Original Article

Automatic Stereotype Activation Is Context Dependent

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Abstract. Processes involving an automatic activation of stereotypes in different contexts were investigated using a priming paradigm with the lexical decision task. The names of social categories were combined with background pictures of specific situations to yield a compound prime comprising category and context information. Significant category priming effects for stereotypic attributes (e.g., Bavarians – beer) emerged for fitting contexts (e.g., in combination with a picture of a marquee) but not for nonfitting contexts (e.g., in combination with a picture of a shop). Findings indicate that social stereotypes are organized as specific mental schemas that are triggered by a combination of category and context information.

Keywords: automatic stereotype activation, social categories, context dependence, priming, lexical decision task

According to common models of stereotyping (e.g., Fiske, 1998; Moskowitz, 2005; Schneider, 2004), one can distinguish roughly three steps in the translation of social cues into social perception and behavior: When encountering a person, we first categorize this person on the basis of visible cues (e.g., wrinkles in the face might trigger a categorization of the person as being old). In a second step, attributes associated with the category become activated automatically (e.g., expectations that old people are frail or helpless). In a third step, perceptions of the other person and interpretations of his or her behavior as well as our behavior toward that person are guided by the stereotypic attributes activated in the second step.

Over the past few years, evidence has accumulated that contexts can exert a moderating influence on social information processing and social behavior (e.g., Blair, 2002; Degner, Rothermund, & Meiser, 2009; Diekman & Hirnisey, 2007; Mitchell, Nosek, & Banaji, 2003; Wittenbrink, Judd, & Park, 2001). However, most of this research on context effects in stereotyping relates to either step 1 (categorization) or step 3 (application of stereotypes and prejudice), whereas only few studies have investigated the moderating effect of context on the second step – on the very process of automatic stereotype activation.

In our research, we pursue the main idea that stereotypes are organized as multiple context-specific schemas that are typically activated only by a *combination* of category and context information. A mere category cue in a contextual vacuum or in combination with a context that is not related to a specific substereotype of this category is therefore not sufficient to trigger the activation of stereotypic attributes. If the category information is embedded in a context for which a specific substereotype exists, however, then the combination of category and context should trigger the context-specific stereotype schema, so that stereotypic attributes of this schema become activated. This hypothesis leads to the prediction of a Gestalt-like, superadditive effect of category and context information in stereotype activation (Blair, 2002; Kunda & Thagard, 1996; Read, Vanman, & Miller, 1997).

Wentura, Dräger, and Brandtstädter (1997; Wentura & Brandtstädter, 2003) found first evidence for such an interaction effect; related evidence concerning category-by-context interaction effects in the domain of automatic attitude activation was reported by Barden, Maddux, Petty, and Brewer (2004) and Wittenbrink et al. (2001). In these studies, category information relating to the categories "old" and "young" was embedded into sentences that specified a situational context (e.g., "Martha K. (78 years) was sitting on a park bench"). Following these sentences, different stereotypic attributes varying in content and valence were presented in a lexical decision task. Significant facilitation effects were observed only if the target attributes fitted to the combination of the category and the situational context (e.g., "lonely"). This finding corroborates our hypothesis that the context determines which aspect of a global category stereotype becomes activated. The studies by Wentura and colleagues, however, focused only on the age stereotype and were concerned mainly with analyzing interindividual differences in priming effects.

Moreover, because of the focus on individual differences, Wentura and colleagues did not test the full design necessary to our hypothesis. They compared the RTs to a target word (e.g., lonely) that was preceded either by an "old"

DOI: 10.1027/1864-9335/a000019

sentence ("Martha K. (78) was sitting on a park bench") or a "young" sentence ("Susan K. (25) was sitting on a park bench"). To account for unspecific effects of the sentences, they contrasted this difference with the difference in RTs to a target word equal in valence but not fitting the sentence (e.g., embarrassing). However, they did not control for the possibility that "lonely" (an age-stereotypic word) might be primed by "Martha K. (78) . . ." (in comparison to "Susan K. (25) . . .") alone, that is, in any sentence context. Moreover, if the first part of the sentence alone acts as a prime, the stimulus onset asynchrony (SOA) is unduly long to claim automaticity of the priming process, since it is known that strategic expectations might alter effects at long SOAs (Neely, 1977). Thus, in our research, we wanted to test the implications of the category-by-context-interaction model in automatic stereotype activation more stringently.

In order to test our model, we needed a priming paradigm that allows for the simultaneous and independent combination of two types of primes, one of which refers to the category and the other of which provides a (matching or nonmatching) context. Drawing on the work of Wittenbrink et al. (2001) in automatic evaluation research, we used pictures as context primes (e.g., pictures of a marquee, of a shop, of an airport). Category information was specified by prime words referring to different social categories (e.g., Bavarians, Arabs, Asians). Following the brief presentation of prime words on context pictures, stereotypic attributes were presented as targets, and participants had to decide as quickly as possible whether the presented target was a word or not (lexical decision task). To ensure that participants attended to the context pictures, a question mark was presented instead of a letter string in some of the trials and participants had to name the context picture as quickly and correctly as possible.

We predicted that only a combination of a matching category (e.g., Bavarians) and a matching context (e.g., picture of a marquee) would facilitate responding to the target words referring to specific stereotypic attributes (e.g., beer). Neither the presentation of the category prime in a nonmatching context nor the combination of the matching context prime with a nonmatching category should produce a facilitation effect compared to the baseline (nonmatching category in a nonmatching context).

Method

Sample

Participants were 25 students of the University of Jena (Germany). They were recruited on campus and were paid 2 Euros for their participation. Four participants were removed from the analyses due to extremely slow responses (mean RT > 1000 ms) or due to a large amount of erroneous responses in the lexical decision task (mean error rate > 10%).

Materials

Categories were represented by 39 names referring to nationalities, regional groups, or other social groups (e.g., Arabs, women). Context stimuli consisted of 39 photos representing a specific situation (e.g., pictures of an airport hall or a car). Each context picture was selected to yield a specific substereotype in combination with one of the category names (e.g., picture of an airport hall + "Arabs" → terrorists). For each of these 39 context/category combinations, a word matching the specific stereotype was selected as a target word (e.g., picture of a badly parked car + "women" → clumsy). Each target word was assigned once to each of the four cells of a 2 (Category: matching vs. nonmatching) × 2 (Context: matching vs. nonmatching) design. This yielded a total of 39 × 4 = 156 combinations of context pictures, category names, and target words, with each picture, category, and target appearing once in each of the four matching conditions (see Appendix). For the lexical decision task, each of the 156 combinations of pictures and categories was also presented once with a nonword. Nonwords were derived from real words by replacing some letters. Each of the context pictures was presented once again without a category and target word. In these 39 trials, question marks ("???") were presented instead of category name and target, and participants had to name the context picture as fast as possible. In total, this yielded 351 combinations of context pictures, categories (or question marks), and target words (or nonwords). Each participant received each of these combinations once in the experiment, in an individually randomized sequence.

Design

The design comprised two basic factors that were varied orthogonally to represent the priming manipulation: (1) context matching vs. nonmatching the stereotypical trait or attribute, (2) category matching vs. nonmatching the stereotypical trait or attribute. Those two factors were varied within subjects, and the dependent variable was the reaction time on the stereotypical trait words.

Procedure

Experiments were conducted individually in separate soundproof cubicles. Presentation of materials and response registration was controlled by an E-Prime program. In a first part of the experiment, participants learned simple names for the 39 images that represented the context. This was followed by a test of whether the participants remembered the names correctly. If more than five mistakes were made, the learning and testing blocks were repeated. The main experiment consisted of 15 practice trials, followed by the 351 experimental trials (see Materials). Trials consisted of the following sequence of events (see Figure 1):

A fixation cross (shown for 750 ms) was replaced by a context picture. After 1000 ms had elapsed, a category name appeared randomly either in the upper or lower part of the picture. After further 300 ms, the target was presented in addition to the context picture and the category name at the opposite position of the category prime (i.e., either in the upper part or the lower part of the picture). Participants had to decide as quickly as possible whether the target formed a real German word or not by pressing one of two marked keys on a computer keyboard. The picture, category name, and target stayed on the screen until participants responded. In 39 trials, three question marks ("???") were shown instead of category name and target, indicating that participants had to name the picture by speaking into the microphone. The correctness of the picture naming responses was coded by an experimenter. After each response, brief feedback indicated the correctness of the previous response. The next trial sequence started after an intertrial interval of 250 ms, during which a blank screen was shown.

Table 1. Effects of category and context match on lexical decision times for stereotypic target words

	Reaction times			
	Context match		Context mismatch	
	M	*SE*	*M*	*SE*
Category match	764	18	790	20
Category mismatch	785	19	782	18
PE	*21*	*8*	*–8*	*10*
	Errors			
	Context match		Context mismatch	
	M	*SE*	*M*	*SE*
Category match	3.9	0.7	4.0	0.8
Category mismatch	3.3	1.0	4.2	0.9
PE	*–0.6*	*1.0*	*0.1*	*1.0*

Note. Means and standard errors for RTs (in ms) and errors (in %) depending on match of category and match of context. Priming effects (PE) were computed by subtracting the matching category condition from the mismatching category condition.

Results

Analyses were based on the correct lexical decision latencies to the word targets. Erroneous responses (3.85%) and outlier values that were more than three interquartile ranges above the 75th percentile (1.7%) or faster than 350 ms (< 0.1%) were excluded from the analysis ("far out values" according to Tukey, 1977). Average latencies for the four matching conditions are shown in Table 1.[1]

A 2 (Context: matching vs. nonmatching) × 2 (Category: matching vs. nonmatching) analysis of variance (ANOVA) yielded a significant main effect of context, $F(1, 20) = 6.93$, $p < .05$, partial $\eta^2 = .26$, that was qualified by the predicted

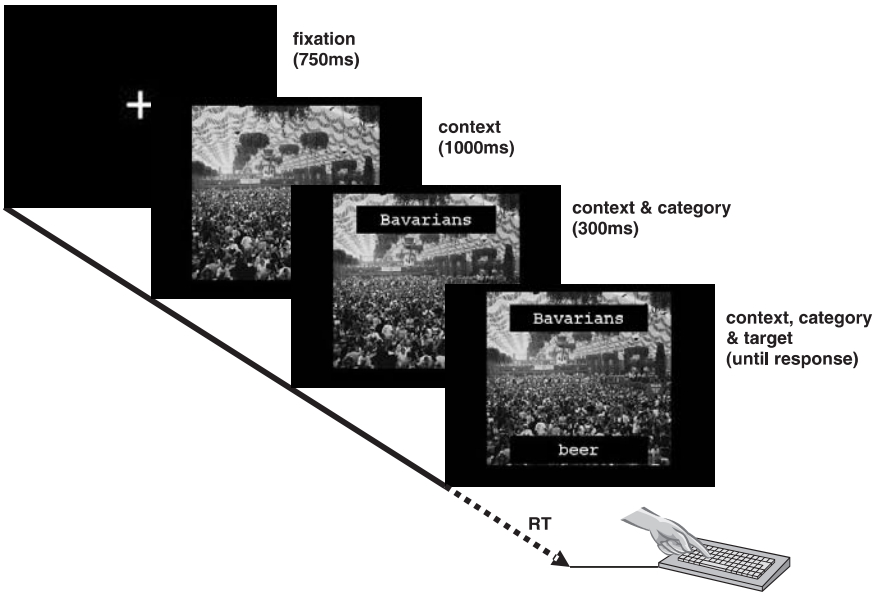

Figure 1. Sequence of events in a lexical decision trial of the experiment. *Note*. In this trial, context and category match the target word.

[1] Mean reaction times in our study were somewhat longer than is usually observed for simple lexical decisions. One might therefore suspect that participants operated in a mode that includes more strategic components than is usually assumed for short-SOA semantic priming. We addressed this question in a simple control study that was identical to the original experiment in most respects (the same targets were used, time parameters were identical). Strategic processes were made impossible by replacing the context pictures with irrelevant pictures (animals, fruits, furniture, etc.) and category primes with consonant strings (PPPPPP). Although strategic processing was impossible in the control study, reaction times were comparable to the original study. In our view, the fairly long RTs in our study can be explained by (a) locational uncertainty of the targets, (b) dual task costs (switching between lexical decision and picture naming), and (c) a high similarity of words and nonwords.

interaction, $F(1, 20) = 5.64$, $p < .05$, partial $\eta^2 = .22$. The main effect of category was not significant, $F(1, 20) = 1.06$, *ns*. The category manipulation exerted a significant effect in combination with a matching context picture (PE = 21 ms), $t(20) = 2.76$, $p = .01$, $d = 0.60$. In a nonmatching context, however, matching versus nonmatching categories did not have a significant influence on lexical decision times (PE = –8 ms), $t < 1$. In addition, we calculated simple effects for the context factor within category conditions: For category match, the context manipulation yielded a significant effect, $M = 26$ ms, $t(20) = 3.51$, $p < .01$, $d = 0.79$. For a nonmatching category, however, contexts did not have a significant influence on lexical decision times, $M = –2$ ms, $t < 1$. An ANOVA with error percentages as dependent variable (see Table 1) yielded no significant effects, all F values < 1.

Discussion

Processes of an automatic activation of stereotypic attributes by related social categories were investigated in a priming paradigm with dual primes, which allowed us to independently manipulate category matches and context matches (see also Wittenbrink et al., 2001). The findings support the predictions that were derived from the context-by-category interaction model of automatic stereotype activation. Processing of stereotypic target words was facilitated by names of matching social categories only if a picture of a matching situational context preceded the presentation of the category prime. No facilitative effect of categories on the same stereotypic attributes was observed in a nonmatching context. This pattern of findings indicates that an automatic activation of stereotypic content is triggered only by specific combinations of contexts and categories that refer to a certain subgroup, substereotype, or to an aspect of a stereotype that is relevant for or related to the current context (see Wentura & Brandtstädter, 2003; Wentura et al., 1997).

Our findings closely parallel previous findings reported in the domain of automatic attitude activation. Wittenbrink et al. (2001) and Barden et al. (2004) found that the automatic activation of negative evaluations of African Americans depended on the context. In their studies, the automatic activation of negative evaluations was confined to specific situational contexts in which negative evaluations of this group are well-known (e.g., a picture of a street corner with graffiti-covered wall was shown as a context prime or an academic context was made salient). On the other hand, no automatic activation of negative evaluations was found when the context emphasized other aspects of attitudes toward African Americans (e.g., when a picture of the interior of a church was shown as a context prime or when a sports context was made salient).

It is important to note that our study included a wide range of social categories and stereotypes, and the stereotypic target words were selected to contain positive, negative, as well as neutral (or ambivalent) materials. The findings are therefore not restricted to a specific category and cannot be explained by a context dependency of automatic content-independent evaluations. The findings conform with the view that automatic activation of stereotypic content in general is highly context dependent. Our results fit a broader picture put forward by Yeh and Barsalou (2006), who claim that background situations are generally important as moderators of cognitive processes, and who document situation effects for various types of conceptual processing.

Facilitation or Inhibition?

Here one caveat should be discussed: We argued that especially the combination of category and context yields activation of stereotypical attributes. However, it might be that both a nonmatching context and a nonmatching category inhibit the target concept. However, due to the short SOA between the category and target words (300 ms), it is rather implausible that the category name exerts an inhibition process, as seminal work on semantic priming indicates (see Neely, 1977). This argument is of course not meant to deny the existence of inhibitory effects of (nonmatching) social categories on the accessibility of stereotypes (Macrae, Bodenhausen, & Milne, 1995). The crucial difference between studies reporting inhibitory effects and our experiment may be the time frame of the category activation effects. In the study by Macrae et al. (1995), category activation preceded the measurement of stereotype accessibility by several minutes rather than by milliseconds (a category was activated in a first part of the experiment, whereas stereotype accessibility was measured in a later, ostensibly unrelated part of their studies), allowing for completely different types of activation or inhibition processes than were investigated in the present study.

Are Stereotypes Adaptive?

The previous discussion of contextual influences on stereotype activation is closely related to the important question of whether stereotypes and stereotyping reflect an adaptive part of human social cognition. With some notable exceptions (e.g., Lee, Jussim, & McCauley, 1995; Schneider, 2004), social cognition researchers have often pointed out that stereotyping can be potentially harmful for social interactions. Stereotypes and stereotyping have been viewed as reflecting a rigid mental process that does not take into account individual differences and situational requirements in order to allow for a fast and resource-conserving processing of the vast amount of information in social interactions (Macrae, Milne, & Bodenhausen, 1994). The finding of strong context dependence might support a more flexible view of stereotypes and stereotyping. Of course, we do not want to claim that stereotypes always produce adequate views of reality – at least some are based on blatantly false assumptions, not just with respect to individuals in situa-

tions, but also with respect to populations. By going beyond the information that is given in a certain situation, stereotypes always run the risk of leading to incorrect predictions and implications. In order to come to a fair assessment of stereotype correctness, or their "kernel of truth," however, it is of vital importance to take their context dependence into account. Apparently, stereotypes are often not applied to social categories as a whole, but instead contain implications for people of social categories in specific contexts. For example, not all old people are perceived as being frail, but encountering an old person in a nursing home guides our perception and behavior in this direction. Of course, such a stereotypic bias can still be wrong (the person might be a visitor and not frail); nevertheless, the "verisimilitude" (Popper, 1963) of context-specific stereotypes should be much higher than that of global, context-free stereotypes. The flexible and context-dependent activation of stereotypes can be one reason why stereotypes may often yield fairly useful predictions and may less often stand in direct contrast to reality than is typically assumed.

Acknowledgments

The research reported in this article was supported by a research grant of the Deutsche Forschungsgemeinschaft to Klaus Rothermund and Dirk Wentura (RO 1272/5–1,2). This project is part of the collaborative research unit "Discrimination and Tolerance in Intergroup Relations" (DFG FOR 461).

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Appendix

Materials (stereotypical target words, category names, context pictures) used in the study and assignment of materials to matching and nonmatching conditions.

Stereotypical word	Matching category	Matching context	Nonmatching category	Nonmatching context
ehrgeizig (ambitious)	business students	certificate	Italians	bottles of spirits
Bier (beer)	Bavarians	beer tent	Asians	attractive women
mutig (brave)	men	diving platform	the Scottish	staircase
sachlich (objective)	men	files	old people	rose
fürsorglich (caring)	women	baby	the Japanese	crowded highway
ungeschickt (clumsy)	women	small parking space	men	overland bus
Kaffeefahrt (coffee trip)*	retired people	overland bus	the French	bathroom cabinet
Informatik (computer science)	Indians	call center	old people	beer tent
korrupt (corrupt)	politicians	mansion	the English	factory
Doping (doping)	cyclists	syringe	car dealer	stock market
emotional (emotional)	women	tissues	obese people	golf ball
erschöpft (exhausted)	old people	staircase	the Irish	burger
fotografieren (to photograph)	the Japanese	castle	men	rusty car
trinkfest (hard drinking)	the Irish	bottles of spirits	hairdresser	diving platform
fleißig (hard working)	Asians	factory	politicians	apple
gesund (healthy)	athletes	apple	business students	small parking spot
hektisch (hectic)	manager	stock market	women	bench
hilfsbereit (helpful)	nurses	handshake	the Polish	armchair
faul (idle)	the unemployed	TV set	women	donation box
faul (idle)	students	alarm clock	physicians	syringe
krank (ill)	old people	bathroom cabinet	Arabs	baby
einsam (lonely)	old people	bench	manager	mansion
laut (loud)	Italians	crowded highway	old people	handshake
bleich (pale)	the English	bottle of sunscreen	the unemployed	glass of wine
religiös (religious)	Turks	rug	men	TV set
reich (rich)	physicians	golf ball	women	alarm clock
romantisch (romantic)	Italians	rose	caretakers	expensive car
geizig (stingy)	the Scottish	donation box	Bavarians	rug
gestohlen (stolen)	the Polish	expensive car	nurses	ax
streng (strict)	janitors	prohibition sign	the Americans	magazine
stark (strong)	men	ax	Italians	airport
Terrorist (terrorist)	Arabs	airport	cyclists	tissues
dick (overweight)	the Americans	burger	Indians	prohibition sign
schnorren (to cadge)	punks	pedestrian area	retired people	certificate
betrügen (to cheat)	car dealer	rusty car	punks	castle
geniessen (to enjoy)	the French	glass of wine	athletes	pedestrian area
tratschen (to gossip)	hairdresser	magazine	building worker	call center
pfeifen (to whistle)	building worker	attractive women	Turks	bottle of sunscreen
unsportlich (unathletic)	overweight people	armchair	students	files

*A form of sales promotional activity consisting of a cheap or complimentary day trip during which free coffee and cake are served to participants in the course of an (extended) sales session designed to make them buy various goods.

