A *POSTERIORI* STEREOTYPE ACTIVATION: THE PRESERVATION OF STEREOTYPES THROUGH MEMORY DISTORTION

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Four experiments investigated memory for stereotype-consistent and stereotype-inconsistent information after a posteriori stereotype activation. In Experiment 1 it was established that, in comparison with a no stereotype control condition, recall of stereotype-inconsistent behaviors of group members deteriorated after a *posteriori* stereotype activation, while recall of stereotype-consistent information was not affected. An explanation of this phenomenon in terms of the memory organization of behaviors in trait-behavior clusters was tested in Experiment 2. The results of Experiment 2 suggest that recall of stereotype-inconsistent behaviors suffered from a stereotype activated afterwards when they were stored in a separate trait (i.e., not linked to stereotype-consistent behaviors), while stereotype-inconsistent information that was linked to stereotype-consistent information did not. In Experiment 3 the same pattern of results was obtained when an *a posteriori* stereotype was activated using an "unrelated prime" (i.e., the stereotype did not pertain to information presented earlier), suggesting the operation of involuntary, unconscious processes in deteriorated recall of stereotype-inconsistent information. Finally, the results of Experiment 4 provide evidence for the idea that the impaired recall of stereotype-inconsistent information may be, at least partly, ascribed to suppressed access to stereotype-inconsistent traits due to a *posteriori* stereotype activation.

In the literature on stereotype activation and memory, relatively little attention has been paid to the influence of an activated stereotype on recall of earlier encoded information. In their well-known "Betty K study," Snyder and Uranowitz (1978) suggested that a stereotype presented after encoding elicits a subjective "reconstruction" of initially

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encoded information. They reported superior recognition of "heterosexual" information under conditions in which Betty K was said to be heterosexual compared to conditions in which Betty K was said to be a lesbian. Clark and Woll (1981), however, found no such consistency advantage in similar experiments.

Rothbart, Evans, and Fulero (1979) and Cohen (1981) also studied the effects of *a posteriori* stereotype activation. The recall data of Rothbart et al. (1979) revealed no significant difference between memory for expected and unexpected behaviors; however, their unexpected behaviors cannot simply be regarded as inconsistent. In Cohen's (1981) study, subjects watched a videotape in which a woman performed stereotype-consistent and stereotype-inconsistent behaviors. Under conditions in which the stereotype was activated after the subjects watched the videotape, subjects were able to recognize more stereotype-consistent behaviors than stereotype-inconsistent behaviors. Similar findings were reported in a number of other studies in which both recognition and free recall paradigms were used (Hirt, Erickson, & McDonald, 1993; Pyszczynski, LaPrelle, & Greenberg, 1987; Wyer, Bodenhausen, & Srull, 1984; Wyer & Martin, 1986; see also Belezza & Bower, 1981; Clark & Woll, 1981; for a review, see Rojahn & Pettigrew, 1992).

HOW DOES AN *A POSTERIORI* STEREOTYPE AFFECT MEMORY?

The general picture that emerges from the studies previously cited is that, compared to prior stereotype activation, the activation of an *a posteriori* stereotype impedes recall of stereotype-inconsistent information, while recall of stereotype-consistent information is not affected. However, the processes underlying *a posteriori* stereotype effects on recall do not seem to be well understood.

Pyszczynski et al. (1987) suggested that an *a posteriori* activated stereotype might function as a *retrieval cue* (for a similar argument, see Srull & Wyer, 1989; Wyer, Bodenhausen, & Srull, 1984). The postulated retrieval cue mechanism may operate as follows: An *a posteriori* activated stereotype elicits a memory search guided by stereotypical expectations. This would lead the search in stereotype-consistent directions, while at the same time this expectancy-guided search would misdirect or distract the search away from stereotype-inconsistent information, reducing the chance of recall of stereotype-inconsistent behaviors. Since this prediction was sustained, the retrieval cue explanation seems to be corroborated.

On closer examination, however, some questions arise which cannot be answered within Pyszczynski et al.'s experimental design. As argued

by Dijksterhuis and van Knippenberg (1995a), the comparison between *a priori* and *a posteriori* stereotype activation may be more indicative of encoding than of retrieval effects. Assuming that *a priori* stereotype activation affects both encoding (i.e., the on-line processing and storage of information in memory) and retrieval (assuming that during the free recall task the stereotype was still activated), while stereotype activation afterwards only affects retrieval, the contrast between the two conditions suggests differential encoding effects, and not differential retrieval. In other words, the better recall of stereotype-inconsistent information in the prior activation condition, compared to the stereotype-afterwards condition, most likely reflects an encoding advantage of stereotype-inconsistent information due to prior stereotype activation (see Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992). Hence, to what extent *a posteriori* activated stereotypes serve as retrieval cues is still unknown.

Pure retrieval cue effects of *a posteriori* activated stereotypes may be revealed when one compares the effects on memory of a stereotype activated after subjects have been presented with behavioral information with a condition in which the same behavioral information is presented without mentioning the stereotype at all (i.e., a no stereotype control condition). In such a comparison there would be no encoding difference (because the two conditions are identical at this stage), and only the retrieval circumstances would vary.

Recently, Dijksterhuis and van Knippenberg (1995a) reported an experiment in which, using a recognition paradigm, an *a posteriori* stereotype condition was compared with a no stereotype control condition. Subjects were provided with behavioral information about two social groups. Under conditions in which the groups were labelled (as environmental activists or professional soldiers) after encoding, recognition of stereotype-consistent information was superior to recognition of stereotype-inconsistent information. The comparison of the *a posteriori* stereotype activation condition with the no stereotype control condition showed a recognition decrease of stereotype-inconsistent behaviors due to afterwards stereotype activation, and no effect at all on the stereotype-consistent behaviors.

Although Dijksterhuis and van Knippenberg (1995a) avoided encoding differences between conditions, the fact that they used a recognition paradigm (a paradigm in which earlier presented behaviors had to be allocated to one of two groups), renders their study somewhat inconclusive as regards the retrieval cue function of *a posteriori* stereotypes. Active memory search is probably more crucial in free recall than in recognition (although retrieval processes may operate in recognition, see, e.g., Mandler, 1980). Furthermore, as argued by Belezza and Bower (1981; see also Stangor & McMillan, 1992), recognition paradigms (or, as in this case,

"allocation paradigms") may be subject to guessing biases. That is, if subjects have to allocate a behavior to a group (or to one of two groups), they may not really remember whether or not they have seen it as being associated with that group, but rely on stereotype-inconsistency in their decision not to allocate.

Considering the weaknesses of this study with regard to understanding the effects of a *posteriori* stereotypes on retrieval, a free recall paradigm would be a more appropriate method. Furthermore, as we intend to present a theoretical explanation for the deteriorated recall phenomenon, it seems worthwhile to demonstrate its strengths. Therefore, in Experiment 1 we replicate Dijksterhuis and van Knippenberg's (1995a) design while using a free recall task to assess memory. The results of this study show that recall of stereotype-inconsistent behavior deteriorated due to a *posteriori* stereotype activation, while recall of stereotype-consistent behaviors remained unaffected, which replicates earlier findings. In sum, it seems that the *a posteriori* activated stereotype somehow deflects the memory search away from earlier encoded stereotype-inconsistent information. The question is, how?

In order to account for the observed impeded recall of stereotype-inconsistent behaviors due to a *posteriori* stereotype activation, we have further elaborated on the idea that stereotypes may serve as retrieval cues. The basic tenet of the proposed "guided search" or "guided retrieval" explanation is that traits attributed to a group (or person) guide the memory search in the direction of trait-related behavior. An activated stereotype may lead the search in the direction of some (i.e., stereotype-consistent) traits and distract the search away from other (i.e., stereotype-inconsistent) traits. As our approach entails assumptions concerning the organization of behavioral information in memory, we will first expand on the presumed trait-behavior clustering in encoding and storage of social information, and subsequently elaborate on how this memory organization may affect retrieval.

THE ORGANIZATION OF BEHAVIORAL INFORMATION IN MEMORY

Traits play a major role in social perception. Upon observing the behaviors of others, we may often, when trying to make sense of these behaviors, encode them in terms of underlying traits (see e.g., Gilbert & Malone, 1995; Gilbert, Pelham, & Krull, 1988). In fact, upon perceiving overt behavior we may infer the underlying trait spontaneously and unconsciously (Carlston & Skowronski, 1995; Newman & Uleman, 1989; Uleman, 1987; Winter & Uleman, 1984; Winter, Uleman, & Cunniff, 1985).

If trait implications may be spontaneously invoked during encoding, it is conceivable that traits also play a role in the storage of information in memory. The person memory literature indeed suggests that traits are used to organize behavioral information in memory. When people are forming impressions, behavioral information may be clustered in memory with the help of trait dimensions (e.g., Dijksterhuis & van Knippenberg, *in press-a*; Driscoll, 1992; Gordon & Wyer, 1987; Hamilton, Driscoll, & Worth, 1989; Hastie, 1980; Srull & Wyer, 1989; Wyer, Bodenhausen, & Srull, 1984). For example, behaviors such as "he kicked the cat" and "he wrecked a telephone booth" may be stored together under the trait concept "aggressive." Other behaviors, for instance "he recited a sonnet of Shakespeare by heart" and "he explained quantum theory to his girlfriend" may be stored under another trait concept like "intelligent." Theoretically, such behavior-trait clusterings may be understood as groupings in memory of behavioral items having between-item associations as well as item-trait associations which may facilitate subsequent recall of the clustered items (e.g., Gordon & Wyer, 1987; Hamilton, Katz, & Leirer, 1980; Srull, 1983).

THE ROLE OF TRAITS AND STEREOTYPES IN GUIDED RETRIEVAL

Imagine that you observe behaviors displayed by members of a group (or by a person). Some of these behaviors imply intelligence, while others imply aggressiveness. As suggested above, these behaviors are presumably stored separately in two different trait-behavior clusters. A schematic model of the assumed underlying representation is depicted in Figure 1 ("before stereotype activation").

A guided retrieval conception of recall of behavioral information would suggest that, when no stereotype is activated at all (i.e., in a no stereotype control condition), the memory search is guided by the subject's knowledge that the stimulus group (or person) is both intelligent and aggressive,¹ as a consequence of which the subject may actively try to retrieve instances of intelligent and aggressive behaviors from memory. The solid lines in Figure 1 ("before stereotype activation") indicate the routes through which the search process would evolve. In this situation the probability of retrieval would be equal for the two types of behaviors.

However, if a stereotype is activated after the information is encoded,

1. For the sake of simplicity, guided retrieval is depicted here as a conscious process. However, as will be explained later, evidence suggests that unconscious processes are involved.

Note. Cs represent consistent behaviors, Is represent inconsistent behaviors and Bs represent behaviors of which (in)consistency is not yet defined. Solid lines indicate high probabilities of retrieving information, while dotted lines indicate low probabilities. For simplicity, inter-behavior associations are neglected.

FIGURE 1. Schematic representation under two trait-conditions before (left) and after (right) stereotype activation.

a different process may occur. Suppose the subject learns that the behaviors were all performed by college professors. As a consequence, some behaviors become stereotype-consistent (the intelligent ones) and some others become stereotype-inconsistent (the aggressive ones). In this situation, a guided search approach assumes that the activated stereotype affects the mental representation of the stimulus group (or person) in the sense that, in the present example, the association with the trait intelligent would be strengthened, while the association with the trait aggressive may be weakened. To the extent, then, that the stereotype guides retrieval, the search would preferentially be directed towards retrieving instances of intelligent behavior, while it would misdirect the search away from the stereotype-inconsistent behaviors, reducing the probability of recall of the latter. Figure 1 ("after stereotype activation") schematically depicts the search avenues in the case of a *posteriori* stereotype activation.

It is worth noting at this stage that the preferential search for stereotype-consistent behaviors need not lead to their enhanced recall compared to the control condition because, as we argued above, in the control condition the memory search would be trait-guided as well. Hence, the guided retrieval explanation would account for the reduced recall of stereotype-inconsistent information due to a *posteriori* stereotype activa-

Note. Cs represent consistent behaviors, Is represent inconsistent behaviors and Bs represent behaviors of which (in)consistency is not yet defined. Again, inter-behavior associations are neglected in these figures.

FIGURE 2. Schematic model of the representation in memory under one-trait condition before (left) and after (right) stereotype activation.

tion, as well as for the absence of an effect on stereotype-consistent information.

This explanation in terms of trait-guided retrieval implies that recall of stereotype-inconsistent behaviors suffers from a *posteriori* stereotype activation only if these stereotype-inconsistent behaviors are stored under a *different* trait concept than the stereotype-consistent ones. If stereotype-consistent and stereotype-inconsistent behaviors are stored under the *same* (stereotype-consistent) trait, a *posteriori* stereotype activation is not expected to lead to reduced recall of stereotype-inconsistent information. Some recent research not only shows that behaviors are clustered in memory in terms of traits, but also that behaviors having opposite implications for the same trait dimension (e.g., intelligent and stupid behaviors) are stored under the same trait-behavior cluster (Dijksterhuis & van Knippenberg, in press-a; Hamilton, Driscoll, & Worth, 1989). In this situation stereotype-consistent and stereotype-inconsistent behaviors would become associated with the same stereotype-consistent trait (e.g., intelligence) and presumably consistent-inconsistent inter-behavior associations would be formed as well. One may therefore expect that, in this case, stereotype-consistent and stereotype-inconsistent behaviors will be recalled equally well in the no stereotype control condition (see Figure 2; "before stereotype activa-

tion") and in the *a posteriori* stereotype condition (see Figure 2; "after stereotype activation").

Hence, on the basis of a guided retrieval model, we predict that deteriorated recall of stereotype-inconsistent behaviors due to *a posteriori* stereotype activation only occurs when stereotype-consistent and stereotype-inconsistent behaviors bear on different trait concepts (e.g., intelligent and aggressive), and not when they pertain to the same stereotype-consistent trait (e.g., intelligent). This prediction is tested in Experiment 2. In agreement with our present argument, the results show that, compared to a no stereotype control condition, recall of stereotype-inconsistent behaviors suffers from *a posteriori* stereotype activation only when they bear on a different trait than the stereotype-consistent behaviors, while there is no deteriorated recall when they load on the same trait dimension. Furthermore, clustering data seem to corroborate the presumed underlying memory organization in terms of the same versus separate traits.

COGNITIVE PROCESSES OPERATING IN GUIDED RETRIEVAL

As regards the precise nature of the guided search process, some pertinent questions remain. Is guided retrieval a conscious and deliberate search strategy? A conscious search strategy would require the subjects to be aware of the fact that what they are asked to recall either pertains to an intelligent and aggressive group (that is, in the control condition), or to a group of professors (in the *a posteriori* stereotype condition) to whom they attribute the trait intelligent (and not the trait aggressive). For the strategy to be deliberate, subjects should intentionally try to retrieve trait-related behaviors. That is, their memory search might be characterized by voluntary contemplations, for instance, "So this was a group of professors. Let me think, which intelligent behaviors did I see?" In such an intentional search strategy, subjects might even disregard retrieved stereotype-inconsistent behaviors deeming them inappropriate or unlikely to be true considering the nature of the stimulus group.

Conversely, the influence of the stereotype on recall may be unintentional and unconscious. Even without the subject's voluntary control or awareness of the nature of the search process, the activation of the professor stereotype may simply activate the trait intelligent, or enhance its accessibility, as a result of which the stored intelligence-related behaviors come to mind more easily than aggression-related behaviors. Experiment 3 was designed to see whether deteriorated recall of stereotype-inconsistent behaviors would still be observed when the *a posteriori* stereotype activation was brought about by an "unrelated prime"—a task in which, prior to the recall task, subjects were asked (allegedly to

help out a colleague of the experimenter) to think about a typical professor and to write down attributes of his or her lifestyle and appearance. The results of Experiment 3 showed deteriorated recall of stereotype-inconsistent behaviors due to a *posteriori* stereotype activation, again only when it was stored in a separate stereotype-inconsistent trait. Thus, even when the activated stereotype does not pertain to the stimulus group, it leads to reduced recall of stereotype-inconsistent information stored in a separate trait-behavior cluster (as indicated by the clustering data). These results suggest that the influence of an *a posteriori* activated stereotype on recall is unintentional and unconscious.

THE ROLE OF FACILITATED AND INHIBITED ACCESS

There is one final issue that needs further clarification. How exactly does a stereotype guide memory search? One mechanism already suggested in our argument so far is that stereotype-consistent traits are activated, or become more accessible, by the mere suggestion of the stereotype. For instance, the label "professor" may trigger the activation of the trait concept intelligent (as it may also trigger other, less flattering, traits). As a result of the activation of the trait intelligent, subjects may unintentionally search for instances of intelligence-related behaviors. This very pre-occupation with intelligence-related behaviors may reduce the chance of retrieving examples of aggressive behaviors from memory.

However, it is conceivable that stereotype activation also suppresses access to stereotype-inconsistent traits. If one primes "professor," it may be more difficult to think of the trait aggressive and, consequently, of aggressive behaviors. Such inhibited access to stereotype-inconsistent traits may contribute to the phenomenon of deteriorated recall of stereotype-inconsistent behaviors.

There is some evidence that stereotype activation not only facilitates access to stereotype-consistent traits (cf. e.g., Devine, 1989; Dovidio, Evans, & Tyler, 1986; Macrae, Stangor, & Milne, 1994), but also inhibits access to stereotype-inconsistent traits (Dijksterhuis & van Knippenberg, in press-b). In two different paradigms (i.e., lexical decisions and solving word puzzles), Dijksterhuis and van Knippenberg (in press-b) compared the recognition of trait words by stereotype-primed and nonstereotype-primed subjects. The traits to be recognized were either stereotype-consistent, stereotype-neutral or stereotype-inconsistent. The results showed both enhanced (i.e., faster or better) recognition of stereotype-consistent traits and reduced (i.e., slower or worse) recognition of stereotype-inconsistent traits due to stereotype activation (both compared to the irrelevant-prime control condition and compared to the stereotype-neutral traits). These results were interpreted as indicative of facilitated

access to stereotype-consistent traits and inhibited access to stereotype-inconsistent traits as a result of stereotype activation. As the enhancement and suppression effects were virtually of the same magnitude, it seems plausible that both mechanisms play an important role in stereotyping (see Gernsbacher & Faust, 1991, for a related argument in the language comprehension domain).

To recap, it is conceivable that the mere pre-occupation with the stereotype-consistent trait prevented subjects from searching for stereotype-inconsistent behaviors stored in a separate trait-behavior cluster. The activation of the professor stereotype may have incited subjects to look for intelligent behaviors, they remember some, and try again. As long as the subjects retrieved some stereotype-consistent behaviors, they may simply have persisted in pursuing search within the domain of intelligence-related behaviors, thereby reducing the chance of recalling behaviors related to stereotype-inconsistent traits "by default." In such an interpretation of the guided search process, there is no need to assume that inhibited access to stereotype-inconsistent traits plays any role at all in the observed impeded recall.

In our view, such a persistent search in a stereotype-consistent domain is less likely to occur if there are no stereotype-consistent behaviors to retrieve or, more precisely, if at the initial encoding stage the group (or person) was not associated with any stereotype-consistent trait to begin with. When there are no stereotype-consistent behaviors in the stimulus material, search via stereotype-consistent traits would result in drawing blanks. One would expect subjects, then, to abandon this type of search and to try stereotype-inconsistent traits for a change, unless the *a posteriori* activated stereotype hampers access to stereotype-inconsistent traits.

Experiment 4 tries to elucidate the role of suppressed access to stereotype-inconsistent traits in guided retrieval by presenting stereotype-inconsistent and stereotype-neutral behaviors only. The results of Experiment 4 show impeded recall of stereotype-inconsistent behaviors due to *a posteriori* stereotype activation (both compared to the no stereotype control condition and compared to recall of the stereotype-neutral behaviors) to occur even in the absence of stereotype-consistent behaviors. Therefore, it seems plausible that, next to facilitated access to stereotype-consistent traits, inhibited access to stereotype-inconsistent traits also plays a role in stereotype-guided memory search.

EXPERIMENT 1

The robustness of impaired retrieval of stereotype-inconsistent information from memory due to *a posteriori* activated stereotypes is determined,

by replicating the basic findings of our earlier study (Dijksterhuis & van Knippenberg, 1995a) with a free recall measure. We compare recall of stereotype-inconsistent information under conditions in which a stereotype is activated after encoding with recall of stereotype-consistent information under the same conditions and, more importantly, we also compare recall of stereotype-inconsistent information after posterior stereotype activation with recall of the same information in a no stereotype control condition.

Wyer and Srull (1989) suggest that there is little reason to assume different processes underlie person perception and group perception, as long as the target group is a cohesive one—that is, a group that is bound by common aims and norms of behavior (see also Rojahn & Pettigrew, 1992; but see Stern, Marrs, Millar, & Cole, 1984; Wyer, Bodenhausen, & Srull, 1984). In the context of a test of the robustness of the effect, and because in most relevant studies stereotypes are activated before encoding, we study a target person as well a target group for exploratory purposes.

METHOD

Subjects and Design. Seventy-one undergraduate students from the University of Nijmegen participated in the study, receiving Dfl. 5 (approximately 3 US Dollars) in return. Subjects were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs stereotype activation after encoding) $\times$ 2 (target: group vs. individual) between-subjects design. Type of behavior (stereotype-consistent vs. stereotype-inconsistent) constituted the within-subjects factor.

Pretesting of Stimulus Materials. In an initial study, 33 subjects evaluated 110 behavioral descriptions on a nine-point scale ranging from 1 (undesirable behavior) to 9 (desirable behavior). On the basis of this pilot study, 50 behavioral evaluatively neutral descriptions were selected that were more or less of the same length (25 to 35 characters). In a second pilot study, 40 (other) subjects rated these descriptions on stereotypicality for members of four social groups: artists, professors, police officers, and environmental activists. Subjects were asked how likely it is for a member of a group to perform a particular behavior. Nine-point scales were used with poles labeled “not at all likely” and “very likely.”

Artists (or an artist) were chosen as a target in the first experiment. Eighteen behavioral descriptions were selected six of which were consistent with the stereotype ($M = 6.98$) and six were inconsistent with the stereotype ($M = 3.09$). Furthermore, six filler items were selected ($M = 5.05$). All items were evaluatively neutral.

Procedure. Subjects participated in the experiment in groups of up to 9

persons per session. They were placed in individual cubicles containing an Apple Macintosh computer, which was used to provide all information concerning the experiment. They were asked to read a series of behavioral descriptions about members of a group (or about a single individual) at their own pace and to form an impression of this group (or individual). In the group condition, descriptions were accompanied by (male) first names. In the person condition, all descriptions were accompanied by the name "Bart." In all conditions, the first two items as well as the last two items to appear on the screen were fillers (i.e., stereotype-neutral behaviors). All other items were presented in random order. In the stereotype afterwards condition subjects were informed, on the first screen after the presentation of the behavioral descriptions, that they had been reading about artists (or an artist). In the no stereotype activation condition, no such information was provided. After completion of the reading task, subjects were presented with a free recall task. Subsequently subjects were paid and debriefed.

Dependent Variables. After reading the behavioral statements, subjects were asked to recall as many behavioral descriptions as possible. They were given 6 minutes to complete this task.

RESULTS AND DISCUSSION

Recall. The number of each type of item recalled was counted for each subject. Filler items, however, were not included in the analyses because they were not presented in random order. An item was counted as correct if the general meaning of the original item was reflected (cf. e.g., Gordon & Wyer, 1987; Hastie & Kumar, 1979; Srull, 1981, 1983). A 2 (stereotype activation: no stereotype vs. stereotype after encoding) $\times$ 2 (target: group vs. individual) between-subjects $\times$ 2 (item type: stereotype-consistent vs. stereotype-inconsistent) within-subjects ANOVA revealed a main effect of target. Subjects recalled a higher proportion of the information when the target was a person ($M = .596$, excluding fillers) than when it was a group ($M = .519$, $F(1,67) = 5.19$, $p < .03$). No other main effects were found.

The only significant interaction obtained was the predicted stereotype activation $\times$ item type interaction ($F(1,67) = 4.21$, $p < .05$, see Table 1).

TABLE 1. Recall of Consistent and Inconsistent Information (Percentages)

	Person		Group	
	Consistent	Inconsistent	Consistent	Inconsistent
No stereotype	59.8	64.7	52.8	53.7
Stereotype	59.3	54.6	57.4	43.5

Stereotype activation did not influence the recall of stereotype-consistent information ($F(1,67) = .22$, n.s.). It did, however, affect the recall of stereotype-inconsistent information. As predicted, memory for stereotype-inconsistent information was worse in the stereotype after condition than in the no stereotype condition ($F(1,67) = 4.63$, $p < .04$). Furthermore, memory for stereotype-consistent information was better than memory for stereotype-inconsistent information in the stereotype after condition ($F(1,67) = 4.95$, $p < .03$), while there was no difference in recall of stereotype-consistent and stereotype-inconsistent items in the no stereotype condition ($F(1,67) = .46$, n.s.).

In sum, an *a posteriori* activated stereotype impairs retrieval of stereotype-inconsistent information from memory, both under person perception conditions and under group perception conditions. By replicating earlier findings (Dijksterhuis & van Knippenberg, 1995a), with a different memory measure, the effect appears to be robust.

EXPERIMENT 2

Following from our theoretical argument outlined in the introduction, the hypothesis to be tested is that recall of stereotype-inconsistent information is impaired upon an *a posteriori* stereotype activation if it is stored in a separate trait-behavior cluster not fitting in with the stereotype, while no differential recall of stereotype-consistent and stereotype-inconsistent information is expected if stereotype-consistent and stereotype-inconsistent behaviors are stored in the same stereotype-related trait-behavior cluster.

It may seem confusing that a trait organization explanation is being advanced while this issue was not addressed in the construction of the stimulus material of Experiment 1. Frankly, this explanation was not considered at the time we designed Experiment 1. In view of our present theorizing, it may be worthwhile to take another look at the items used in this experiment. Some of the stereotype-consistent behaviors for artists were: "often forgets to lock the front door," "sometimes doesn't do the dishes for a week," and "arranged to be rejected as unfit for the army." Some of the stereotype-inconsistent items were: "had an A for math at highschool," "often visits soccer matches," and "goes to church every Sunday." In retrospect, it seems that some of the stereotype-consistent items (e.g., those referring to absent-mindedness, and a nonconformist attitude) do not bear on the same trait dimensions as the stereotype-inconsistent items (e.g., pertaining to math ability and sports interest) but, with some imagination, the stereotype-consistent aversion against military service and the stereotype-inconsistent religious attitude may be construed as bearing on an underlying ethics trait dimen-

sion. Hence, in terms of underlying memory organization, the stereotype-consistent behaviors and the stereotype-inconsistent behaviors may have had some dissociated as well as some common trait implications, the former being theoretically conducive to impaired recall of stereotype-inconsistent behaviors due to a *posteriori* stereotype activation, while the latter presumably were not affected by it. The resulting ambiguity concerning the role of trait organization will be explicitly addressed in Experiment 2.

The hypothesis that impaired recall of stereotype-inconsistent behaviors depends on memory dissociation from stereotype-consistent behaviors was tested in Experiment 2. We provided subjects either with information loaded on the same trait dimension (e.g., intelligent and stupid behaviors) or with information loaded on different trait dimensions (e.g., intelligent and aggressive behaviors). Again, a stereotype is either activated afterwards or not at all.

In Experiment 2, the recall task is used to measure both recall and ARC-scores (Roener, Thompson, & Brown, 1971). ARC-scores may be used to obtain evidence for differential storage for different item types in the same versus different traits conditions. It follows from our trait organization argument that we should obtain higher ARC-scores (i.e., stronger clustering) for stereotype-consistent and stereotype-inconsistent behaviors under conditions with two *separate* trait-behavior clusters than under conditions in which stereotype-consistent and stereotype-inconsistent behaviors are expected to be stored in the *same* cluster. Note that the presumed memory organization of stereotype-consistent and stereotype-inconsistent behaviors in the same or different trait-behavior clusters is assumed to take place during encoding (although the validity of this assumption is difficult to verify, see Klein & Loftus, 1990). That is, we assume that memory organization in terms of one versus two trait-behavior clusters will not be affected by later stereotype activation (despite the fact that it may help to explain its effects on retrieval). In a sense, these ARC scores may be regarded as checks on the trait organization manipulation.

For practical reasons, and because of the comparable results obtained in Experiment 1 for person perception and group perception, only group perception is studied in this experiment.

METHOD

Subjects and Design. Ninety-six undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs. stereotype activation after encoding) $\times$ 2 (number of trait dimensions in the stimulus material: 1-

TABLE 2. Stimulus Material (Ratings on Nine-Point Scales)

	Intelligent	Aggressive
Intelligent items	7.12	4.32
Nonintelligent items	2.98	5.16
Aggressive items	4.41	7.36
Nonaggressive items	5.45	2.72
Fillers	5.06	4.96

stereotype-consistent and stereotype-inconsistent information loaded on the same trait dimension vs. 2- stereotype-consistent and stereotype-inconsistent information loaded on different dimensions) $\times$ 2 (target: professors vs. hooligans) $\times$ 2 (stimulus set: the intelligent/nonintelligent set vs. the aggressive/nonaggressive set in the one-trait conditions and the intelligent/aggressive set vs. the nonintelligent/nonaggressive set in the two-traits conditions) between-subjects design. Item type (stereotype-consistent vs. stereotype-inconsistent) constituted the within-subjects factor. Subjects received Dfl. 5 for participating.

Pretesting of Stimulus Materials. Thirty-three subjects rated fourteen social groups on 14 trait dimensions. Nine-point scales were used with poles labeled "members of this group are not at all . . ." (1) and "members of this group are very. . ." (9). To control for possible negative-positive asymmetries (e.g., Ikegami, 1993; Reeder, 1979; Skowronski & Carlston, 1987; Vonk, 1993), two groups were selected with opposite scores. Professors were perceived as intelligent ($M = 7.79$) and as nonaggressive ($M = 2.98$) and hooligans were perceived as aggressive ($M = 8.75$) and as nonintelligent ($M = 1.87$). Subsequently, 40 (other) subjects rated 98 behaviors on intelligence and aggressiveness. Nine-point scales were used with poles labeled "performing this behavior is not at all . . ." (1) and "performing this behavior is very . . ." (9) (e.g., intelligent). Thirty behaviors were selected of which 6 were intelligent, 6 were nonintelligent, 6 were aggressive, 6 were nonaggressive and 6 were neutral. Behaviors that loaded on one trait dimension were neutral with respect to the other trait dimension (see Table 2 for means).

Four stimulus sets were constructed with 6 stereotype-consistent descriptions, 6 stereotype-inconsistent descriptions and (for all sets the same) 6 filler items (i.e., stereotype-neutral items). In two sets, stereotype-consistent and stereotype-inconsistent behaviors had implications for the same trait dimension (either intelligent and nonintelligent behaviors, or aggressive and nonaggressive behaviors). In the two remaining sets, stereotype-consistent and stereotype-inconsistent behaviors loaded on different dimensions (intelligent and aggressive behaviors, nonintelligent and nonaggressive behaviors). The resulting design, then, is a 2

TABLE 3. Recall of Consistent and Inconsistent Information (Percentages)

	1 trait		2 traits	
	Consistent	Inconsistent	Consistent	Inconsistent
No stereotype	50.0	47.9	54.8	55.6
Stereotype	50.7	50.7	55.1	34.8

(stereotype activation) $\times$ 2 (target) $\times$ 2 (number of traits) $\times$ 2 (stimulus set) between-subjects design, with a 2 (item type) level factor as within-subjects factor.

Procedure. The reading task and the stereotype activation manipulation were administered in the same way as in Experiment 1. The first two behaviors as well as the last two behaviors to appear on the screen were fillers. All other behaviors were presented in random order. After reading the behavioral descriptions (and, in the stereotype afterwards condition, the introduction of the group label), subjects were presented with a free recall task. At the end, subjects were paid and debriefed.

Dependent Variables. The free recall task was conducted in the same way as in Experiment 1. It was now also used to calculate ARC-scores.

RESULTS AND DISCUSSION

Recall. The number of correctly recalled stereotype-consistent and stereotype-inconsistent descriptions were counted for each subject. Again, filler items were not included in the analyses because they were not presented in random order. A 2 (Stereotype activation) $\times$ 2 (Number of traits in the stimulus material) $\times$ 2 (Target: professors vs. hooligans) $\times$ 2 (Stimulus set: the intelligent/nonintelligent set vs. the aggressive/nonaggressive set in the one-trait conditions and the intelligent/aggressive set vs. the nonintelligent/nonaggressive set in the two-traits conditions) between-subjects $\times$ 2 (item type) within-subjects ANOVA revealed a stereotype activation $\times$ number of traits $\times$ item type interaction ($F(1,80) = 4.54, p < .04$, see Table 3 for means). No other effects were obtained.

Simple two-way interactions revealed that in the no stereotype control condition and the *a posteriori* stereotype activation condition there was no differential recall for stereotype-consistent and stereotype-inconsistent information when they loaded on the same trait dimension ($F(1,80) = .09$, n.s.), while there was a differential recall effect of stereotype activation under conditions with different trait dimensions ($F(1,80) = 10.98, p < .002$). Under conditions with different trait dimensions, memory for stereotype-inconsistent information was worse when a stereotype was activated after encoding compared to the no stereotype control

condition ($F(1,80) = 16.48, p < .001$), while there was no effect at all of stereotype activation on stereotype-consistent behaviors ($F < 1$). In other words, reduced recall of stereotype-inconsistent information due to a *posteriori* stereotype activation only occurred when it was stored in a separate trait-behavior cluster. Furthermore, in the stereotype-afterwards condition, memory for stereotype-inconsistent information was worse than memory for stereotype-consistent information under conditions with separate trait-behavior clusters ($F(1,80) = 17.11, p < .001$), while there was no recall difference in the no stereotype control condition ($F < 1$).

ARC-Scores. Behaviors that are stored under the same trait-behavior cluster are likely to be reproduced in free recall consecutively (i.e., in strings of two or more) above chance expectation. The extent to which such clustering occurs is indicated by ARC-scores (Roenker et al., 1971). In conditions in which the information is stored in two separate clusters, one would therefore expect ARC-scores for stereotype-consistent and stereotype-inconsistent behaviors to be higher compared to these ARC-scores in conditions in which all behaviors are stored in one single cluster.

Two ARC-scores were computed, one representing the clustering of stereotype-consistent behaviors, the other representing the clustering of stereotype-inconsistent behaviors. These two ARC-scores were subjected to a 2 (Stereotype activation) $\times 2$ (Number of traits in the stimulus material) $\times 2$ (Target) $\times 2$ (Stimulus set) between-subjects $\times 2$ (ARC-scores) within-subjects ANOVA. The only effect obtained was a main effect of number of traits. In agreement with the intended memory organization, it was found that clustering was higher in conditions in which stereotype-consistent and stereotype-inconsistent information had implications for different trait dimensions (ARCcon = .22 and ARCcinc = .19) than in conditions in which stereotype-consistent and stereotype-inconsistent information had implications for the same trait dimension (ARCcon = .13 and ARCcinc = .13; $F(1,80) = 5.22, p < .03$).

In our guided retrieval explanation, the occurrence of deteriorated recall of stereotype-inconsistent information as a result of a *posteriori* stereotype activation depends on its separate trait-cluster organization in memory. That is, a stereotype afterwards should bring about impaired recall of stereotype-inconsistent behaviors to the extent that these are stored in a separate trait-behavior cluster. One piece of evidence sustaining this argument is provided by the above reported higher ARC scores in the two-traits versus one-trait condition. In addition, one might on the basis of the same argument expect the recall of stereotype-inconsistent behaviors in the two traits/*a posteriori* stereotype condition to be inversely related to the clustering of stereotype-inconsistent behaviors in

a separate trait. In agreement with our argument, we indeed found a substantial and significant negative correlation between the ARC-index for inconsistent information and the recall of this information in this condition ($r = -.59$, $n = 24$, $p < .004$).

Considering the evidence provided in Experiment 2, the conclusion seems warranted that deteriorated recall of stereotype-inconsistent behaviors due to *a posteriori* stereotype activation is contingent upon their storage in a separate stereotype-inconsistent trait-behavior cluster. In other words, if memory storage of stereotype-inconsistent behaviors is dissociated from the storage of stereotype-consistent behaviors, the afterwards induced stereotype leads to their reduced recall. The question addressed in the next experiment is whether deteriorated recall of stereotype-inconsistent information results from an intentional and strategic search for stereotype-consistent information, or from an involuntary, perhaps even unconscious, enhanced activation of stereotype-consistent traits and, potentially, also an involuntary de-activation of stereotype-inconsistent traits.

EXPERIMENT 3

One general approach towards explaining reduced recall of stereotype-inconsistent behaviors due to *a posteriori* stereotype activation is based on the assumption that subjects more or less deliberately make use of their knowledge of what the stimulus group is (said to be) like. Memory search may, for instance, take on confirmatory properties (see, e.g., Snyder and colleagues [Snyder, 1981; Snyder & Swann, 1978] for a related argument in the domain of external information search). That is, subjects may search their memory for behaviors that fit in with traits stereotypically attributed to the group. They may think, for example, "Ah, these are hooligans. They must be aggressive. Right, I remember some aggressive behaviors." The stereotype may also incite subjects to disregard stereotype-inconsistent information, even if they do remember having seen such behaviors. "Explaining quantum theory? Hooligans? No way!"

Another, also strategic and deliberate, account would be to assume the operation of demand characteristics (Orne, 1962). Experiment 1 and 2 confront subjects with a curious string of events, which may well make them wonder what on earth the experimenter is up to. "A professor wrecking a telephone booth? I think I'm not supposed to write that down."

Obviously, there is one major flaw in this strategy-based account. It fails to explain the pivotal role of associated (same trait) versus dissoci-

ated (separate traits) storage of stereotype-inconsistent and stereotype-consistent information in memory. It is, however, conceivable that when the stereotype-consistent and the stereotype-inconsistent information bear on the same trait dimension, the inherent contradictions in the stimulus material (and possibly the attendant "inconsistency resolution" attempts, see, e.g., Dijksterhuis & van Knippenberg, 1995a; Wyer & Srull, 1989) may have obliterated the strategic handling of the situation, because the cognitive effort invested in understanding these inherent contradictions may have diverted attention away from other information provided in the experiment.

Alternatively, the stereotype-guided retrieval process may be quite unintentional. The activated stereotype of hooligans may simply have installed the concept of aggressiveness in the subject's mind. Thinking of aggressiveness may have—unintentionally and without any deliberate search strategy operating—brought some of the just learned aggressive behaviors to mind at the expense of accessing stereotype-inconsistent traits and behaviors. In addition, recall of stereotype-inconsistent information stored in a separate stereotype-inconsistent trait concept, may also suffer from involuntarily reduced accessibility of stereotype-inconsistent traits due to a *posteriori* stereotype activation (cf. Dijksterhuis & van Knippenberg, in press-b).

The operation of intentional search and selection mechanisms described above would require that subjects see the activated stereotype as pertaining to the group about which they just have received behavioral information. In other words, subjects must apply the activated stereotype to the group for it to affect the recall process intentionally. If, however, as we argue, the stereotype guides memory search through unintentional and unconscious processes, deteriorated recall of stereotype-inconsistent behaviors of group members would still be obtained even if the *a posteriori* stereotype activation is brought about by an "unrelated prime," that is, by priming the stereotype in such a way that there is no plausible reason to associate it with the group or the stimulus behaviors.

In order to obtain evidence for our argument that *a posteriori* stereotypes impede recall of separately stored stereotype-inconsistent information via involuntary processes rather than deliberate search strategies or selective responding, we replicated Experiment 2 with one important modification. In Experiment 3 the stereotype is activated in an ostensibly unrelated task (e.g., Dijksterhuis & van Knippenberg, in press-b; Higgins, Rholes & Jones, 1977; Macrae, Stangor, & Milne, 1994; Wyer & Srull, 1986). The stereotype activation procedure was the same as the procedure used in experiments conducted by Macrae, Stangor, and Milne

(1994; see also Dijksterhuis & van Knippenberg, in press-b). Subjects were asked to think about a soccer-hooligan (or a professor) and to list the lifestyle and appearance of a typical member of this group. If with the use of such an unrelated prime we replicate the results of Experiment 2, a strategic explanation of the deteriorated recall phenomenon would become highly unlikely, while it would strengthen the case for an explanation in terms of unintentional processes.

METHOD

Subjects and Design. One hundred and twelve undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs. stereotype activation after encoding) $\times$ 2 (number of trait dimensions in the stimulus material: 1- consistent and inconsistent information loaded on the same trait dimension vs. 2- consistent and inconsistent information loaded on different dimensions) $\times$ 2 (target: professors vs. hooligans) $\times$ 2 (stimulus set: the intelligent/nonintelligent set vs. the aggressive/nonaggressive set in the one-trait conditions and the intelligent/aggressive set vs. the nonintelligent/nonaggressive set in the two-traits conditions) between-subjects design. Item type (stereotype-consistent vs. stereotype-inconsistent) serves as within-subjects factor. Subjects received Dfl. 5 for participating.

Because the stereotype activation procedure may give rise to suspicion among subjects who may be familiar with deceptions used in social psychological experimentation, we used only students from other faculties and college freshmen (the experiment was conducted in September) as subjects.

The design, the stimulus materials, and the dependent variables used are the same as in Experiment 2. As outlined before, the only difference concerns the stereotype activation procedure.

Stereotype Activation. After subjects read the behavioral descriptions they were told that a colleague of the experimenter needed some information to be used in a forthcoming experiment. Under no stereotype activation conditions subjects were asked to list as many capital cities as they were able to come up with. Under stereotype activation conditions subjects were asked to think about a typical soccer-hooligan (or a typical professor) and to list attributes of his or her lifestyle and appearance. Both subjects under no stereotype activation conditions and subjects under stereotype activation conditions were given five minutes to complete this task. Subsequently, the recall task was introduced. Upon probing in the debriefing, none of the subjects indicated suspicion as to the real purpose of the priming task (i.e., they perceived it as an unrelated task).

TABLE 4. Recall of Consistent and Inconsistent Information (Percentages)

	1 trait		2 traits	
	Consistent	Inconsistent	Consistent	Inconsistent
No stereotype	49.4	46.7	54.0	47.1
Stereotype	41.1	42.3	46.0	29.3

RESULTS AND DISCUSSION

Recall. The number of correctly recalled stereotype-consistent and stereotype-inconsistent descriptions were counted for each subject. Again, filler items were not included in the analyses because they were not presented in random order. These data were subjected to a 2 (Stereotype activation) $\times$ 2 (Number of traits in the stimulus material) $\times$ 2 (Target: professors vs. hooligans) $\times$ 2 (Stimulus set: the intelligent/non-intelligent set vs. the aggressive/nonaggressive set in the one-trait conditions and the intelligent/aggressive set vs. the nonintelligent/nonaggressive set in the two-traits conditions) between-subjects $\times$ 2 (item type) within-subjects ANOVA. First, a main effect for stereotype activation was found. Subjects recalled more information under no stereotype conditions than under stereotype activation conditions ($F(1,96) = 7.13, p < .01$). This effect is qualified by the three-way interaction described below.

The only significant interaction of theoretical interest² obtained was the predicted three-way interaction of stereotype activation $\times$ number of traits $\times$ item type ($F(1,96) = 4.03, p < .05$, see Table 4 for means). Simple interactions revealed that no differential recall was found when stereotype-consistent and stereotype-inconsistent information loaded on the same trait dimension ($F(1,96) = .10$, n.s.) and that recall of stereotype inconsistent information was impaired after an *a posteriori* activated stereotype under conditions with different trait dimensions ($F(1,96) = 17.00, p < .001$). Under conditions with different trait dimensions, memory for stereotype-inconsistent information was worse when a stereotype was activated after encoding compared to the no stereotype control condition ($F(1,96) = 18.30, p < .001$). Furthermore, memory for stereotype-inconsistent information was worse than memory for stereotype-

2. Except for a three-way Number of traits (one vs two) $\times$ Group (professors vs hooligans) $\times$ Item type (stereotype-consistent vs stereotype-inconsistent information) interaction ($F(1, 96) = 7.52, p < .008$). Cell means indicate that subjects recalled stereotype-consistent information with greater ease than stereotype-inconsistent information, except under one-trait soccer-hooligans conditions. Importantly, the four-way Stereotype activation $\times$ Number of traits $\times$ Group $\times$ Item type interaction was not significant ($F(1,96) = .00, p < 1$).

consistent information under conditions with separate trait-behavior clusters and an *a posteriori* activated stereotype ($F(1,96) = 21.30, p < .001$). No other simple main effects were obtained.

ARC-Scores. Again, ARC-scores were calculated to provide evidence for the presumed memory organization in terms of 1 versus 2 traits. Two ARC-scores were computed, one representing the clustering of consistent behaviors, the other representing the clustering of inconsistent behaviors. The ARC-scores were subjected to a 2 (Stereotype activation) $\times$ 2 (Number of traits in the stimulus material) $\times$ 2 (Target) $\times$ 2 (Stimulus set) between-subjects $\times$ 2 (ARC-scores) within-subjects design. Again, a main effect for number of traits was found, although it failed to reach significance. In case stereotype-consistent and stereotype-inconsistent information had implications for different trait dimensions, clustering was higher ($ARC_{con} = .24$ and $ARC_{inc} = .28$) than under conditions where stereotype-consistent and stereotype-inconsistent information had implications for the same trait dimension ($ARC_{con} = .17$ and $ARC_{inc} = .20$; $F(1,96) = 3.15, p < .08$).

We expected retrieval loss of stereotype-inconsistent information to depend on the way in which this information is stored in memory. Stereotype-inconsistent information stored in a separate trait-behavior cluster (i.e., dissociated from the stereotype-consistent information) should be hard to access. Hence, subjects who stored this information separately should show impaired retrieval of stereotype-inconsistent behaviors and, therefore, the degree of separate clustering should be correlated negatively with recall of this information. We calculated the correlation between the ARC-score for stereotype-inconsistent information and recall of this information under two-trait stereotype-activation. Although the correlation failed to reach significance this time, it was indeed negative ($r = -.31, n = 28, p < .13$).

The present experiment shows that stereotype activation by means of an unrelated priming task—i.e., a task explicitly and seemingly convincingly (as probes in the debriefing yielded no indications of suspicion) presented as unrelated to the experiment—does lead to deteriorated recall of stereotype-inconsistent behaviors stored in a separate trait-behavior cluster, while recall of stereotype-inconsistent information stored together with stereotype-consistent behaviors in the same trait-behavior cluster does not suffer from the primed stereotype. In our view, these data constitute compelling evidence that the biased retrieval phenomenon described is of an involuntary nature, rather than the result of a controlled strategic search for stereotype-consistent information or a deliberate strategy of suppressing inconsistent responses. Except for some minor deviations, the effects of the unrelated prime in Experiment

3 parallel those of the *a posteriori* stereotype activation in Experiment 2, suggesting that the observed deteriorated recall of stereotype-inconsistent information observed in Experiment 2 may be ascribed to facilitatory and/or inhibitory effects of stereotype activation. Furthermore, as in Experiment 2, in the two-traits conditions we observed stronger clustering of stereotype-consistent and stereotype-inconsistent information (as indicated by the ARC-scores) than in the one-trait conditions, underscoring the postulated role of the organization in memory of behavioral information in terms of trait clusters with regard to the deteriorated recall phenomenon.

EXPERIMENT 4

In our theoretical account of deteriorated recall of stereotype-inconsistent information, we have suggested that two co-ordinate processes may contribute to the observed phenomenon. Namely, facilitated access to stereotype-consistent traits and inhibited access to stereotype-inconsistent traits. Considering the evidence obtained so far, it is not necessary to posit reduced access to stereotype-inconsistent traits upon stereotype activation. It may be argued that the search in memory for behavioral information often starts with stereotype-consistent traits, due to the strong links between these traits and the stereotype (or the schema, or person concept; see e.g. Srull, 1981; Srull & Wyer, 1989). Under two-traits conditions (i.e., separate storage of stereotype-consistent and stereotype-inconsistent information), then, the enhanced probability that the search process starts in the stereotype-consistent trait-behavior cluster may simply explain the reduced recall of stereotype-inconsistent information. That is, the reduced recall of stereotype-inconsistent behaviors may be interpreted as a byproduct of the preferential retrieval of information from the stereotype-consistent cluster.

However, if stereotype activation also reduces access to stereotype-inconsistent traits, the deteriorated recall of stereotype-inconsistent information will be retained even if there are no stereotype-consistent behaviors at all presented in the stimulus set. That is, in situations in which a group about which information is provided is not associated with any stereotype-consistent trait to begin with, search via stereotype-consistent traits is fruitless. The recall task would then require subjects to search for other information, including stereotype-inconsistent information, unless access to stereotype-inconsistent traits would be impeded due to the stereotype activation.

In Experiment 4 we provide subjects only with stereotype-inconsistent and stereotype-neutral information. It may be argued that in such a

situation a stereotype activated afterwards would not affect recall of stereotype-inconsistent information any more than it would affect stereotype-neutral information, unless the activated stereotype suppresses access to stereotype-inconsistent traits.

The stereotype activation task used in Experiment 4 is the same as in Experiment 3 for two reasons. First, a replication with this procedure may demonstrate the robustness of the effect obtained in Experiment 3. Second, subjects might get suspicious or confused when, after hearing what the group consisted of, they realize that they have not read one single behavior consistent with the stereotype. The unrelated stereotype prime would avoid this confusion.

METHOD

Subjects and Design. Thirty-six undergraduate students from the University of Nijmegen were randomly assigned to the cells of a 2 (stereotype activation: no stereotype activation vs. stereotype activation after encoding) $\times$ 2 (target: soccer-hooligans vs. professors) $\times$ 2 (stimulus set: intelligent vs. nonaggressive behaviors for soccer-hooligans and aggressive vs. nonintelligent behaviors for professors) between-subjects design. Subjects received Dfl. 5 for participating. Only freshmen and students from outside the Psychology faculty were allowed to participate. Again debriefing indicated that the stereotype activation task was perceived as a distinct task.

Except for the stimulus material, the experiment is a replication of Experiment 3.

Stimulus Materials. Subjects were provided with 18 behavioral descriptions. Six of them were inconsistent with the stereotype, the remaining 12 were fillers. Subjects in the stereotype activation condition were either provided with the stereotype of a soccer-hooligan or with the stereotype of a professor. In case the stereotype of soccer-hooligans was activated, subjects received either a set with 6 nonaggressive behaviors or with 6 intelligent behaviors. Subjects for whom the stereotype of professors was activated either received 6 aggressive behaviors or 6 nonintelligent behaviors. In the no stereotype control condition subjects were requested to list capital cities. The stimulus sets presented in these control conditions matched those used in the stereotype activation conditions. All subjects were provided with the same filler items. Six filler items were identical to those used in Experiments 2 and 3. The remaining six items were selected from the pilot-study described in the Method section of Experiment 2. These items were neutral with respect to aggressiveness ($M = 4.78$) and with respect to intelligence ($M = 5.18$).

TABLE 5. Recall of Inconsistent Information and Filler Items (Percentages)

	Inconsistent	Fillers
No stereotype	50.5	46.1
Stereotype	31.5	42.3

In this experiment, all items, including the filler items, were presented in random order.

RESULTS AND DISCUSSION

Recall. Correctly recalled stereotype-inconsistent items and stereotype-neutral items were counted for each subject. A 2 (Stereotype activation) $\times$ 2 (Target: professors vs. hooligans) $\times$ 2 (Stimulus set: the intelligent set vs. the nonaggressive set in the "soccer-hooligan condition" and the aggressive set vs. the nonintelligent set in the "professor condition") between-subjects $\times$ 2 (item type: stereotype-inconsistent vs. stereotype-neutral) within-subjects ANOVA was performed with proportion recalled as dependent variable. Again, a main effect of stereotype activation was found. Overall recall was poorer when a stereotype was activated than when it was not activated ($F(1,32) = 6.71, p = .02$). The significant two-way interaction of stereotype activation $\times$ item type qualifies this main effect, as predicted ($F(1,32) = 4.25, p < .05$, see Table 5 for means). Recall of stereotype-inconsistent information suffered from an activated stereotype ($F(1,32) = 8.62, p = .01$), while recall of the stereotype-neutral items did not ($F(1,32) = .60, n.s.$).

These results suggest that behavioral information that is inconsistent with a later activated stereotype is more difficult to retrieve from memory than stereotype-neutral behavioral information in the filler items (the latter having no shared trait implications with the stereotype-inconsistent information as shown in the reported pilot study results). As the present results demonstrate that impaired recall of stereotype-inconsistent information is obtained even in the absence of any stereotype-consistent information, it may be argued that the impeded recall of stereotype-inconsistent information observed in Experiments 2 and 3 may, at least partly, have been due to impaired access to stereotype-inconsistent traits due to stereotype activation rather than (exclusively) to preferential search for stereotype-consistent information. The present results further demonstrate that, as in Experiment 3, stereotype activation by means of a priming task ostensibly unrelated to the behavioral information presented earlier does reduce access to stereotype-inconsis-

tent behaviors, suggesting that the inhibition phenomenon studied is of an involuntary nature.

GENERAL DISCUSSION

The present experiments show that stereotype activation leads to deteriorated recall of stereotype-inconsistent behaviors. Results establishing this phenomenon were obtained across four experiments in which three different target groups (artists, professors, and soccer-hooligans) were studied. In a previous study (Dijksterhuis & van Knippenberg, 1995a) comparable results were obtained for two different target groups (environmental activists and professional soldiers). Moreover, impaired memory for stereotype-inconsistent behaviors due to *a posteriori* stereotype activation was demonstrated in a recognition paradigm (Dijksterhuis & van Knippenberg, 1995a) as well as in a free recall paradigm. Considering these findings the impaired memory phenomenon seems to be robust.

In Experiment 2 a theoretical explanation in terms of trait-behavior clusters was tested. On the basis of person memory research (e.g., Dijksterhuis & van Knippenberg, *in press-a*; Hamilton, Driscoll & Worth, 1989), it was argued that if stereotype-consistent and stereotype-inconsistent behaviors have implications for different trait dimension (e.g., aggressive and intelligent behaviors), these behaviors are stored under different trait-behavior clusters, while stereotype-consistent and stereotype-inconsistent behaviors having implications for the same trait (e.g., aggressive and nonaggressive behaviors) are stored under the same trait-behavior cluster. It was further argued that a later activated stereotype would deteriorate recall of stereotype-inconsistent information only when it was stored in a separate trait-behavior cluster which as such was inconsistent with the activated stereotype.

In agreement with this line of argument, the results of Experiment 2 show that impeded recall of stereotype-inconsistent behaviors only occurred when they had implications for a different trait than the stereotype-consistent behaviors (as suggested by the results of a pilot study), and not when they had implications for the same trait as the stereotype-consistent behaviors. The presumed underlying differential memory organization of stereotype-inconsistent and stereotype-consistent information in terms of separate traits versus the same trait was further corroborated by ARC-data (i.e., stronger clustering of stereotype-inconsistent and stereotype-consistent behavioral information, respectively, in the separate traits conditions). In addition, the obtained negative correlation between the ARC-score for stereotype-inconsistent behaviors and

recall of this information under two-trait stereotype activation conditions provided further support for the idea that separate clustering in a stereotype-inconsistent trait underlies impaired recall of stereotype-inconsistent information.

Our guided search interpretation of the observed decreased recall of separately stored stereotype-inconsistent information is that the *a posteriori* activated stereotype involuntarily directs memory search in the direction of stereotype-consistent information and away from stereotype-inconsistent information, probably without people's awareness of the influence of the stereotype on retrieval. Alternatively, one could ascribe the observed decreased recall to an intentional retrieval or response strategy aimed at recalling and reproducing stereotype-consistent behaviors, possibly even accompanied by a strategic suppression of stereotype-inconsistent responses.

Experiment 3 was designed to investigate the idea that stereotype-biased retrieval results from involuntary and unconscious cognitive processes, rather than from strategic memory search and selective response editing. After the presentation of the stimulus material, subjects were requested to help out another experimenter. They received either a filler task or were asked to think about "professors" (or "soccer-hooligans") and list features of their lifestyle and appearance. This manipulation, ostensibly unrelated to the experiment and, therefore, unlikely to elicit deliberate retrieval or response strategies, yielded the same pattern of results as the no versus afterwards stereotype activation manipulation of Experiment 2. It may therefore be concluded that the obtained impaired recall of separately stored stereotype-inconsistent behavioral information was due to an involuntary process instead of being the result of an intentional search strategy. Again, as in Experiment 2, the ARC-scores indicated separate clustering in the two-traits condition, underscoring our explanation in terms of the underlying trait organization.

The possibility that the mere prevalence of the involuntary search for stereotype-consistent information and subsequent reproduction of such information simply detracts from retrieving stereotype-inconsistent behaviors organized in a separate stereotype-inconsistent trait cluster (rather than the latter being difficult to access) was investigated in Experiment 4. This experiment was identical to Experiment 3, except that all stereotype-consistent behaviors were replaced by additional stereotype-neutral items. It appeared that *a posteriori* stereotype activation resulted in decreased recall of stereotype-inconsistent behaviors (both compared to the no stereotype control condition and compared to the recall of stereotype-neutral behaviors). As there were no stereotype-consistent behaviors to retrieve, it seems unlikely that the decreased recall

of stereotype-inconsistent behaviors may be ascribed to a consistency prevalence in the retrieval of behaviors. It therefore seems plausible that stereotype activation essentially makes it more difficult to access behaviors organized in a stereotype-inconsistent trait (see Dijksterhuis & van Knippenberg, in press-b, for converging evidence).

Our present explanation of deteriorated recall of stereotype-inconsistent information due to a *posteriori* stereotype activation may have some important theoretical implications. Since the investigated phenomenon appears to be robust, models describing memory for social information may need to be extended. The associative network model proposed by Srull and Wyer (1989) explains memory for behavioral information with the help of associations among behaviors, traits and stereotypes (or person concepts). They argue that the activation of a stereotype may strengthen associations between stereotype-consistent trait-behavior clusters and the "central person concept" or the stereotype. The probability of recall of items from memory is explained in terms of the *relative* strength of the associations of these items with other bits of information. Stereotype activation may enhance the strength of associations of stereotype-consistent information with the concept.³ Such a model could account for impaired recall of stereotype-inconsistent information (organized in a stereotype-inconsistent trait) only by predicting a *relative decrease* of the strength of associations of stereotype-inconsistent information as a result of the *relative increase* of the accessibility of stereotype-consistent information, because the latter would lower the probability of retrieving stereotype-inconsistent information. However, considering the results of Experiment 4, this explanation seems somewhat implausible. First, deteriorated recall of stereotype-inconsistent information was also obtained when there was no stereotype-consistent information present in the stimulus information. Second, recall of stereotype-inconsistent information suffered from afterwards stereotype activation, while stereotype-neutral information did not.

The above argument suggests that, in order to account for impaired retrieval of stereotype-inconsistent information, models of social memory should incorporate mechanisms accounting for suppressed (or inhibited) access to stereotype-inconsistent traits. For this purpose, one might think of extending associative network models by introducing *negative* associations (e.g., of the type "hooligans are *not* intelligent") as, for instance, proposed in the spreading activation model (see e.g., Collins & Loftus, 1975; see, for a more extensive discussion of this issue, Blair & Banaji, 1995; Dijksterhuis & van Knippenberg, in press-b). Such extended

3. In this case, concept stands for the group or person with which the behavioral information was originally associated.

or modified models might be capable of describing and predicting impaired access to stereotype-inconsistent information by postulating the active dissociation of trait and concept through a *posteriori* stereotype activation.

Apart from the significance of biased retrieval with respect to associative network models (Hamilton, Driscoll, & Worth, 1989; Hastie, 1980; Srull & Wyer, 1989), our research may have more general implications for research on impression formation and stereotyping. Recently, the emphasis in this line of research shifted towards conditions of stereotype use (e.g. Brewer, 1988; Fiske & Neuberg, 1990) and, although this idea is not new (Allport, 1954; Lippman, 1922), towards the function of stereotypes as simplifying structures (e.g., Bargh, 1989; Devine, 1989; Dijksterhuis & van Knippenberg, 1995b, in press-b; Dovidio, Evans & Tyler, 1986; Fiske & Taylor, 1991; Fox, 1992; Gilbert & Hixon, 1991; Hamilton, Sherman, & Ruvolo, 1990; Macrae, Hewstone, & Griffiths, 1993; Macrae, Milne, & Bodenhausen, 1994; Macrae, Stangor, & Milne, 1994; Medin, 1988; Stangor & Duan, 1991). In most of this research and theorizing, the focus is basically on the influence of stereotypes on the increased accessibility and use of stereotype-consistent information. That is, the core concept in most research is consistency (or congruency, or stereotypicality). Although this may enhance our knowledge of the function of stereotypes and the circumstances under which stereotypes are used, it may be argued that studying the conditions under which stereotypes impede access to counterstereotypic information can add considerably to our understanding of stereotypes as well. Stereotypes may operate as knives that cut both ways, not only facilitating access to information fitting in with a stereotype, but also obstructing access to information that conflicts with it (cf. Dijksterhuis & van Knippenberg, in press-b).

Considering the present theoretical ideas and empirical results, it is tempting to speculate on the significance of facilitatory and inhibitory effects of stereotype activation for memory and, indeed, for social perception. In a sense, our guided search explanation of a *posteriori* stereotype effects can be understood as a more elaborate account of the nature of the memory "reconstruction" process as Snyder called it (cf. Snyder & Uranowitz, 1978; Snyder, 1981). Stereotypes—here conceived of as mental representations of social groups—may serve to understand "social reality" both by providing the perceiver with knowledge of what a group is like, and with knowledge of what a group is not like. Understanding social reality may simultaneously require the activation of appropriate knowledge and the suppression of inappropriate, or competing, knowledge (cf. Gernsbacher & Faust, 1991). Facilitation of access to stereotype-consistent information and inhibition of access to stereo-

type-inconsistent information may, as two sides of coin, complementarily contribute to stereotype stability and persistence.

Since many judgments we make about persons and groups are based on available information in memory (see Hastie & Park, 1986), biased retrieval may explain why memory-based judgments are biased in a stereotypical manner and, as a result, why stereotypes are hard to change (see e.g., Kunda & Oleson, 1995). Suppose we see a woman in a restaurant giving an outrageous tip and we come to the conclusion that she is far from stingy. Then, she says to the waiter that the meal, raw herring in cream, was delicious and her accent betrays that she is Dutch. Theoretically, this would make it difficult to remember her giving the tip, and, as a consequence, the Dutch may still be perceived as a bunch of misers. In sum, a stereotype may protect itself by suppressing the retrieval of counterstereotypic information.

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