.e. one sub-block of 20 and one sub-block of 40 trials) and was .82.

## Results

*Attitude ratings*

Mean differences in the feelings towards Ossis and Wessis were tested by a 2 (origin: East versus West Germans) × 2 (group: Ossis versus Wessis as attitude objects) mixed analysis of variance with origin as the between subjects factor and group as the within subjects factor. Results showed a significant effect of origin, $F(1, 276) = 3.92$, $p < .05$, $\eta^2 = 0.014$, no significant effect of group, $F(1, 276) = 1.38$, *n.s.*, $\eta^2 = 0.005$ and a significant interaction effect, $F(1, 276) = 97.55$, $p < .001$, $\eta^2 = 0.261$. Single comparisons revealed that East Germans rated Wessis ($M = 5.44$, $SD = 1.53$) less positively than East Germans rated Ossis ($M = 6.60$, $SD = 1.75$), $t(97) = 6.09$, $p < .001$, $d = 0.87$. Similarly, West Germans rated Wessis ($M = 6.41$, $SD = 1.90$) more positively than they rated Ossis ($M = 4.93$, $SD = 1.74$), $t(179) = -8.82$, $p < .001$, $d = -0.93$. A *t*-test for the aggregated explicit relative attitude measure indicated that East Germans showed an explicit preference for Ossis relatively to Wessis ($M = 0.72$, $SD = 0.70$) and that West Germans showed the opposite pattern ($M = -0.43$, $SD = 0.84$), $t(276) = 11.59$, $p < .001$, $d = 1.40$. Mean differences are depicted in Figure 2.

*Valence ratings of associations*

Mean differences in the valence of associations were tested by a 2 (origin: East versus West Germans) × 2 (stimulus: Ossi versus Wessi) mixed analysis of variance with origin as the between subjects factor and stimulus as the within subjects. Results (Figure 2) showed no significant effect of origin, $F(1, 282) = 0.99$, *n.s.*, $\eta^2 = 0.003$, no significant effect of stimulus, $F(1, 282) = 0.00$, *n.s.*, $\eta^2 = 0.00$ but a significant interaction effect, $F(1, 282) = 49.86$, $p < .001$, $\eta^2 = 0.150$. Single comparisons revealed that associations of East Germans to 'Ossi' ($M = 4.25$, $SD = 0.72$) were more positive than to 'Wessi' ($M = 3.80$, $SD = 0.73$), $t(99) = 4.05$, $p < .001$, $d = 0.57$. Similarly, associations of West Germans to 'Ossi' ($M = 3.75$, $SD = 0.66$) were less positive than to 'Wessi' ($M = 4.19$, $SD = 0.75$), $t(28) = -6.24$, $p < .001$, $d = -0.65$. A *t*-test for the relative measure of the valence of associations indicated that East Germans generated more positive associations to 'Ossi' relatively to 'Wessi' ($M = 0.45$, $SD = 1.12$) and that West Germans showed the opposite pattern ($M = -0.44$, $SD = 0.96$), $t(282) = 7.06$, $p < .001$, $d = 0.84$.

*Implicit Association Test*

Because the IAT already represents a relative attitude measure differences between East and West Germans were directly explored using a *t*-test. Results indicated that East Germans showed an implicit preference for 'Ossi' relatively

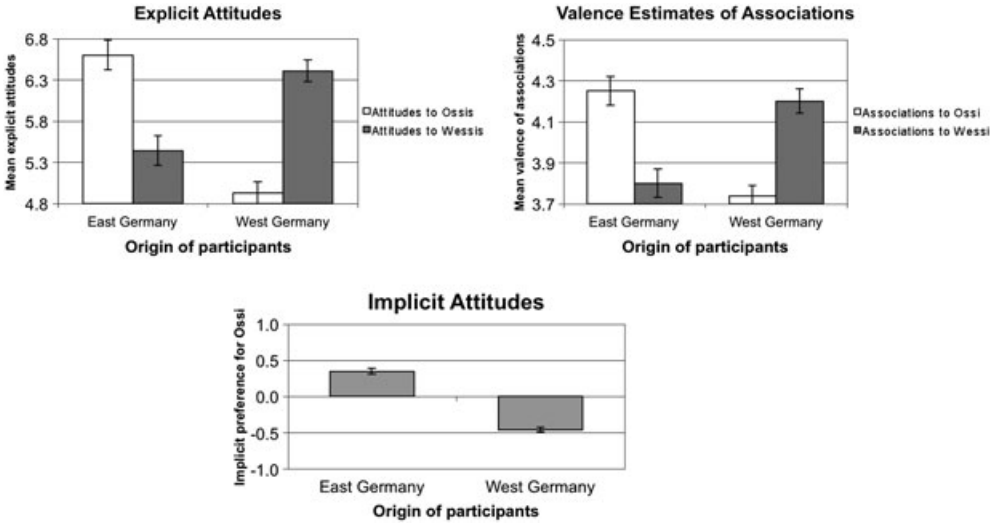


Figure 2. Mean explicit attitude ratings, mean valence ratings of associations to Ossi and Wessi, and results in an Ossi–Wessi IAT for participants from East and West Germany in Study 2. Ossi, colloquial for East German; Wessi, colloquial for West German; error bars represent standard errors.



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to 'Wessi' ($M = 0.35$, $SD = 0.44$) and that West Germans showed the opposite pattern ($M = -0.46$, $SD = 0.33$), $t(269) = 17.0$, $p < .001$, $d = 2.09$. Group differences are depicted in Figure 2.

*Correlations between explicit and implicit attitudes and valence ratings of associations*

Correlations between explicit attitude measures, valence ratings of associations and the Ossi–Wessi IAT are depicted in Table 3. Concerning the relative measures based on difference scores, moderate correlations from .43 to .54 illustrate the good convergent validity between the explicit attitude ratings, the valence of associations and the Ossi–Wessi IAT. Surprisingly, there was a small positive correlation between explicit attitudes to Ossis and explicit attitudes to Wessis, $r = .12$, $p < .05$. However, the correlation between explicit attitudes to Ossis and Wessis might have been caused by response styles, because these two attitudes were assessed with single items. Additionally, this correlation was only small, and the lack of a significant correlation between valence of associations to Ossi and valence of association to Wessi suggested that attitudes to Ossis and Wessis were rather independent from each other. In contrast, explicit attitudes towards Ossis correlated significantly with valence of associations to Ossi, and explicit attitudes towards Wessis correlated significantly with valence of associations to Wessi, $r = .42$ and $r = .37$, respectively, $p$s $< .001$.

*Incremental validity of explicit and implicit attitude measures*

In order to explore the differential validity of implicit and explicit attitude measures, we conducted a hierarchical regression analysis with the valence ratings of the free associations as the dependent variable and implicit and explicit attitudes as the independent variables. Explicit attitudes were entered in Step 1 and implicit attitudes in Step 2. Explicit attitudes contributed significantly to the prediction of the valence ratings of associations when entered in Step 1, $R^2 = .276$, $p < .001$. Additionally, implicit attitudes showed an independent contribution when entered in Step 2, $R^2_{change} = .030$, $p < .001$. When explicit and implicit attitudes were entered into the equation in Step 2, both explicit and implicit attitudes were significant predictors, $\beta = .41$, $t = 6.79$, $p < .001$ and $\beta = .21$, $t = 3.39$, $p < .001$, respectively. Results of the hierarchical regression analysis illustrated that valence estimates of the free associations were a composite of both explicit and implicit attitudes.

### Discussion

Study 2 showed a clear pattern of ingroup favouritism on explicit attitudes, implicit attitudes and valence estimates of associations for participants from both East and West Germany. In terms of effect sizes, ingroup favouritism was the largest in the Ossi–Wessi IAT, followed by explicit attitudes and valence estimates of associations. Different from Study 1, not only East Germans but also West Germans showed ingroup favouritism on the explicit measure, and not only West Germans but also East Germans showed ingroup favouritism on the valence of associations estimates. Differences between the two studies, especially the lack of explicit ingroup favouritism of West German participants in Study 1, may be explained by the non-anonymous telephone interview situation and the relative small sample size of Study 1. Study 2 replicated the high convergent validity between explicit attitudes and the valence of associations estimates at least at the level of relative difference scores that compared attitudes with Ossis and Wessis. Additionally, Study 2 showed, for the first time, good convergent validity between valence of associations estimates and an attitude IAT and provided evidence that valence estimates of free associations are a composite of both implicit and explicit attitudes. Different from Study 1, not only valence estimates of associations to Ossi but also valence estimates of associations to Wessi showed convergent validity with the corresponding explicit attitude measure. Lack of convergent validity for valence estimates of associations to Wessi may be attributed to the relatively small sample size of Study 1. Internal consistencies were satisfactory for the valence estimates of associations to Wessi and for the relative valence of associations estimates and somewhat less satisfactory for the valence estimates of associations to Ossi.

## GENERAL DISCUSSION

Results of two studies provided evidence that free associations show psychometric properties that are satisfactory for the assessment of attitudes. Even though the stability of the

Table 3. Correlations between explicit attitudes, valence of associations and the Ossi–Wessi Implicit Association Test (IAT) in Study 2

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| (1) Explicit attitudes to Ossis | – | .12* | .67*** | .42*** | −.19** | .41*** | .37*** |
| (2) Explicit attitudes to Wessis | | – | −.49*** | −.01 | .37*** | −.27*** | −.25*** |
| (3) Explicit attitudes to Ossis–Wessis | | | *.88* | .26*** | −.41*** | .53*** | .54*** |
| (4) Valence of associations to Ossi | | | | *.55* | −.08 | .73*** | .40*** |
| (5) Valence of associations to Wessi | | | | | *.78* | −.74*** | −.24*** |
| (6) Valence of associations to Ossi–Wessi | | | | | | *.78* | .43*** |
| (7) Ossi–Wessi IAT | | | | | | | *.82* |

*Note*: Internal consistency αs are depicted in italics along the diagonal. No internal consistencies are available for the single item measures (1) and (2). $N = 269$,
*$p < .05$,
**$p < .01$,
***$p < .001$.



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actual associations was rather low and Study 1 showed that only 35% of the associations recurred when the stimulus words were repeated after 3 weeks, psychometric properties of the valence estimates of the free associations were satisfactory. Valence estimates of associations were provided by independent judges who rated the valence of the associations that were generated by participants. Reliabilities of the valence estimates of the associations were satisfactory. Additionally, valence estimates of the associations were significantly and independently related to both explicit self-reported attitudes and implicit attitudes that were assessed with an Ossi–Wessi IAT.

An interesting characteristic of free associations as a measurement procedure for the assessment of attitudes is that it allows for the assessment of non-relative attitudes without requiring the existence of a dichotomous contrast category. In the current studies, valence estimates of associations assessed attitudes towards Ossis independently from attitudes towards Wessis. More importantly, results showed that both attitudes were not correlated negatively with each other and were rather independent from each other. Independent assessment of attitudes is a crucial advantage of free association methods in comparison with the IAT that only allows for the assessment of relative attitudes (Blanton, Jaccard, Gonzales, & Christie, 2006).

Free associations methods also allow to estimate whether attitudes that were assessed are rather positive or negative in nature. In Study 1, participants from both East Germany ($t(27) = 4.60$, $p < .001$) and West Germany ($t(22) = 3.00$, $p < .01$) reported explicit attitudes towards the opposite group that were above the scale mean, that means, rather positive than negative. Interestingly, only East Germans ($t(28) = 2.70$, $p < .04$) but not West Germans ($t(22) = -1.43$, *n.s.*) generated associations towards the opposite group that were on average judged rather positively than negatively. In Study 2, valence estimates of associations from both East Germans ($t(99) = -2.70$, $p < .01$) and West Germans ($t(183) = -5.21$, $p < .001$) to the opposite group were below the scale mean and rather negative, and only explicit attitudes of East Germans ($t(97) = 2.83$, $p < .01$) but not West Germans ($t(179) = -0.52$, *n.s.*) towards the opposite group were positive. Differences between the studies may be attributed to the relatively small sample size and the non-anonymous telephone interview situation in Study 1. Together the results illustrate that free association methods are not only able to assess non-relative attitudes but also the positivity or negativity of these attitudes. Different from explicit measures, that most often showed positive attitudes towards the outgroup, association methods may also reflect socially undesirable negative attitudes towards the outgroup. Apart from a relative valence rating of associations (i.e. positive relatively to negative) as used in the current studies free association methods also allow for the separate coding of the positivity, negativity or neutrality of associations. A combination of separate valence codings of several associations may then be used as an indicator of the ambivalence of participants toward an attitude object (cf. Rozin et al., 2002).

### Free associations as a measure of stable attitudes

One of the most interesting findings of the current study was the high stability of the valence estimates of the free associations both within and across measurement points. Sufficient internal consistency and test–retest reliability is an essential precondition for the use of association techniques for the assessment of individual differences. It should be taken into consideration that in Study 1, the aggregation level of the valence estimates was quite high in the current study, because 60 associations by each stimulus were evaluated for every measurement point. Using the Spearman–Brown formula and calculating with the lowest internal consistency of .87 in the current study, a minimum of 21 associations is required to obtain an internal consistency of at least .70. In other words, with no more than 30 associations per attitude object one may be able to reliably assess attitudes without explicitly asking participants. Study 2 revealed that internal consistency for valence estimates of 10 associations was .78 for associations to Wessi and .55 for associations to Ossi. This illustrates that more than 10 associations per stimulus word are advisable for the reliable assessment of attitudes with free association methods. Of course, future studies should examine whether comparable reliability indices may also be reached for different attitude objects.

## CONCLUSION

Even though free association techniques have long been used in psychology, their psychometric properties have hardly been examined. Research rather focused on questions related to what associations are elicited by certain stimuli or explored to the amount of words and the speed with which associations are generated (e.g. Marx, 1988). Few research has looked at the possible use of association techniques for the assessment of individual differences. In the current study, we explored whether free associations are suitable for the assessment of attitudes. Whereas the specific content of the associations was rather unstable both within and across measurement points, their evaluative meaning as rated by independent judges was highly stable both in terms of internal consistency and stability over a 3-week interval. Additionally, valence estimates of associations were significantly and independently related to both explicit self-reported attitudes and an Ossi–Wessi IAT. Free associations may therefore represent an alternative implicit measure to the explicit assessment of attitudes.

We acknowledge that free associations techniques do not strictly meet the criterion of automaticity that was postulated for implicit measures (cf. De Houwer, 2006). That means, free associations may not reflect the assessed attitudes in a purely automatic way. For instance, the valence of associations may neither be totally unaware nor uncontrollable for the person who generates the associations. At least partial introspective accessibility of attitudes assessed by free association methods is illustrated by the convergent validity between valence estimates of associations and self-reported explicit attitudes. However, observer-rated valence estimates



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of associations to attitude objects are a far more unobtrusive and less transparent measurement procedure than the direct assessment of explicit attitudes. Therefore, free association techniques may provide an interesting way for the assessment of more spontaneous attitudes and should be less distorted by social desirability concerns. Different from other open-ended procedures such as thought-listening techniques (e.g. Cacioppo, von Hippel, & Ernst, 1997), free associations clearly refer to an attitude object and do at the same time not require or foster deliberate recollection or other explicit processes.

It should not be concealed that free association techniques are a quite complex and time-consuming procedure that requires multiple steps. Associations need to be collected in written or oral form and their valence need to be judged by observers. This is probably the reason why they are only rarely used, and why studies that explored their psychometric properties especially in terms of convergent validity with other implicit and explicit attitude measures were previously missing. Additionally, free association techniques may not be fully standardised, because they will always be influenced at least to some degree by the valence estimates of the judges. Nevertheless, free associations techniques may provide an idiographic access to individual mental representations that is not possible with more standardised implicit measurement procedures (e.g. the IAT by Greenwald et al., 1998). Also, free association methods may be especially useful for the construct validation of implicit measures because of their high face validity. Future research that explores the use of association techniques for the assessment of attitudes and their convergent and discriminant validity to other implicit and explicit attitude measures is required. Apart from measuring individual differences in implicit attitudes association techniques may be adapted for the assessment of implicit self-esteem and implicit self-concept. Valence ratings of associations that are named with respect to the self may be used as an indicator of implicit self-esteem and trait categorisations of associations may serve as an indicator of implicit self-concept. In sum, free association procedures seem to be a prime candidate in order to complement the family of implicit measures.

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