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About the impact of automaticity in the Minimal Group Paradigm: evidence from affective priming tasks

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Abstract

Two experiments examined whether novel, minimal ingroups are automatically associated with positive affect while outgroups do not elicit such positive evaluative default. Participants were assigned to social categories in a typical minimal group setting and subsequently administered a masked priming task, i.e. prime words were not consciously recognized. Following either the presentation of a priori *positive or negative words or the presentation of the group labels, participants classified adjectives with regard to their valence (positive/negative). In Experiment 1, a standard affective priming paradigm was realized with response latencies as dependent measures; in Experiment 2, a response window technique was used, with errors as crucial measure. In both studies, significant affective congruency effects emerged similarly for standard primes and category labels, indicating ingroup bias on an implicit level. Copyright © 1999 John Wiley & Sons, Ltd.*

The link between social categorization and social discrimination has received a lot of interest in social psychological research on intergroup behavior. Experiments on 'minimal' groups, first conducted by Rabbie and Horwitz (1969) and Tajfel, Billig, Bundy, and Flament (1971), were a crucial hallmark in this domain of research. Results obtained in these studies indicate that the mere categorization of individuals into arbitrary social categories can be sufficient to elicit ingroup favoritism. Obviously, social categorization does not only fulfil the cognitive function of structuring the complex social world (Allport, 1954), but, as outlined by Tajfel and Turner (1979, 1986) in their Social Identity Theory, it also serves a motivational function. Group members not only strive to differentiate their own categories from

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other categories, but they also try to make them positively distinct from outgroups, thus elevating their self-concepts.

Despite the many experiments confirming that 'mere categorization' as established in the Minimal Group Paradigm can be sufficient to elicit social discrimination (see e.g. reviews by Brewer, 1979; Messick & Mackie, 1989, Mullen, Brown, & Smith, 1992; Tajfel, 1982), the interpretation of these results in terms of a striving for positive social identity has been questioned (e.g. Diehl, 1990; Mummendey, 1995; Mummendey & Otten, 1998; Spears & Oyen, 1993, unpublished manuscript). Consequently, Cadinu and Rothbart (1996) summarize the current state of affairs as follows: 'Overall, in-group favoritism in the minimal group paradigm is a well-established phenomenon, but the exact reasons for this favoritism remain unclear (p. 661).'

In this vein, the present research suggests an additional factor that might account for the mere categorization effect. A minimal ingroup's positive distinctiveness might not necessitate an active, motivated social comparison process as described by Social Identity Theory, but ingroup bias might—at least partly—be based upon an automatically activated, implicit positive attitude towards the self-including social category. In other words, there might be a positive ingroup default that is already inherent in the very act of assigning a social category to the self. Before turning to the empirical investigation of this idea, some approaches that are based on a similar reasoning will be introduced.

SOCIAL CATEGORIZATION AND POSITIVE INGROUP DEFAULT

Initial categorisation-based ingroup bias

When discussing the interface between motivational and cognitive processes underlying stereotype formation, Maass and Schaller (1991) argue that an 'initial categorization-based ingroup bias' guides the processing of new information in intergroup contexts. Their data indicate that 'ingroup–outgroup categorization triggers ingroup-favoring evaluations and expectancies which then bias subsequent information processing ...' (p. 204). Hence, positive ingroup distinctiveness is understood as a default reaction in intergroup comparisons and not just as its desired outcome: 'Group members seem to approach their task with the rudimentary hypothesis that their own group is better than the opposing group' (Maass & Schaller, 1991, p. 204).

Automaticity and social discrimination

The single 'rudimentary hypothesis' that the ingroup is better than the outgroup—as put forth by Maass and Schaller (1991)—presupposes that judges do not reflect thoroughly over their decisions. The question then arises whether the positively distinct attitude towards ingroups in the Minimal Group Paradigm is in fact at least partly based on the activation of a positive ingroup stereotype that has been acquired automatically (for the notion of 'automaticity', see Bargh, 1982, 1997) by the mere act of social categorization.

Empirical evidence for an *automatic* positive evaluation of ingroup-related (compared to outgroup-related) words was reported by Perdue, Dovidio, Gurtman, and Tyler (1990; Experiment 2). Non-specific ingroup-related pronouns such as *us*, *we*, and *ours* as well as outgroup-related pronouns such as *them*, *they*, and *theirs* were presented to the participants on a computer screen, followed by positive or negative target words that were to be evaluated as positive or negative (*evaluation priming task*). It could be shown that the evaluation latencies were shorter for positive target words after a priming by ingroup-related pronouns and for negative target words after a priming by outgroup-related pronouns (compared to their respective counterparts). With reference to a study by Fazio, Sanbonmatsu, Powell, and Kardes (1986), who found a comparable pattern with *a priori* positive and negative prime words, this crossover interaction could be interpreted as an affective congruency effect that unobtrusively reveals an automatic positive evaluation of ingroup-related pronouns (compared to outgroup-related pronouns).

Perdue and associates (1990) worked with generalized ingroup- and outgroup-designators, which possibly are associated with familiar, relevant groups, like peers, family, etc. Whether similar effects can be obtained with reference to minimal groups has still to be shown. Besides, the interpretation of their results in terms of conditioning seems to be less appropriate when discussing minimal groups. Assuming that 'because of their differentially conditioned associations, ingroup and outgroup pronouns ... may introduce evaluative biases automatically into the perception of new and unfamiliar people' (Perdue *et al.*, 1990, p. 476), is problematic if—as in the following studies—new, unfamiliar category labels are introduced and assigned to participants, without using terms like 'we', 'us', 'they' and 'them'.

Besides, although not dealing with social objects, Feys (1991, 1995) demonstrated evidence for a 'mere ownership effect', that is, for the preference for any objects belonging to the self (thus, probably also for categories assigned to the self) based on a purely affective self-bias rather than based on evaluative conditioning. Similarly, we assume that the association of the new ingroup with the typically positive evaluated self (see below) is responsible for the 'initial categorization-based ingroup bias' as postulated by Maass and Schaller (1991). In fact, though neither linked to the question of favoritism effects, nor based on minimal groups, Smith and co-workers (Smith and Henry, 1996; Smith, Coats, & Walling, 1999) have demonstrated evidence for a close self-ingroup association on an implicit level. If evaluations of self and ingroup matched on a particular dimension, subsequent ratings of either self or ingroup could be made more quickly. However, (mis-)matches between self and outgroup had no effect.

In sum, the core assumption of the accounts summarized above—an automatically triggered positive connotation of self-categories as a basis of favoritism towards minimal ingroups—implies a shift of emphasis in the analysis of ingroup favoritism in the Minimal Group Paradigm. The self-concept and ingroup favoritism become linked in terms of cognitive rather than motivational processes. From this perspective a typical minimal group experiment might be seen as follows. Initially, participants receive self-related category information, which they either did not know about or which they did not consider relevant before. The 'evaluative vacuum' associated with this new category can be filled automatically by a 'spill-over' of a general positive self-regard (e.g. Banaji & Prentice, 1994; Greenwald, 1980; Taylor & Brown, 1988). This process will lead to a positive evaluation of the new social category, which subsequently can be activated implicitly. Since typically the category is introduced in comparison to its opposite, which, by definition, differs from the self ('not me', Simon, 1993), the counterpart will be evaluated more negatively (at least relative to the self-related category). These processes can be expected to occur quickly, automatically and involuntarily, rather than slowly, strategically and with thorough reflection (see Bargh, 1982, 1997). As such, one might conceive of an automatic positive ingroup default based on a generalization from self to novel ingroup as an efficient means to serve the need for uncertainty reduction which Hogg and collaborators (Hogg & Abrams, 1993; Hogg & Mullin, 1999) assume to be decisive for processes within the Minimal Group Paradigm.

Analyzing positive distinctiveness in the Minimal Group Paradigm as the result of implicit, initial value connotations which can be activated automatically by reference to the respective novel category, has two methodological implications. First, the affective connotation of a new self-related category should be measured *directly after assignment* of the category, and before any overt comparative or evaluative reference to ingroup or outgroup is made. Second, the supposedly implicit character of the evaluation process necessitates an *indirect measure* of this affective connotation (Greenwald & Banaji, 1995). This is especially important because we want to isolate ingroup bias on the implicit level from positive ingroup distinctiveness based on explicit social comparisons.

In order to investigate the assumptions summarized above, we decided to adapt the affective priming paradigm introduced by Fazio and collaborators (1986) to a typical minimal group situation and to analyze the automatic evaluation of newly acquired category labels. Is there an affective congruency effect in the evaluation task when using arbitrary category labels as primes immediately after they have been assigned to the participants? Before proceeding with a report of our experiments we will briefly give some general information about research on affective priming, focusing especially on the details which are specifically relevant to our hypothesis.

AFFECTIVE PRIMING

The evaluation priming task and the affective congruency effect were introduced by Fazio and associates (1986). Since the publication of their seminal paper, this effect was replicated in many experiments (e.g. Bargh, Chaiken, Govender, & Pratto, 1992; Hermans, De Houwer, & Eelen, 1994; Klauer, Roßnagel, & Musch, 1997; Wentura, 1999). At the same time, several studies using other tasks and a variety of experimental manipulations have revealed many constraints, with ensuing implications for theorizing about the phenomenon. It seems that the affective congruency effect in evaluation tasks is interpreted most appropriately in line with Stroop-like interference tasks (Klauer, 1998; Klauer *et al.*, 1997; Wentura, 1999, in press; see also Stroop, 1935; MacLeod, 1991). That is, via automatic evaluation, the prime word triggers the appropriate response, i.e. to respond with either 'positive' or 'negative'. If the target word requires the same response, it might be facilitated; if the target word requires a different response, it will be delayed. Two fields in this research area are, in our opinion, very important for the attempt to link the hypothesis of an initial pro-group bias to the method of affective priming, namely findings concerned with (a) episodic affective priming and (b) masked priming.

Episodic affective priming

De Houwer, Hermans, and Eelen (1998) have recently shown that prime stimuli with a newly acquired valence association also yielded an affective priming effect. In a learning phase, senseless letter strings ('nonwords') were paired with existing positive or negative words. In the priming phase, the nonwords served as primes for evaluatively polarized targets in an evaluation task. In three experiments, the affective congruency effect emerged. Based on these findings, we anticipate that affective priming tasks could fruitfully be applied to our research question, namely whether (previously neutral) category labels acquire affective value connotations immediately after participants' social categorization.

Masked priming

In a standard priming experiment the prime stimulus, although it is presented for a brief period only (e.g., 200 ms), is still clearly visible so that participants can fully report the content of the prime. While this is not problematic for priming experiments in basic research, it poses a difficulty for social cognition studies. We suspected that if a participant discerned the newly acquired minimal group label repeatedly as a prime word in the evaluation task, this might create suspiciousness concerning the previously disguised interest of the study in ingroup favoritism. Therefore, we preferred a masked priming technique. Here, the prime is presented only for a very brief period (e.g. 20 ms) before it is overwritten by a mask (e.g. a meaningless letter string), thereby preventing the conscious recognition of the stimulus. Greenwald and colleagues (Greenwald, Draine, & Abrams, 1996; Greenwald, Klinger, & Liu, 1989; Greenwald, Klinger, & Schuh, 1995) showed that reliable masked priming effects can be obtained with evaluation tasks (see also Perdue *et al.*, 1990; Perdue & Gurtman, 1990).

OVERVIEW

Two experiments were conducted to test the assumed implicit intergroup bias towards minimal groups. We assume that directly after social categorization, merely by its self-referential character and without explicit social comparison, a novel social category that is defined as the participant's ingroup might acquire and subsequently activate positive affect.

We expect that the assumed positive ingroup default manifests itself in an affective congruency effect such that ingroup category labels—compared to outgroup category labels—will facilitate reactions towards positive targets, while outgroup category labels should rather facilitate reactions towards negative targets. By comparing the priming effects for category labels with those obtained for *a priori* positive and negative adjectives as primes, it can be tested whether by reference to the new category labels a positive or negative affective connotation could be activated. We expect comparable priming effects for *a priori* positive prime words and ingroup labels, on the one hand, and of *a priori* negative prime words and outgroup labels, on the other.

Two experiments—both utilizing a masked affective priming procedure—tested these hypotheses about an intergroup bias on the implicit level. In both studies, participants were subjected to a typical minimal group situation, that is, they were anonymously assigned to a social category which they neither knew nor considered relevant before. The novel category labels were then used in an affective priming task as masked primes for positive and negative target adjectives. As will be outlined below, differences between the two experiments concerned the type of priming task, the type of categorization as well as the dependent measures.

EXPERIMENT 1

Method

Participants

A total of 135 participants were recruited through advertisements in a local newspaper. The data from 17 participants had to be excluded from analyses due to the following reasons: (1) Eleven subjects stated in a questionnaire at the end of the experiment that they had participated in a former minimal group experiment; (2) three subjects used the wrong ingroup label while answering manipulation check questions; and (3) three participants were excluded due to their probable awareness of the prime words (see below). The remaining 118 participants (73 women; 45 men) were almost exclusively students of different faculties of the University of Münster and they were native speakers of German. Their median age was 23.0 years with a range from 17 to 34 years. Subjects were paid DM 20, – (about 10 Euro) for their participation in the complete study.

Design

For the priming task the following repeated measurement design was used. The factorial combination of target valence (positive versus negative) and prime condition (positive versus negative versus *concave* versus *convex* versus neutral) is central. The five prime conditions were crossed with five groups of participants and five sets of stimuli (see 'Materials') in a balanced design (Latin square). Finally, two orthogonal between-subjects factors were added. First and most importantly, the category labels assigned to the participants were varied. For half of the participants *concave* was the ingroup label, while for the other half it was *convex*. Second, but only of minor interest, the frequency of exposure of *a priori* positive and negative primes was manipulated. In a typical priming experiment, a list of primes is presented without repetition within subjects. But since the category labels *concave* and *convex* have to be presented repeatedly, the non-repeated *a priori* condition differs in more than one respect from the category label condition. Therefore, we decided to compare a non-repeated prime condition with three conditions of repeated positive/negative prime pairs (using either [*right*/*wrong*] or [*positive*/*negative*] or [*good*/*bad*] as repeated primes). To reduce organizational complexity, there was a fixed assignment of these four conditions to the eight computers which were used during the experiment.

Materials

The target set consisted of 60 positively and 60 negatively valenced German adjectives. Adjectives were selected on the basis of their pleasantness values (absolute values of 50 and more on a scale ranging from −100 to +100) according to a norm list of 908 adjectives (Hager, Mecklenbräuker, Möller, & Westermann, 1985; Möller & Hager, 1991). The set of target adjectives was divided into five lists of equal size for the balanced design (see 'Design'). Each list included 12 positive and 12 negative items balanced for length. Prime stimuli for the repeated *a priori* conditions were the pairs *right*/*wrong* (German: '*richtig*'/'*falsch*'), *positive*/*negative* ('*positiv*'/'*negativ*'), and *good*/*bad* ('*gut*/'*schlecht*'). In addition, for the non-repeated *a priori* condition, 30 positively and 30 negatively valenced German adjectives (including those for the repeated conditions) were selected according to the same criteria as the targets. In order to guarantee semantic or associative unrelatedness in this condition, the combination of primes with target stimuli was fixed. For the category label conditions the word pair *concave*/*convex* ('*konkav*'/'*konvex*') was used, while for the neutral prime condition the string *xxxxxx* was presented.

Procedure

Participants were tested in small groups composed of four to eight subjects. They were seated in front of IBM-compatible personal computers. The computers were placed on three sides of the laboratory and separated by partition walls.

First, allegedly based on a test assessing 'type of attention sequence', participants were assigned anonymously either to the *concave* or *convex* group (see e.g. Otten, Mummendey & Blanz, 1996). Participants were asked to work through a simple letter-matching task known from research on negative priming (Neill, Lissner, & Beck, 1990), which was embedded into a program the layout of which emphasized the inputed character of a professional test procedure. This test was claimed to assess their type of attention sequence. After 5 minutes the program stopped automatically and presented a feedback screen. A bar chart was computed with each bar supposedly representing performance of a 10-second period. Depending on the random assignment of the participant, the height of the bars reflected either a concave curve or a convex curve. Additionally, three numerical indices were presented on the screen, one of them called 'Delta', whose sign allegedly—in addition to the curve—reflected whether the concentration type was either *concave* or *convex*. Half of the participants were anonymously assigned to the *concave* group, the other half to the *convex* group. (Odd numbers of participants were allowed with a 2:3 or 3:4 splitting).

Next, participants were instructed to work on a second, supposedly, related test which was the priming task. Instructions were given on the CRT screen. Participants were told that they had to classify common words with regard to their valence. Both speed and accuracy were emphasized. Presentation of prime words was not mentioned. On every trial, a prime was presented for one or two refresh cycles of the video signal (i.e. 20 or 28 ms, depending on screen type),[1] followed by a pattern mask (a row of 14 '@'s) for three refresh cycles (i.e., 60 or 42 ms) and then by a blank screen, so that the stimulus onset asynchrony (SOA) was 100 ms. The target adjective then appeared and remained on the screen until the subjects pressed a key. The blank screen interval between response and the beginning of the next trial was 3000 ms. The 'positive' response was assigned to the right index finger, the 'negative' response to the left index finger.

To practice the evaluation decision, ten trials were administered with a feedback message on the screen whenever an error was made (' *** error! *** '). If the response was slower than 1000 ms, the following message was added: 'Your reaction time was . . . ms. Please try to respond more quickly!' The main part of the experiment consisted of 120 trials (i.e. 12 trials per target valence $\times$ prime type condition). After 60 trials, participants were given the opportunity to have a short break. In the main phase there was no feedback. For each participant, the sequence of trials was determined randomly.

Following completion of the priming task, and after participants had filled out some questionnaires which are of no relevance to the present hypotheses, the conscious recognition of the prime words was tested. That is, a short explanation of masked priming was given, and participants were asked to indicate on a 10-point scale for a listed of ten words how confident they were to recognize these words from the previous task. Depending on whether participants had been assigned to the repeated or non-repeated priming condition, up to six of these words were real primes, while the remaining words were distracters. Participants were instructed to indicate their recognition certainty on a scale from '+1.0' = 'absolutely certain to recognize' to '−1.0' = 'absolutely certain that the word had not been presented'. Intermediate scores were 0.8, 0.6, etc.; to force guesses, the score of zero was not included. To avoid suspicion concerning the cover story, the words *concave* and *convex* were not included in the list of words. Instead, participants were asked to write down any words they believed to have seen, but which were not included in the list presented in the questionnaire. Finally, participants were fully debriefed.

Results

Recognition ratings

For each participant the mean recognition rating for targets (i.e. the prime words actually presented for that participant; mean = −0.23) as well as for the distracters (mean = −0.24) was computed. The difference was not significant, $t(113) = 0.28$,

[1]This variance depended on screen type, namely, one refresh cycle of the video signal for computers with a 50 Hz screen (i.e. 20 ms) and two refresh cycles of the video signal for computers with a 70 Hz screen (i.e. 28 ms). There were three 70 Hz screens and five 50 Hz screens. We took care that the type of screen was not confounded with the between-subjects factors 'sample of the latin square' and 'assignment of category label'.

$p > 0.77$.[2] Two participants, however, had difference scores more than 3.6 standard deviations above the mean (for all other participants $z < 2.1$). Both these participants and an additional one who reported that he had been aware of the words *concave* and *convex* were excluded from further analyses (see 'Participants').

Priming effects

Mean reaction times (RT were derived from correct responses only. The average error rate across subjects was 3.7 per cent. Reaction times which either could be considered far-out values (Tukey, 1977) with respect to the individual distribution (three interquartile ranges above the third quartile), or were above 1500 ms or below 300 ms were discarded as well (1.3 per cent of all responses). Since there were small differences in the sample sizes of the balanced design, differences in the RT means of the item lists of the balanced design were adjusted to compute priming effects without bias (see Pollatsek & Well, 1995). The combination of target valence and prime condition was re-arranged into a factorial combination of affective congruency status (congruent versus incongruent) and type of prime (*a priori* versus category labels). For *a priori* materials, congruent priming is defined by the mean of the conditions 'positive target following positive prime' and 'negative target following negative prime'. Accordingly, incongruent priming is defined by the mean of the conditions 'positive target following negative prime' and 'negative target following positive prime'. For conditions with category labels, equivalent means were computed, replacing the positive prime condition with the ingroup label condition and the negative prime condition with the outgroup label. Means for congruent and incongruent priming concerning *a priori* materials and category labels are given in Table 1.

In a 2 (prime type: *a priori* versus category label) $\times$ 2 (congruence: congruent versus incongruent) analysis of variance a main effect of congruence emerged, $F(1, 117) = 5.45$, $p < 0.05$, both other Fs$(1, 117) < 1$, *ns*. Tested separately, the effect for *a priori* primes, $M = 5$ ms ($SD = 34$ ms), $t(117) = 1.65$, $p = 0.05$ (one-tailed), as well as the effect for category labels, $M = 5$ ms ($SD = 35$ ms), $t(117) = 1.64$, $p = 0.05$

Table 1. Mean response times (in ms; percentages of errors are shown in parentheses) as a function of priming (congruent versus incongruent) and prime type (*a priori* versus category labels; Experiment 1)

	Priming		
Prime type	Congruent	Incongruent	AP[a]
a priori	699 (3.9)	704 (4.1)	5(3)
Category labels	700 (4.0)	706 (3.4)	5(3)

[a]Affective priming (=mean RT for incongruent priming minus mean RT for congruent priming; standard error in parentheses).

[2]Dichotomization of recognition ratings (i.e. taking ratings above zero as 'recognition') yielded a comparable result. Actually, the mean for targets (mean = 0.37, coding '0' as 'not recognized', '1' as 'recognized') is *below* the mean for distractors (mean = 0.38). The difference, however, is far from significant, $t(113) = -0.60$, *ns*.

(one-tailed) were significant. The priming effect for *a priori* materials does not interact with type of *a priori* primes (*right*/*wrong* versus *positive*/*negative* versus *good*/*bad* versus mixed primes), $F1(3, 114) = 1.67$, *ns*. The priming effect for category label primes does not interact with assignment of these labels (*convex* = ingroup versus *convex* = outgroup), $t(116) = 0.62$, *ns*. For the neutral baseline, mean RT was 693 ms, i.e. responses following the *xxxxxx* strong were faster than responses in all other conditions. Therefore, we refrained from a decomposition of affective priming effects with regard to costs and benefits. The error data did not show any significant effects, all $Fs(1, 117) < 1.19$, *ns*.

Discussion

The main concern of Experiment 1 was to show that *a priori* neutral words automatically acquire an affective connotation, simply by introducing them as constituents of a social categorization and by relating one of the two category labels to the participants' self concept. This hypothesis was largely supported. The words *concave* and *convex* produced an affective priming effect corresponding to the effect for *a priori* positive/negative primes. The self-related category label functioned equivalently to *a priori* positive primes, whereas the other-related category label functioned equivalently to *a priori* negative primes. However, the effects were rather small, significant in one-tailed tests only. Above that, the neutral baseline did not work properly so that no differentiating information with regard to costs and benefits could be obtained. Thus, the question left unanswered is whether the affective priming effect for category labels is dominantly due to the positive valence of the ingroup label or to the negative valence of the outgroup label. Finally, up to now we have no information about the relation of the affective priming effect for category labels as an implicit measure for intergroup attitudes (Greenwald & Banaji, 1995) to explicit measures of ingroup favoritism. Accordingly, we conducted a modified replication of Experiment 1, in order to substantiate and extend its findings.

EXPERIMENT 2

To enhance effect size, compared to Experiment 1 two major differences were introduced. First, a different minimal group manipulation was used. This time, participants were randomly assigned to either a *figure* or *ground* perceptual style. These category labels were easier to distinguish than *concave* and *convex*. Second, as the priming task the response window technique introduced by Draine and Greenwald (1998) was used. In a nutshell, with this procedure participants are forced to give categorization responses to target stimuli within a time span that is too short to achieve high levels of accuracy. Thus, priming processes show up predominately in the error rates; they are expected to be lower in affectively congruent than in affectively incongruent conditions. Effect sizes, however, are enlarged compared to standard procedures (Draine & Greenwald, 1998). Moreover, the neutral baseline condition was now realized by neutral words allowing a more reliable cost–benefit analysis. Lastly, some explicit measures of identification and favortism were administered. It will be of special interest whether implicit measures (i.e. the affective priming effect for category labels) will correlate with the explicit indices for ingroup favoritism.

Method

Participants

A total of 21 high school students were recruited. The data from one participant had to be excluded from analyses due to using the wrong ingroup label in a manipulation check question. The remaining 20 participants (8 women; 12 men) were native speakers of German with a median age of 16.0 years (range from 15 to 18 years). Participants were paid DM 10, – (about 5 Euro).

Design

The priming manipulation comprised the factorial combination of target valence (positive versus negative) and prime condition (positive versus negative versus ingroup label versus outgroup label versus neutral). In addition, there were two presentation blocks. In both blocks, each given target stimulus was presented five times to a participant, once in each priming condition. Sequence of priming was counterbalanced in a Latin-square design with five groups of participants and five sets of stimuli. A between-subjects factor determined the assignment of category labels (*figure* versus *ground*; see below) to participants.

Materials

The target set comprised 10 positively and 10 negatively valenced German adjectives with a length of five to eight letters, which were almost completely a subset of the targets used in Experiment 1. The list of target adjectives was divided into five sets of equal size for the balanced design (see 'Design'). The *a priori* valenced prime set comprised 15 positively, 15 negatively, and 15 neutrally valenced German nouns with a length of four to six letters. The mean affective rating (-3 = negative; $+3$ = positive) for these words obtained in another study (Wentura, in press) was 2.51 ($SD = 0.19$) for positive nouns, -2.41 ($SD = 0.28$) for negative nouns, and 0.04 ($SD = 0.11$) for neutral nouns. For each participant, a positive, a negative, and a neutral noun was randomly selected as the positive, negative, and neutral prime. The nouns *figure* ('*Figur*') and *ground* ('*Grund*'; see below) were used as category label primes.

Procedure

All participants were tested individually. They were seated in front of IBM-compatible personal computers. Half of the participants were randomly assigned to the *figure* group, the other half to the *ground* group. Participants were told they would perform a task assessing perceptual style in perceiving and structuring pictorial information (see also Otten, Mummendey & Buhl, in press; Otten & Moskowitz, in press). The task was said to identify differences in perception and information processing. Typically, two categories could be distinguished: One group, labeled 'figure group' (Gruppe 'Figur'), was said to comprise people who focus on salient features of a stimulus first, and later examine the more global characteristics of the picture. The other group, labeled 'ground group' (Gruppe 'Grund'), was said to comprise people who focus first on global impressions, adding details to the general frame only later. Like the 'attention-sequence' categorization in Experiment 1, this task categorized people on a dimension that (a) had no prior meaning to them and (b) had no expectations or content attached to it prior to the group assignment. Perceptual style was said to be measured by a test depicting eight ambiguous pictures (mostly taken from Escher, 1992). Each picture was shown on the computer monitor and was followed by the presentation of two alternative interpretations. Participants were instructed to press keys '1' or '2' in order to indicate which of the two alternative images they saw first. After the eight judgments were given, the computer seemingly processed the data. A blank screen appeared, followed by the message: 'Please wait. Your data are being processed'. After 1000 ms, false feedback about the participant's category membership appeared on the screen, together with another written description of the perceptual style and a pictogram illustrating this style. Participants were randomly assigned to either the 'figure' or 'ground' group.

Next, participants were instructed to work on the priming task, introduced as a second test, supposedly related to the general research issue of 'perception and information processing'. Instructions were given on the CRT screen. Participants were told that they had to classify common words with regard to their valence.

The response-window prime task roughly followed Draine and Greenwald (1998). The sequence of events was as follows. A randomly generated string of nine consonant letters (e.g. *lmsdzkhwd*) marked the beginning of the trial and also served as a forward mask, which remained on the screen for 300 ms and was immediately overwritten by the prime. Thus, as the prime word was always shorter than the forward mask, it was embedded into the string of random consonants (e.g. *lfigurewd*). This technique seems to be a very efficient masking.[3] The prime remained on the screen for 43 ms (three refresh cycles) and was immediately replaced by a different randomly generated string of nine consonant letters that served as a backward mask that was displayed for 14 ms (one cycle). The subjective impression of the presentation sequence was a brief flicker of a senseless string that was completely replaced by the target stimulus. Finally, the target word was replaced after 300 ms by an exclamation mark that remained on the screen for 450 ms. Onset of the exclamation point defined the beginning of the response window. The window width was 150 ms. If the response fell within the range defined by the response window (i.e. from 300 ms to 450 ms after onset of the target), the exclamation point changed colors (from white to red), giving feedback to the participant that the response was in time. If it did not change the color, the participant knew that the response had been too slow. If the response was given too quickly, the target was erased immediately and the exclamation point never appeared. Participants were instructed to press the correct key (i.e. the right key for positive targets and the left

[3]The technique goes back to Anthony Greenwald, but we were informed about it by Jochen Musch (personal communication, 11 November 1998).

key for negative targets) within the response window. The inter-trial interval was 2500 ms following the response.

At the beginning of the priming task, participants worked through 20 practice trials (i.e. each target word was presented once) in order to get familiarized with the task, and to receive additional feedback if their responses were either too fast or too slow. After the practice trials, a summarized feedback was given, indicating the percentage of correct trials, median RT, percentage of trials with an RT falling within the response window, and percentage of trials with a response that was too fast. The following message was added: 'Your goal should be to maximize the rate of responses within the "time window". Simultaneously, the rate of correct responses should be about 70 per cent to 80 per cent.' Then, a second set of 100 practice trials was administered. This rather long practice was necessary (a) to assure that participants got fully acquainted with the task and (b) to adjust the response window contingent on the participant's accuracy. That is, if the error rate of a 20-trial block was above 45 per cent and the RT median was 100 ms or more above the center of the response window, the onset of the response window was increased by 33 ms. If, however, the error rate was below 20 per cent and the RT median was below the center of the response window plus 100 ms, the beginning of the response window was decreased by 33 ms. At the beginning of the main phase, the onset of the response window was between 267 ms and 366 ms. During the main phase, further adjustment was allowed. However, only eight participants needed one or more increments or decrements.

The main part of the experiment consisted of two blocks of 100 trials each. Within a block, each target word was presented once in each of the five priming conditions, with the sequence determined by a Latin-square design (see 'Design'). The practice block as well as the two main blocks were further subdivided into five 20-trial sequences. Each 20-trial sequence comprised each target word once, and was followed by the summarized feedback (see above). Following the two main blocks, a direct measure of prime valence recognition was administered. Forty more trials (eight trials per prime) were presented with a row of nine question marks instead of a target word. Before these trials, participants were informed that the sequence of flickers contained a word and they were instructed to categorize these words with regard to valence. Following the recognition task, identification with the assigned category ('How much do you enjoy having this perceptual style?'), the subjective validity of categorization ('Does this test result fit your own observations about your perceptual style?' both scales ranging from 1 = 'not at all' to 7 = 'very much'), and ingroup favoritism (four items: 'If you could choose, which perceptual style would you prefer? 'Which perceptual style is superior with regard to performance in school and job?' 'Which perceptual style is superior with regard to social skills?' 'Which perceptual style is superior with regard to the job you strive for?' all scales: 1 = 'clearly figure' to 7 = 'clearly ground') were measured. Finally, participants were fully debriefed.

Results

Direct effects

The signal detection sensitivity for the valence of the masked prime was $d' = 0.13$ ($SD = 0.50$) for the *a priori* primes and $d' = 0.08$ ($SD = 0.73$) for the group labels. Both means were not significantly different from zero, $t(19) = 1.12$, *ns*, for *a priori* primes and $t(19) = -0.49$, ns, for the group labels. Hence, we can assume that the masking of primes was successful.

Priming effects

Error rates (in percentages) were computed for congruent and incongruent *a priori* priming as well as for congruent and incongruent group labels priming (see Table 2). A 2 (block: first versus second) × 2 (congruence: congruent versus incongruent) × 2 (type: *a priori* versus category label) analysis of variance yielded a significant block × congruence interaction only, $F(1, 19) = 7.43, p < 0.05$, all other $F < 3.99$, *ns*. In the first block, there was no significant effect, all Fs < 3.02. In the second block, there was nothing but a main effect of congruence, $F(1, 19) = 13.84$, $p < 0.01$, all other Fs < 1.27. For *a priori* primes, the effect of 10.00 per cent ($SD = 13.48$ per cent) was significant, $t(19) = 3.32$, $p < 0.01$, as was the case for category labels, $M = 6.00$ per cent (SD 11.43), $t(19) = 2.35$, $p < 0.05$. The effect for category labels was not moderated by sample (*figure* versus *ground*), $t(18) = 0.98$, *ns*.

The mean error rates following neutral primes were 36.50 per cent (Block 1) and 37.25 per cent (Block 2). Decomposing the overall priming effects of block 2 into 'benefits' (i.e. the differences in error rates for neutral priming minus congruent priming) and 'costs' (i.e. the differences in error rates for incongruent priming minus neutral priming) showed the *a priori* effect to be due to both benefits and costs, $M(\text{benefit}) = 5.75$ per cent ($SD = 12.70$), $t(19) = 2.03$, $p < 0.05$ (one-tailed); $M(\text{cost}) = 4.25$ per cent ($SD = 12.90$), $t(19) = 1.47$, $p = 0.08$ (one-tailed). The category label effect, however, was due to benefits only, $M(\text{benefit}) = 6.25$ per cent ($SD = 12.55$), $t(19) = 2.23$, $p < 0.05$; $M(\text{cost}) = -0.25$ per cent ($SD = 11.18$), $t(19) = -0.10$, *ns*.

To allow a closer look at the contributions of ingroup and outgroup label, Table 3 shows the error rates for the 2 (target valence) × 3 (prime condition: ingroup versus outgroup versus neutral) conditions of Block 2. Given the neutral priming condition, it is possible to compute alternative priming indices. By replacing the outgroup label condition with the neutral condition in calculating the priming effect, a net priming effect due to processing the ingroup label (i.e. in a sense the implicit positivity of the

Table 2. Mean error rates (in percentages) as a function of block (first versus second), priming (congruent versus incongruent), and prime type (*a priori* versus category labels; Experiment 2)

	Priming		
Prime type	Congruent	Incongruent	AP[a]
Block 1			
a priori	37.25	35.00	−2.25 (4.25)
Category labels	39.50	40.50	1.00 (3.58)
Block 2			
a priori	31.50	41.50	10.00 (3.01)
Category labels	31.00	37.00	6.00 (2.55)

[a]Affective priming (=error rate for incongruent priming minus error rate for congruent priming; standard error in parentheses).

Table 3. Mean error rates (in percentages) as a function of target valence (positive versus negative) and priming (ingroup label versus outgroup label versus neutral) for block 2 (Experiment 2)

	Priming		
Target valence	Ingroup	Outgroup	Neutral
Positive	19.00	28.50	27.00
Negative	45.50	43.00	47.50

ingroup label) can be measured. In the same way, by replacing the ingroup label condition with the neutral condition in calculating the priming effect, a net priming effect due to processing the outgroup label (i.e. the implicit negativity of the outgroup label) can be measured. This procedure yielded symmetrical effects, i.e. the overall priming effect of 6 per cent ($SD = 11.43$ per cent) was decomposed into 3 per cent ($SD = 13.80$ per cent) net effect of the ingroup label and 3 per cent ($SD = 16.37$ per cent) net effect of the outgroup label (both were non-significant, [absolute] $ts[19] < 1$). However, comparing the four non-neutral conditions with their respective neutral prime error rate (i.e. the neutral prime related to the same target valence) revealed a more differentiated pattern. The two cost components (i.e. the negative/ingroup condition as well as the positive/outgroup condition) were far from significant; $t[19] = -0.41$, *ns*, $t[19] = 0.36$, *ns*, respectively. The benefit for negative targets due to priming with the outgroup label was not significant either, $t(19) = 0.92$, *ns*. The benefit for positive targets due to priming with the ingroup label, however, was significant, $t(19) = 2.32$, $p < 0.05$.

Explicit measures

Values for the four favoritism items were inversed for the *figure* sample to obtain values of ingroup favoritism (i.e. values above the scale midpoint denote preference for an superiority of the ingroup). A scale combining these items had a reliability of Cronbach's $\alpha = 0.55$ due to a low item-total correlation for the last variable (superiority within the future job domain). Ignoring this item resulted in a satisfactory reliability of Cronbach's $\alpha = 0.78$. As can be seen in Table 4, the means of all three explicit indices (i.e. identification, subjective validity of categorization, mean favoritism score) were significantly above the scale midpoint. Thus, participants identified with the assigned perceptual style, perceived the categorization as valid (which might be conceived of as an additional item reflecting identification), preferred it and believed it to be superior compared to the other style. Above that, all three variables correlated positively (albeit significantly for two indices only) with the overall priming effect for category labels (Block 2), whereas there was—as expected—no covariation with the *a priori* affective priming effect. Of special interest are the correlations of the net priming effects of ingroup label and outgroup label (see above). With the exception of identification (that does not show any significant correlations), covariations are especially due to processing the ingroup label, i.e. due to the positivity of that label.

Table 4. Means of explicit measures (standard deviations in parentheses) and correlations of explicit measures with priming effect indices (block 2; Experiment 2)

		Priming effect index[a]			
Explicit measure[a]	M[b] (SD)	*A priori*	Category label	Net ingroup	Net outgroup
Identification	4.40 (0.88)*	0.11	0.25	−0.13	0.27
Subjective validity	4.95 (1.50)*	−0.18	0.51**	0.45**	−0.03
Ingroup favoritism	4.67 (1.29)**	0.01	0.41*	0.74***	−0.33
Ingroup favoritism ($n = 19$)[c]	4.86 (0.98)***	0.09	0.27	0.55**	−0.18

[a]see text for explanation;
[b]Inferential statistics refer to one-sample t-tests for the deviation from the scale midpoint (4);
[c]Ignoring one participant with an extreme value on the favoritism scale.
*$p < 0.05$ (one-tailed), **$p < 0.05$ (two-tailed), ***$p < 0.001$.

Discussion

Experiment 2 replicates the affective priming effect for category labels perfectly. Effects for *a priori* primes and category labels were essentially in parallel and both were significant in the second of two blocks. Given this parallel, it is not disturbing that in block one no priming effect was obtained. This can be conceived of as a special characteristic of the response window technique that is not the focus of the present text.[4] The only inconsistency between *a priori* primes and category label primes is the result that the *a priori* effect is somewhat (though not significantly) larger than the category label effect. Comparing costs and benefits, however, showed both effects to be of equal size with regard to benefits. Thus, the potential of both *a priori* primes and category labels to facilitate responses is equivalent, while the potential to interfere with the response to an incongruent target seems to be somewhat less pronounced for category labels in the Minimal Group Paradigm.

Beyond its value as a replication, Experiment 2 adds some essential new results to our understanding of the processes involved. First, the modified neutral prime condition now allowed a comparison of the net effects of processing the ingroup label versus the outgroup label. The category label effect seems to be especially due to the newly acquired positivity of the ingroup label. Second, the category label priming effect correlates meaningfully with explicit measures of ingroup identification and ingroup favoritism, thereby giving convergent validity to both of them. Most interestingly, the implicit measure (i.e. the priming effect for category labels) can be decomposed into the part relating to the positivity of the ingroup label and the part

[4]Two explanations suggest themselves. First, it might be that responses are reliable after a certain amount of practice only. Second, according to Anthony Greenwald (personal communication; 16 December 1998), effects with the response window technique are especially pronounced if the stimuli used as primes are presented as targets (in different trials) too. Own pilot work conforms to this observation. Thus, given the backdrop that affective priming effects in the evaluation task are often related to response facilitation/ interference accounts (Klauer *et al*., 1997; Wentura, 1999), it is plausible that effects are boosted if the prime-response link is strengthened within the experiment by overt responses to prime stimuli (if presented as targets). If this is not the case (and our goal of measuring implicit attitudes towards the ingroup precluded this), the facilitation and/or interference of responses due to the masked prime presentation might heavily rely on repeated presentations and will therefore be observed after a huge amount of practice only.

relating to the negativity of the outgroup label. (Note, that this is usually not possible with the explicit measures in minimal group research.) Unequivocally, the covariation of these net effects for ingroup and outgroup labels with the explicit measures show the ingroup favoritism effect to be one of heightened preference for the newly acquired trait and *not* to be an effect of outgroup derogation (see also Brewer, 1979, 1993).

GENERAL DISCUSSION

The data of the two studies successfully extended the findings of Perdue and associates (1990) about implicit biases towards generalized ingroup and outgroup designators to the domain of minimal groups, and are in line with our assumptions concerning automaticity and ingroup favoritism in the Minimal Group Paradigm. There is firm evidence that a minimal social categorization is already sufficient to automatically activate positive attitudes towards the self-inducing category and negative or rather neutral attitudes towards the other (non-self) category. This finding is further corroborated by recent findings of Otten and Moskowitz (in press), who demonstrated an implicit positive ingroup bias in a study combining a typical minimal categorization with a paradigm measuring spontaneous trait inferences.

Seemingly, the affective positive distinctiveness of the ingroup needs no explicit social comparison with the corresponding outgroup. Self categories in fact 'do tend to be positive' as Turner, Hogg, Oakes, Reicher, and Wetherell claimed (1987, p. 58), but they already do so initially and without further motivated reflection about the ingroup's possible superiority over the outgroup. In this vein, one might even speak of a 'mere categorization effect' at a more radical level. Mere categorization is not only sufficient to elicit a striving for positive ingroup distinctiveness, and hence intergroup bias, but the very act of assigning a social category might already implicitly include the self-category's relative superiority. An alternative or additional cognitive process contributing to the positive evaluation of newly assigned social categories is the motivational tendency to interpret ambivalent situations in a self-enhancing manner (e.g. Frijda, 1988; Wentura & Greve, 1996).

Implications in the domain of affective priming research

Before further discussing our results in terms of their relevance to the interpretation of ingroup favoritism in the Minimal Group Paradigm as derived from Social Identity Theory (Tajfel & Turner, 1986), we would like to comment on some methodological and theoretical implications our finding have for basic research on affective priming.

First, the results of our experiments extend the work of De Houwer *et al.* (1998) who were the first to show affective congruence effects by stimuli that were valenced by virtue of their episodically acquired association with a positive or negative word only. Our experiments show how 'minimal' an association can be to induce affective priming effects. Besides, the findings demonstrate that, at least in the version with the response window technique of Draine and Greenwald (1998), the masked affective priming technique is a useful tool for studying subtle processes of evaluating attitude objects.

Second, the use of masked priming precludes suspicion by participants and, above all, allows multiple repetition of the concepts that will be tested. This feature should not be discounted, because hypotheses in social cognition research are often referring to only small sets of meaningful stimuli which are embedded in large samples of irrelevant materials. Given the need of a high level of aggregation to get reliable priming effects, this is a dilemma. In this regard it is highly valuable that in our studies massive, but masked repetition of stimuli yielded meaningful results.

Finally, our findings are of theoretical importance for research on implicit attitudes. Fazio and collaborators (1986) assumed and demonstrated that an automatic activation of attitudes relies on a previously learned, well-established set of associations. Similarly, Devine (1989) argues that a lot of research on the automatic activation of attitudes reflects stereotypical knowledge rather than biased affective responses. However, per definition, minimal categories can not be judged in terms of prior experiences and well-established knowledge. Hence, to our opinion, the fact that—especially the ingroup—nevertheless carries an implicit value connotation might be taken as a further hint that the association with the self is of crucial importance in this process.

Implicit ingroup bias and the self

Our perspective on the mere categorization effect implies a shift to a focus on cognitive processes rather than motivational ones. Not self-enhancement via striving for positive ingroup distinctiveness, but the self as an anchor (Cadinu & Rothbart, 1996) or as a heuristic to give meaning to a novel ingroup is assumed to be crucial for mere categorization effects. Since in the Minimal Group Paradigm the attributes characterizing the categorization dimension are new and since category assignment is anonymous, the self-characterizing category label and in the ingroup might be conceptualized as equivalent. The empirical evidence indicates that the mere act of assigning a category label to the self can be sufficient to elicit positive affect by reference to this label. Thus, we assume that the self is the source from which the minimal ingroup acquires its initially positive meaning.

At this point, as already briefly mentioned in the Introduction, parallels to research on the 'name-letter effect' and the research on 'mere ownership' might well be drawn (Feys, 1991, 1995; Hoorens & Nuttin, 1993; Nuttin, 1987). One might argue that the minimal category label and—especially—the characteristic allegedly linked to this label is 'owned' by the individual (a statement that need not be challenged by the individual's knowledge that there are other owners of the same characteristic). As soon as the self is defined as possessing this category label, exactly the information provided in the course of category assignment, its previously neutral value turns positive; no evaluative conditioning is necessary but merely the association with the self.

Although it seems very plausible to assume that the implicit intergroup bias as demonstrated in the two studies relies on the association between self and ingroup, we have to state that our present data don't provide an empirical test of this assumption. We assume that a generalization from self to ingroup allows the new ingroup label to acquire its positive meaning, but we only infer this from the finding that ingroup labels *activated* positive affect after a minimal categorization. In fact, up to now there is only little evidence for such self-anchoring process on an implicit level. First, a noteworthy finding was obtained by Forgas and Fiedler (1996, Experiment 2), who found for minimal groups—after the induction of positive mood—not only the strongest bias, but also the strongest similarity between self and ingroup compared to the other mood conditions. Second, Smith and associates (Smith & Henry, 1996; Smith *et al*., 1999) provided strong evidence for the close link between self and ingroup on an implicit level. However, while their research documents how self and ingroup much more than self and outgroup are linked in associative networks, their research does not deal with the evaluative consequences of this process, that is, with the assumption that the association with the self also implies the ingroup's positivity.

To tackle directly the question of whether a process of 'self expansion', as described by Aron and collaborators (Aron, Aron, Tudor & Nelson, 1991) in the domain of interpersonal relations, can account for implicit biases towards minimal groups, future research will have to combine more stringently minimal categorization and self-concept research. Besides intergroup treatment, aspects of the self-concept should be measured as well as manipulated. We are assuming that as a complementary process to depersonalization, i.e. to the description of self in terms of an ingroup, there is also a description of ingroups in terms of the self, which can be expected to be especially important, the more novel and minimal the respective groups are (see also Cadinu & Rothbart, 1996). To analyze the link between self and ingroup appropriately, research must go beyond the analysis of the interplay between self-esteem and social discrimination (e.g. Hogg & Abrams, 1990; Rubin & Hewstone, 1998). Besides its valence, other aspects of the self-concept, like its structure, its content, its complexity and its psychological functions have to be taken into account (e.g. Brandtstädter & Greve, 1994; Linville, 1987; Markus & Nurius, 1996; Markus & Wurf, 1987).

CONCLUSIONS

The validity of our research findings on a positive ingroup default provided by the categorization *per se* is further enhanced by the findings of Experiment 2, where we could demonstrate that implicit and explicit measures of ingroup favoritism correlate. Besides, it is remarkable that the decomposition of priming effects in Experiment 2 replicated a finding that is already well established for explicit measures of intergroup treatment, namely that—at least in the Minimal Group Paradigm—ingroup favoritism stems from a bias towards the ingroup rather than from a negative treatment or negative attitude towards the outgroup (e.g. Brewer, 1979, 1993; Brown, 1988). However, the question of whether the automatically acquired positive connotation of minimal category labels directly predicts ingroup favoritism in decisions about relative group treatment needs further empirical investigation. Experiment 2 provided a fairly 'pure' situation in so far as the priming task was immediately followed by the intergroup evaluation task. As soon as realistic experiences with the social categories and their members are involved, the importance of the implicit bias might decrease dramatically.

Finally, it is important to clarify that we are not postulating that an automatically activated positive attitude towards the ingroup is the major variable determining social discrimination between groups in general. It would be misleading to read this paper as a principal challenge to a group level analysis of ingroup-favoring behavior.

However, for *minimal* intergroup situations which typically provide no rationale to legitimize the unequal treatment of ingroup and outgroup, unreflected self-ingroup generalization might be a more relevant predictor of ingroup favoritism than the traditionally assumed processes of social comparison and social competition. Our study demonstrates that it is possible and worth while to combine two hitherto distinct research domains, namely research on implicit social cognition and research in the Minimal Group Paradigm. The distinction between unreflected automatically activated ingroup favoritism and social discrimination in Allport's (1954) sense, namely from cases where there is an actual and subjectively legitimized disregard of individual properties for the sake of category distinctions, may finally contribute to a deeper and more comprehensive understanding of intergroup behavior.

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REFERENCES

Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.

Banaji, M. R. & Prentice, D. A. (1994). The self in social contexts. *Annual Review of Psychology*, **45**, 297–332.

Bargh, J. A. (1982). Attention and automaticity in the processing of self-relevant information. *Journal of Personality and Social Psychology*, **43**, 425–436.

Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer (Ed.), *Advances in social cognition* (Vol. 10, pp. 1–61). Mahwah, NJ: Erlbaum.

Bargh, J. A., Chaiken, S., Govender, R. & Pratto, F. (1992). The generality of the automatic activation effect. *Journal of Personality and Social Psychology*, **62**, 893–912.

Brandtstädter, J. & Greve, W. (1994). The aging self: Stabilizing and protective processes. *Developmental Review*, **14**, 52–80.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin*, **86**, 307–324.

Brewer, M. (1993). The role of distinctiveness in social identity and group behavior. In M. A. Hogg & D. Abrams (Eds), *Group motivation. Social psychological perspectives* (pp. 1–16). New York: Harvester Wheatsheaf.

Brown, R. J. (1988). *Group processes: Dynamics within and between groups*. Oxford: Blackwell.

Cadinu, M. R. & Rothbart, M. (1996). Self-anchoring and differentiation processes in the minimal group setting. *Journal of Personality and Social Psychology*, **70**, 661–677.

De Houwer, J., Hermans, D. & Eelen, P. (1998). Affective and identity priming with episodically associated stimuli. *Cognition and Emotion*, **12**, 145–169.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, **56**, 5–18.

Diehl, M. (1990). The minimal group paradigm: Theoretical explanations and empirical findings. In W. Stroebe & M. Hewstone (Eds), *European Review of Social Psychology* (Vol. 1, pp. 263–292). Chichester: Wiley.

Draine, S. C. & Greenwald, A. G. (1998). Replicable unconscious semantic priming. *Journal of Experimental Psychology: General*, **127**, 286–303.

Escher, M. C. (1992). *The graphic work*. Köln: Benedikt Taschen Verlag.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C. & Kardes, F. R. (1986). Attitudes and social cognition: On the automatic activation of attitudes. *Journal of Personality and Social Psychology*, **50**, 229–238.

Feys, J. (1991). Briefly induced belonginess to self and preference. *European Journal of Social Psychology*, **21**, 547–552.

Feys, J. (1995). Mere ownership: Affective self-bias or evaluative conditioning? *European Journal of Social Psychology*, **25**, 559–575.

Forgas, F. P. & Fiedler, K. (1996). Us and them: Mood effects on discrimination. *Journal of Personality and Social Psychology*, **70**, 28–40.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist*, **43**, 349–358.

Greenwald, A. (1980). The totalitarian ego: Fabrication and revision of personal history. *American Psychologist*, **35**, 603–618.

Greenwald, A. G. & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, **102**, 4–27.

Greenwald, A. G., Draine, S. C. & Abrams, R. L. (1996). Three cognitive markers of unconscious semantic activation. *Science*, **273**, 1699–1702.

Greenwald, A. G., Klinger, M. R. & Liu, T. J. (1989). Unconscious processing of dichoptically masked words. *Memory & Cognition*, **17**, 35–47.

Greenwald, A. G., Klinger, M. R. & Schuh, E. S. (1995). Activation by marginally perceptible ('subliminal') stimuli: Dissociation of unconscious from conscious cognition. *Journal of Experimental Psychology: General*, **124**, 22–42.

Hager, W., Mecklenbräuker, S., Möller, H. & Westermann, R. (1985). Emotionsgehalt, Bildhaftigkeit, Konkretheit und Bedeutungshaltigkeit von 580 Adjektiven: Ein Beitrag zur Normierung und zur Prüfung einiger Zusammenhangshypothesen [Emotionality, imageability, concreteness, and meaningfulness of 580 adjectives: A contribution to norming and test of correlations]. *Archiv für Psychologie*, **137**, 75–97.

Hermans, D., De Houwer, J. & Eelen, P. (1994). The affective priming effect: Automatic activation of evaluative information in memory. *Cognition and Emotion*, **8**, 515–533.

Hogg, M. A. & Abrams, D. (1990). Social motivation, self-esteem and social identity. In D. Abrams & M. A. Hogg (Eds), *Social identity theory. Constructive and critical advances* (pp. 28–47). New York: Harvester Wheatsheaf.

Hogg, M. A. & Abrams, D. (1993). Towards a single-process uncertainty-reduction model of social motivation in groups. In D. Abrams & M. A. Hogg (Eds), *Group Motivation: Social Psychological Perspectives* (pp. 173–190). Hemel Hempstead: Harvester.

Hogg, M. A. & Mullin, B.-A. (1999). Joining groups to reduce uncertainty: Subjective uncertainty reduction and group identification. In D. Abrams & M. A. Hogg (Eds), *Social Identity and Social Cognition*. Oxford: Blackwell.

Hoorens, V. & Nuttin, J. M. (1993). Overevaluation of own attributes: Mere ownership or subjective frequency? *Social Cognition*, **11**, 117–200.

Klauer, K. C. (1998). Affective Priming. *European Review of Social Psychology*, **8**, 67–103.

Klauer, K. J., Roßnagel, C. & Musch, J. (1997). List context effects in evaluative priming. *Journal of Experimental Psychology*, **23**, 246–255.

Linville, P. W. (1987). Self-complexity as a cognitive buffer against stress-related illness and depression. *Journal of Personality and Social Psychology*, **52**, 663–676.

Maass, A. & Schaller, M. (1991). Intergroup biases and the cognitive dynamics of stereotype formation. In W. Stroebe & M. Hewstone (Eds), *European Review of Social Psychology* (Vol. 2, pp. 189–209). Chichester: Wiley.

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin*, **109**, 163–203.

Markus, H. & Nurius, P. (1986). Possible selves. *American Psychologist*, **41**, 954–969.

Markus, H. & Wurf, E. (1987). The dynamic self-concept: A social psychological perspective. *Annual Review of Psychology*, **38**, 299–337.

Messick, D. M. & Mackie, D. M. (1989). Intergroup relations. *Annual Review of Psychology*, **40**, 45–81.

Möller, H. & Hager, W. (1991). Angenehmheit, Bedeutungshaltigkeit, Bildhaftigkeit und Konkretheit-Abstraktheit von 452 Adjektiven [Pleasantness, meaningfulness, imageability and concreteness of 452 adjectives]. *Sprache und Kognition*, **10**, 39–51.

Mullen, B., Brown, R. & Smith, C. (1992). Ingroup bias as a function of salience, relevance and status: An integration. *European Journal of Social Psychology*, **22**, 103–122.

Mummendey, A. (1995). Positive distinctiveness and intergroup discrimination: An old couple living in divorce? *European Journal of Social Psychology*, **25**, 657–670.

Mummendey, A. & Otten, S. (1998). Positive–negative asymmetry in social discrimination. *European Review of Social Psychology* (Vol. 9, pp. 107–143). New York: Wiley.

Neill, W. T., Lissner, L. S. & Beck, J. L. (1990). Negative priming in same–different matching: Further evidence for a central locus of inhibition. *Perception and Psychophysics*, **48**, 398–400.

Nuttin, J. M. (1987). Affective consequences of mere ownership: The name letter effect in twelve European languages. *European Journal of Social Psychology*, **17**, 381–402.

Otten, S. & Moskowitz, G. W. (In press). Evidence for implicit evaluative ingroup bias: Affect-biased spontaneous trait influence in a minimal group paradigm. *Journal of Experimental Social Psychology*.

Otten, S., Mummendey, A. & Blanz, M. (1996). Intergroup discrimination in positive and negative outcome-allocations: The impact of stimulus-valence, relative group status and relative group size. *Personality and Social Psychology Bulletin*, **22**, 568–581.

Otten, S., Mummendey, A. & Buhl, T. (In press). Accuracy in information processing and the positive-negative asymmetry in social discrimination. *Revue Internationale de Psychologie Sociale*.

Perdue, C. W., Dovidio, J. F., Gurtman, M. B. & Tyler, R. B. (1990). Us and them: Social categorisation and the process of intergroup bias. *Journal of Personality and Social Psychology*, **59**, 475–486.

Perdue, C. W. & Gurtman, M. B. (1990). Evidence for the automaticity of ageism. *Journal of Experimental Social Psychology*, **26**, 199–216.

Pollatsek, A. & Well, A. D. (1995). On the use of counterbalanced designs in cognitive research: A suggestion for a better and more powerful analysis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, **21**, 785–794.

Rabbie, J. M. & Horwitz, M. (1969). Arousal of ingroup–outgroup bias by a chance win or loss. *Journal of Personality and Social Psychology*, **13**, 269–277.

Rubin, M. & Hewstone, M. (1998). Social Identity Theory's Self-Esteem Hypothesis: A review and some suggestions for clarification. *Personality and Social Psychology Review*, **2**, 40–62.

Simon, B. (1993). On the asymmetry in the cognitive construal of ingroup and outgroup: A model of egocentric social categorization. *European Journal of Social Psychology*, **23**, 131–148.

Smith, E. R., Coats, S. & Walling, D. (1999). Overlapping mental representations of self, in-group, and partner: Further response time evidence and a connectionist model. *Personality and Social Psychology Bulletin*, **25**, 873–882.

Smith, E. R. & Henry, S. (1996). An ingroup becomes part of the self: Response time evidence. *Personality and Social Psychology Bulletin*, **22**, 635–642.

Stroop, J. R. (1935). Studies of inference in serial verbal reactions. *Journal of Experimental Psychology*, **18**, 643–662.

Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology*, **33**, 1–39.

Tajfel, H., Billig, M. G., Bundy, R. P. & Flament, C. (1971). Social categorisation and intergroup behaviour. *European Journal of Social Psychology*, **1**, 149–178.

Tajfel, H. & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds), *The Social Psychology of Intergroup Relations* (pp. 33–47). Monterey, CA: Brooks/Cole.

Tajfel, H. & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. G. Austin (Eds), *Psychology of intergroup relations* (pp. 7–24). Chicago: Nelson-Hall.
Taylor, S. E. & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, **103**, 193–210.
Tukey, J. W. (1977). *Exploratory data analysis*. Reading, MA: Addison-Wesley.
Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D. & Wetherell, M. S. (1987). *Rediscovering the social group. A self-categorization theory*. Oxford: Basil Blackwell.
Wentura, D. (1999). Activation and inhibition of affective information: Evidence for negative priming in the evaluation task. *Cognition and Emotion*, **13**, 65–91.
Wentura, D. (In press). Dissociative affective and associative priming effects in the lexical decision task: 'Yes' vs. 'no' responses to word targets reveal evaluative judgment tendencies. *Journal of Experimental Psychology: Learning, Memory, and Cognition*.
Wentura, D. & Greve, W. (1996). Selbstkonzept-Immunisierung: Evidenz für automatische selbstbildstabilisierende Begriffsanpassungen [Self-concept immunisation: Evidence for automatic self-stabilising concept adaptation]. *Zeitschrift für Sozialpsychologie*, **27**, 207–223.

