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*Published in:*  
Journal of Experimental Social Psychology

*DOI:*  
[10.1006/jesp.1995.1026](https://doi.org/10.1006/jesp.1995.1026)

[Link to publication](#)

*Citation for published version (APA):*

de Dreu, C. K. W., Yzerbyt, V., & Leyens, J. (1995). Dilution of stereotype-based cooperation in mixed-motive interdependence. *Journal of Experimental Social Psychology*, 31(6), 575-593. DOI: 10.1006/jesp.1995.1026

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## Dilution of Stereotype-Based Cooperation in Mixed-Motive Interdependence

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Received: November 28, 1994; revised: May 10, 1995; accepted: May 10, 1995

This research expands the finding that nondiagnostic information about a target reduces the impact of stereotypes on person perception and social judgment. Specifically, we examined this dilution effect in settings of mixed-motive outcome-interdependence and studied stereotype-based cognition as well as cooperative behavior. Three experiments employing Prisoner's and Chicken Dilemma Games revealed that people cooperate less when category information suggests that the other is competitive and immoral rather than cooperative and honest, but not when nondiagnostic attribute information is added. Moreover, Experiment 3 shows that people are motivated to interpret attribute information as consistent with their stereotype-based beliefs; dilution occurs only when it is impossible to construe attribute information as consistent with the stereotype. Implications to both the person perception literature and interdependence and conflict resolution theories are discussed. © 1995 Academic Press, Inc.

In social interaction, people's impressions and behaviors are often influenced by social stereotypes—the belief that certain traits and acts are

This research was supported by a Royal Netherlands Academy of Sciences Fellowship awarded to Carsten de Dreu, and Grant FRFC 8-4510-93 of the Belgian National Science Fund awarded to Vincent Yzerbyt and Jacques-Philippe Leyens. Parts of the data reported here were previously presented at the EAESP Social Cognition Meeting at Vendôme, France, April 10–17, 1994, and at the Annual Meeting for Conflict Management, Eugene, Oregon, June 14–7, 1994. We are much indebted to Jessica Klugkist for her assistance during data collection, and to Mahzarin Banaji and two anonymous reviewers for their helpful comments on a previous draft. Correspondence about this research and reprint requests should be addressed to Carsten de Dreu, Department of Psychology, University of Groningen, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands. Phone/Fax: + 31 50 63-6418/6304; E-mail: c.k.w.de.dreu@ppsw.rug.nl.

characteristic of a particular social group (e.g., Brewer, 1988; Stroebe & Insko, 1989; Fiske & Neuberg, 1990; Leyens, Yzerbyt, & Schadron, 1994; Oakes, Turner, & Haslam, 1994). Suppose, as an example, that students stereotype professors as busy and absent-minded, whereas professors stereotype students as unpredictable and irresponsible. When having an appointment, the student may decide to come in late, because the professor may still be busy, or may have forgotten the meeting. Vice versa, the professor may be tardy in order to avoid waiting for an unpredictable student. When both live up to their stereotypes, both arrive late and both confirm their stereotype-based beliefs. This may cause mutual irritation and negative interpersonal attitudes, and it may reduce cooperative interaction (Rubin, Pruitt, & Kim, 1994). Research corroborates our example. Indeed, people interact with a target individual so that their initial stereotypes are confirmed (Snyder & Swann, 1978; Snyder, Tanke, & Berscheid, 1977; Word, Zanna, & Cooper, 1974).

In light of the above, it is important to note that stereotype-based judgment is readily undercut when additional information about the target's habits, preferences, and recent behaviors is available but irrelevant to the judgment at hand (e.g., Denhaerinck, Leyens, & Yzerbyt, 1989; Hilton & Fein, 1989; Locksley, Hepburn, & Ortiz, 1982; Nisbett, Zukier, & Lemley, 1981; Yzerbyt, Schadron, & Leyens, 1994a). For example, Locksley et al. (1982, Experiment 1) asked their subjects to give their stereotypes about diurnal and nocturnal people. Afterward, the same subjects were randomly assigned to one of six conditions and asked to rate eight targets on a series of traits typically associated with diurnal and nocturnal persons. All eight targets were either diurnal or nocturnal and they were described by their social category alone, or with individuating information either diagnostic or nondiagnostic for the judgment at hand. An instance of nondiagnostic information is: "Gene W. has an IQ of 118 and does fairly well in his college classes. His mother works as a nurse and his father is a lawyer in the town where Gene grew up. Gene has a couple of friends in college, one of whom went to the same high school as he did." Any kind of individuating information, whether diagnostic or nondiagnostic, was capable of alleviating the effect of category information.

A classical explanation of the dilution effect is that nondiagnostic attribute information reduces the perceived representativeness of the target by adding noncommon features (cf. Hilton & Fein, 1989; Kahneman & Tversky, 1973; Locksley et al., 1980, 1982; Zukier, 1982). Other researchers additionally argued that dilution occurs because nondiagnostic attribute information accentuates the fact that relevant personalized information is lacking (e.g., Leyens, Yzerbyt & Schadron, 1992; 1994; Yzerbyt et al., 1994a; Yzerbyt, Schadron, Leyens & Rocher, 1994b).

In the current research, we wished to study dilution of stereotype-based judgments at the behavioral level in settings of social interaction. In general, social interaction induces quite different processing goals than settings in which no interaction is expected (cf. Hilton & Darley, 1990; Leyens et al., 1994;

Snyder, 1992). Thus, the current research may provide information about (1) the generality of the dilution effect, (2) the impact of stereotype-based judgment on social interaction, and (3) the development of constructive interpersonal relations.

#### DILUTION EFFECT IN MIXED-MOTIVE INTERDEPENDENCE

Social interaction implies interdependence—the fact that one's own outcomes are the confluence of one's own behaviors and those of the other person (Kelley & Thibaut, 1978). Since the dilution effect has been demonstrated without an interdependent judge–target relationship, it may be limited to situations in which the judgment has no implications for the judge, or for the target individual. In the current research, we studied the dilution effect in settings of mixed-motive interdependence. Mixed-motive interdependence occurs when (1) each party earns most when it competes while the other cooperates, but (2) both parties earn less when both compete rather than cooperate (Dawes, 1980; Komorita & Parks, 1995). We opted for mixed-motive interdependence because it characterizes economic markets (Messick & Brewer, 1985; Lopes, 1994), interpersonal negotiation (Carnevale & Pruitt, 1992; De Dreu & Van Lange, 1995), and close relationships (Rusbult & Buunk, 1993). Thus, we investigated the dilution effect in a setting representative of many social interactions.

Like many phenomena in person perception, the dilution effect has been demonstrated at the cognitive level (i.e., ratings reflecting perceptions of the target individual). No research dealt with the dilution effect at the behavioral level. Hence, it remains possible that stereotype-based judgments affect behavior and thus the dynamics of social interaction, even when nondiagnostic attribute information is available. In the current research, we considered cooperation as the main dependent variable. Cooperation in mixed-motive interdependence is critical to the development of constructive interpersonal relations (Deutsch, 1973; Pruitt & Kimmel, 1977).

There is a reason to expect cooperation in mixed-motive interdependence to vary as a function of stereotype-based judgment. Mixed-motive interdependence is a complex decision-making task involving risk and uncertainty (Marwell & Schmitt, 1975), which promotes biased information processing (De Dreu, Carnevale, Emans, & Van de Vliert 1994, 1995) and possibly stereotype-based judgment. In addition, people base their cooperation in mixed-motive interdependence on expectancies about other's cooperation (Pruitt & Kimmel, 1977). That is, people cooperate more when their interdependent other cooperated rather than competed on previous occasions, or when they are told that the other has a moral and honest personality rather than an immoral and dishonest personality (McClintock & Liebrand, 1988; Van Lange & Kuhlman, 1994; Van Lange & Liebrand, 1989). In the current experiments, we told subjects that their interdependent other was a religion major, or a business major. According to pilot research, religion majors were

seen as higher in morality and honesty than business majors. We predicted more cooperation when the interdependent other was a religion major, rather than a business major.

In addition, there is reason to expect a dilution effect in mixed-motive interdependence. Fiske and colleagues show that anticipated interaction leads to scrutinization of individuating attribute information (e.g., Erber & Fiske, 1984; Neuberg & Fiske, 1987), and to close attention to inconsistencies between pieces of information provided (e.g., Ruscher & Fiske, 1990). Other research indicates that interpersonal interaction leads people to perceive the other as an individual rather than as a member of a group (e.g., Neuberg, 1989). Thus, in itself, mixed-motive interdependence may motivate close scrutinization of attribute information. As a result, nondiagnostic attribute information may readily dilute stereotype-based judgment and subsequent decision making.

#### *Overview of Experiments 1 and 2*

The first two experiments were directly designed to study dilution of stereotype-based cooperation in mixed-motive interdependence. As noted, these experiments expand the dilution effect to settings in which judge and target are interdependent, in which judgment has implications to both judge and target, and in which behavior can be observed. We used a game-experimental paradigm. For reasons of generality, we employed Prisoner's Dilemma Games (PDG) and Chicken Dilemma Games (CDG) (Kelley & Thibaut, 1978; McClintock & Liebrand, 1988). PDGs are situations in which joint cooperation yields higher outcomes than mutual noncooperation, but highest outcomes are obtained by being noncooperative when the other party cooperates and lowest outcomes by being cooperative when the other is noncooperative. In CDGs, joint cooperation yields higher outcomes than joint noncooperation, but being cooperative when the other is noncooperative still yields more than mutual noncooperation (cf. Table 1).

TABLE 1  
PRISONER'S DILEMMA GAME (PDG) AND CHICKEN DILEMMA GAME (CDG)

Subject:	PDG		CDG	
	Coop	Noncoop	Coop	Noncoop
Other				
Coop	30, 30	0, 40	30, 30	10, 40
Noncoop	40, 0	10, 10	40, 10	0, 0

*Note.* Within each cell, Subject receives the outcomes to the right while Other receives outcomes to the left. Subjects were confronted four times with a PDG and four times with a CDG. In the experiments, Coop was denoted by letter A, and noncoop was denoted by letter B.

## EXPERIMENT 1

### *Method*

*Design.* We employed a  $2 \times 2$  factorial design, involving Category Label (Business vs Religion) and Attribute Information (None vs Nondiagnostic) as between-subjects variables. The dependent variable was the number of cooperative choices in four non-iterated PDGs and in four non-iterated CDGs.

### *Subjects*

Sixty-two undergraduate students at the University of Groningen participated in the experiment, for which they received 10 Dutch guilders (about 5 U.S. dollars). Subjects were recruited from History, Languages, Social Sciences, and Medical Sciences. Hence, for all subjects, the interdependent other came from a department different from their own. Also, care was taken that subjects participating in the same experimental session were not acquainted prior to the experiment. Preplay contact, a variable that substantially affects cooperation (Komorita & Carnevale, 1993) was avoided as much as possible.

### *Procedure*

Subjects came to the laboratory in groups of eight individuals each. Upon arrival, each subject was seated in a separate cubicle in front of an Apple MacIntosh computer connected to a central server. Each subject was randomly assigned to an experimental condition, and the experimenters were blind to this assignment. The computer screen displayed all information, instructions and questionnaires. Responses could be given by means of a keyboard.

After some general instructions, subjects were told that during an upcoming decision-making task they would be paired to one of the other participants. They read that, "in order to get acquainted with each other, we now ask you to answer YES or NO to each of the following questions. Before the decision making starts, the computer will randomly select some of the questions you answered with YES and display them on the other's computer screen. Likewise, you will receive a random sample of the questions the other answered with YES."

After these instructions, subjects responded to 40 questions by typing a 1 (YES) or a 2 (NO). The questions dealt with daily life activities, preferences, ideas, and opinions. Examples are "I often visit my parents," "I sometimes join some friends in a bar," and "Yesterday, I read the newspaper." Among these phrases were the statements used to manipulate attribute information (see below). The questionnaire ended with asking subjects to press the number that corresponded to their major as listed on the computer screen. This question was included to make the manipulation of category label possible.

Subsequently, we repeated that subjects would be engaged in a decision-making task with another participant. A Prisoner's Dilemma was displayed (cf. Table 1) and thoroughly explained. We told subjects that if they both would pick option A (i.e., the cooperative alternative), both would gain more than when both would pick option B (i.e., the noncooperative alternative). However, when one would pick A while the other would pick B, the one picking A would get the lowest gains possible whereas the one picking B would get the highest gains possible. These explanations were neutral as to whether one should adopt a cooperative or noncooperative strategy. That is, we never used terms like "competition," "cooperation," "partner," or "opponent." However, to increase experimental realism, subjects were asked to take the decision making seriously and we told them that their winnings would be converted into lottery tickets giving them a chance at one of three 75 guilder prizes available (in reality, each subject was given an equal chance in this lottery).

Hereafter, subjects learned that the computer had selected some statements the other party answered with YES. One half read that the other party was a business major, whereas the others

read that the other was a religion major. Subjects in the No Attribute Information conditions received no other information than that about other's major. However, subjects in the Nondiagnostic Attribute Information conditions additionally read that the other party "recently got a haircut," "had a White beer some time ago," and "had a second hand bicycle." Pretesting these phrases using 30 psychology sophomores revealed that, on 7-point Likert scales, all three statements received ratings below 2.20 (1 = says nothing at all, to 7 = says a lot about this person). Also, the phrases did not convey anything about other's cooperativeness (all ratings were between 3.89 and 4.07, where 1 = very cooperative, 4 = neither cooperative or competitive, and 7 = very competitive). These ratings did not differ as a function of Category Label (i.e., religion, business, or no label). Hence, the Attribute Information was truly nondiagnostic for either category.

Subjects had 30 s to read the information and then learned that the decision making with the other party began. They were presented with four PDGs and with four CDGs (in randomized order). Each time, subjects were asked to indicate whether they picked option A (cooperation) or option B (noncooperation). It was made clear to the subjects that they nor their other party would know other's choices before the completion of the experiment. This was done because other's behavior may be highly consistent or highly inconsistent with initial beliefs based on category or attribute information. Thus, to avoid potential confounding, we employed a non iterated method—we had subjects play the series of PDGs and CDGs without providing them with feedback about other's choices.

After the decision-making task, subjects were shown a large list of possible majors at the University of Groningen and then were asked to check their other party's major. Hereafter, subjects were fully debriefed and thanked for participation. No subject voiced any suspicion about the experimental manipulations.

### Results

*Manipulation check.* At the end of the experiment, all subjects correctly recalled their other party's major (i.e. either Business or Religion).

*Cooperation.* The number of cooperative choices in the PDG and the number of cooperative choices in the CDG was submitted to a  $2 \times 2 \times 2$  (Category Label  $\times$  Attribute Information  $\times$  Game-structure) ANOVA with the latter variable within-subject. No main or interaction effects involving Game-structure were found ( $F_s < 1$ ). Also, there was no main effect for Attribute Information ( $F < 1$ ).

As predicted, the main effect for Category Label showed that subjects confronted with a business major cooperated less than those confronted with religion major,  $M = 3.48$  vs  $M = 5.52$ ;  $F(1, 58) = 10.58$ ,  $p < .002$ . In addition, there was a two-way interaction between Category Label and Attribute Information,  $F(1, 58) = 4.51$ ,  $p < .038$ . Cell means and standard deviations are presented in Table 2. Planned comparisons revealed that, as predicted, Category Label influenced cooperation in the absence of nondiagnostic attribute information ( $p < .05$ ), but not in its presence. This pattern is consistent with the classical dilution effect and shows dilution occurs at the behavioral level as well.

## EXPERIMENT 2

### Method

Experiment 2 was designed to replicate and extend the findings of Experiment 1. It used the same design and the same procedures. To supplement the data for cooperation, we administered

TABLE 2  
COOPERATION AS A FUNCTION OF CATEGORY AND ATTRIBUTE INFORMATION, EXPERIMENT 1

		Attribute information			
		None		Nondiagnostic	
		Business	Religion	Business	Religion
1.	<i>N</i>	16	15	15	16
2.	<i>M</i>	2.64 <sup>a</sup>	6.13 <sup>b</sup>	4.27 <sup>ab</sup>	5.00 <sup>ab</sup>
3.	<i>SD</i>	2.41	1.64	2.91	2.92

*Note.* Unequal superscripts per row are significantly different ( $p < .05$ ) according to Duncan's multiple range test.

a questionnaire after the decision-making task, which assessed (1) perceptions of other's morality, (2) expectations about other's cooperativeness, and (3) subjects' motivation to cooperate. The specific questions are fully described in the Results section.

Subjects were 128 undergraduates at the University of Groningen, who participated for 10 Dutch guilders (approx. 5. U.S. dollars). Again, for all subjects, the interdependent other came from a department different from their own, and care was taken that subjects participating in the same experimental session were not acquainted prior to the experiment.<sup>1</sup>

### Results

*Manipulation check.* All subjects correctly recalled their other party's major.

*Cooperation.* The number of cooperative choices in the PDG and the number of cooperative choices in the CDG was submitted to a  $2 \times 2 \times 2$  (Category Label  $\times$  Attribute Information  $\times$  Game Structure) ANOVA with the latter variable within-subject.

<sup>1</sup> Prior to the experiment, subjects' social value orientation was assessed using a method developed by Kuhlman and Marshello (1975; see also, De Dreu & Van Lange, 1995). Based on this measurement, subjects could be classified as having a predisposition toward being cooperative (i.e., focusing on maximizing joint outcomes,  $N = 75$ ), toward being individualistic (i.e., focusing on own outcomes only,  $N = 82$ ), or toward being competitive (focusing on the relative advantage over the other,  $N = 37$ ). Entering social value orientation into the overall design revealed no interactions between social value orientation and any of the experimental variables. Only an additional main effect for value orientation,  $F(1, 116) = 79.13$ ,  $p < .001$ , revealed that pro-socials cooperated more ( $M = 3.69$ ) than competitors ( $M = 1.62$ ), with individualists taking an intermediate position which did not differ significantly from the other two ( $M = 2.23$ ). The lack of interactions with Category Label and Attribute Information is consistent with other findings (Van Lange & Liebrand, 1989; Van Lange & Kuhlman, 1994) and is not discussed any further here.



The main effect for Attribute Information was not significant,  $F < 1$ .<sup>2</sup> The main effect for Category Label was significant and showed that subjects confronted with a business major cooperated less than subjects confronted with a religion major,  $M = 4.68$  versus  $M = 5.72$ ;  $F(1, 124) = 5.10$ ,  $p < .026$ . In addition, the two-way interaction between Category Label and Attribute Information reached significance,  $F(1, 124) = 5.13$ ,  $p < .018$ . Cell means and standard deviations are given in rows 2 and 3 of Table 3. Planned comparisons showed that Category Label influenced cooperation as predicted in the absence of attribute information ( $p < .05$ ), but not in its presence. Thus, as in Experiment 1, there is evidence for a dilution of stereotype-based cooperation.

*Motivation to cooperate.* This variable was assessed through four different questions, namely (1) did you attempt to maximize your own outcomes (reverse scored), (2) did you consider other's interests, (3) did you attempt to maximize your relative advantage (reverse scored), and (4) did you attempt to maximize joint outcomes (all 1 = not at all, to 6 = definitely). Ratings were averaged into one index (Cronbach's  $\alpha = .87$ ). A  $2 \times 2$  ANOVA revealed a significant two-way interaction between Category Label and Attribute Information,  $F(1, 124) = 5.88$ ,  $p < .017$ . Rows 4 and 5 of Table 3 show that

TABLE 3  
COOPERATION, MOTIVATION TO COOPERATE, EXPECTED COOPERATION AND PERCEPTION OF OTHER'S MORALITY AS A FUNCTION OF CATEGORY AND ATTRIBUTE INFORMATION, EXPERIMENT 2

		Attribute information			
		None		Nondiagnostic	
		Business	Religion	Business	Religion
1.	<i>N</i>	32	31	32	33
2. Own Coop.	<i>M</i>	4.08 <sup>a</sup>	6.08 <sup>b</sup>	5.36 <sup>ab</sup>	5.35 <sup>ab</sup>
3.	<i>SD</i>	2.96	1.98	2.22	2.66
4. Coop. Motive	<i>M</i>	3.45 <sup>a</sup>	4.15 <sup>b</sup>	4.11 <sup>ab</sup>	3.77 <sup>ab</sup>
5.	<i>SD</i>	1.31	0.86	1.20	1.35
6. Exp. Coop.	<i>M</i>	3.29 <sup>a</sup>	4.71 <sup>b</sup>	4.07 <sup>ab</sup>	4.13 <sup>ab</sup>
7.	<i>SD</i>	1.14	1.07	1.14	1.34
8. Perc. Morality	<i>M</i>	4.24 <sup>a</sup>	4.81 <sup>b</sup>	4.49 <sup>ab</sup>	4.66 <sup>ab</sup>
9.	<i>SD</i>	0.56	0.54	0.44	0.59

Note. Unequal superscripts per row are significantly different ( $p < .05$ ) according to Duncan's multiple range test.

<sup>2</sup> There was, however, a significant interaction between Presence of Information and Game Structure,  $F(1, 124) = 5.78$ ,  $p < .018$ , showing that absence vs presence of information affected cooperation differently in the PDG ( $M = 2.37$  vs  $M = 2.76$ ) than in the CDG ( $M = 2.71$  vs.  $M = 2.59$ ). Since this effect was not predicted, nor replicated in the other experiments, we are reluctant to interpret it.

subjects had stronger motivation to cooperate when confronted with a religion major rather than with a business major. Once again, however, this effect was significant only in the absence of attribute information.

*Expected cooperation.* Other's expected cooperation was assessed by asking subjects whether they believed the other would behave in their interest (1 = not at all, to 6 = definitely). A  $2 \times 2$  ANOVA revealed a main effect for Category Label,  $F(1, 124) = 12.37$ ,  $p < .001$  as well as a two-way interaction between Category Label and Attribute Information,  $F(1, 124) = 10.61$ ,  $p < .001$ . Cell means and standard deviations in rows 6 and 7 of Table 3 indicate that subjects expected more cooperation from a religion major than from a business major, but only in the absence of nondiagnostic attribute information ( $p < .05$ ). In its presence, effects of Category Label were not significant.

*Perception of other's morality.* To validate our pilot research, we asked subjects how honest, moral, and opportunistic (reverse scored) they thought the other person was (1 = not at all, to 6 = very much). Ratings were reduced into one index through scale summation (Cronbach's  $\alpha = .63$ ). A  $2 \times 2$  ANOVA revealed no main effect for Attribute Information,  $F < 1$ , but the main effect for Category Label was significant,  $F(1, 124) = 14.01$ ,  $p < .001$ . This effect was qualified by a two-way interaction between Category Label and Attribute Information,  $F(1, 124) = 4.18$ ,  $p < .043$ . As can be seen in row 8 of Table 3, a religion major was seen as more moral and honest than a business major, but only in the absence of nondiagnostic attribute information ( $p < .05$ ). In its presence, Category Label had no effect. Thus, in addition to the above evidence for a dilution of stereotype-based cooperation, there is evidence as well for a dilution effect on perception.

*Intercorrelations.* Pearson correlations between the dependent variables are presented in Table 4. Perception of other's morality only correlated with expected other's cooperation. All other variables were significantly interrelated.

### DISCUSSION AND INTRODUCTION TO EXPERIMENT 3

The first two experiments show that in mixed-motive interdependence, nondiagnostic attribute information dilutes the impact of stereotype-based

TABLE 4  
CORRELATIONS BETWEEN THE DEPENDENT VARIABLES, EXPERIMENT 2

	2	3	4
1. Own Coop.	.72**	.58**	.07
2. Coop. Motive	—	.69**	.01
3. Exp. Coop.		—	.23*
4. Perc. Morality			—

\*\*  $p < .001$

\*  $p < .01$  ( $N = 128$ ).

person perception, expected cooperation, and own cooperative behavior. And since in most social interactions nondiagnostic attribute information is readily available, the provocative implication of these experiments might be that in social interaction, stereotypes exert little influence on perception and behavior. However, this implication may seem at odds with both introspection and research showing that people generally confirm their stereotype-based beliefs (e.g., Snyder & Swann, 1978; Sagar & Schofield, 1980). As a case in point, Kunda and Sherman-Williams (1993), for example, show that a construction worker "hitting someone" is believed to have committed a more violent act than a housewife "hitting someone." Whereas the construction worker is generally seen as more violent than a housewife, this appears especially the case when both construction worker and housewife "hit someone." Kunda and Sherman-Williams conclude that people are motivated to seek confirmation of their initial beliefs and thus interpret attribute information in a way that is consistent with stereotype-based judgments (cf. Kunda, 1990; Klein & Kunda, 1992).

Such tendency to confirm initial beliefs and to find a match between pieces of information may be especially strong in settings of mixed-motive interdependence. That is, mixed-motive interdependence is a setting involving uncertainty, a certain pressure to come to a decision, and a high implication of the self in the decision-making process. All these variables have been shown to increase need for closure (Kruglanski & Webster, 1991), to enhance pragmatic judgment (Fiske, 1992, 1993), and to stimulate a search for hypothesis confirmation rather than disconfirmation (Gollwitzer, Heckhausen, & Steller, 1990). As an example, suppose that knowing that the interdependent other is a member of a fraternity does not tell anything about the other's moral standards. Knowing also that the interdependent other is a religion major may lead one to assume that the fraternity must be a charity-minded and people-oriented one, confirming the stereotype-based judgment that religion majors have high moral standards and are basically cooperative people. Knowing that the other is a business major may, in contrast, lead to the assumption that the fraternity must be money-minded and career-oriented, which matches the stereotype-based judgment that the other must be opportunistic and competitive. Stated otherwise, one single piece of attribute information may receive an entirely different meaning depending upon the category information provided.

Together, the above suggests that in mixed-motive interdependence people attend to attribute information and seek to match this individuating information with their stereotype-based judgments. In case of nondiagnostic information, it is impossible to construe anything, and hence the stereotype-based judgment dilutes. In case of ambiguous attribute information—which in itself is informative about the target individual—it is possible to construe a match and hence stereotype-based judgment will be observed. Thus, contrary to purely nondiagnostic attribute information, ambiguous attribute information may be construed as consistent with the stereotype and therefore categorical

information will continue to influence judgment and cooperation. In Experiment 3 we tested this prediction that stereotype-based cooperation dilutes to a greater degree when nondiagnostic rather than ambiguous attribute information is presented.

### EXPERIMENT 3

#### *Method*

*Subjects and design.* Sixty psychology undergraduates at the University of Groningen participated, for which they received 10 Dutch guilders. Preplay contact was restricted to a minimum.

The design was a  $2 \times 2$  factorial, involving Category Label (Religion vs Business) and Attribute Information (Ambiguous vs Nondiagnostic) as between-subjects variables. Dependent variables were the number of cooperative choices in four PDGs and in four CDGs. For exploratory reasons, we additionally assessed the time subjects took to read the information about the other person.

*Procedure.* The procedures were identical to those of the first experiment, except for the Ambiguous Attribute Information condition. In this condition, subjects were provided with the Category Label as well as with three attribute statements, namely (1) "I am a member of a fraternity," (2) "I regularly attend to meetings," and (3) "I am not easily persuaded." Pretests showed that each piece of information was seen as saying a lot about a person (mean ratings  $> 5.12$ , with 1 = says nothing at all, to 7 = says a lot about this person), but not more about his or her cooperativeness than the nondiagnostic attribute information provided in the other conditions (i.e.,  $3.89 < \text{mean ratings} < 4.13$ , with 1 = very cooperative, to 7 = very competitive). Inspection of associations pretest subjects generated with Category Label (i.e., religion, business, or no label) showed that subjects interpreted the ambiguous attribute information in terms of the category label (readers wishing more information about the rationale behind these procedures are referred to Kunda and Sherman-Williams, 1993). In all, this pilot testing showed that the ambiguous information allowed for confirmatory interpretation.

#### *Results*

*Manipulation checks.* As in the previous experiments, all subjects correctly recalled their interdependent other's major. To check the manipulation of Attribute Information, we asked subjects how useful the information provided was in forming a good impression (1 = very worthless, to 6 = very useful). Consistent with our pretests, ambiguous information was seen as somewhat more useful than nondiagnostic information,  $M = 2.34$  vs  $M = 1.84$ ;  $F(1, 56) = 3.04$ ,  $p < .078$ .

*Cooperation.* We submitted the number of cooperative choices in the PDG and the number of cooperative choices in the CDG to a  $2 \times 2 \times 2$  (Category Label  $\times$  Attribute Information  $\times$  Game Structure) ANOVA with the latter variable within-subject. The predicted Category Label  $\times$  Attribute Information interaction was significant,  $F(1, 56) = 4.61$ ,  $p < .036$ . Cell means and standard deviations are given in rows 2 and 3 of Table 5. As can be seen, category information affected cooperation when ambiguous attribute information was presented, but not when nondiagnostic attribute information was presented. No other effects were significant.

*Attention.* To assess the attention to information about the interdependent other, the time subjects spent reading the information was registered. Cell

TABLE 5  
COOPERATION AND ATTENTION AS A FUNCTION OF CATEGORY AND ATTRIBUTE INFORMATION,  
EXPERIMENT 3

		Attribute information			
		Ambiguous		Nondiagnostic	
		Business	Religion	Business	Religion
1. Own Coop.	<i>N</i>	14	15	15	16
	<i>M</i>	3.14 <sup>a</sup>	5.24 <sup>b</sup>	5.73 <sup>b</sup>	5.06 <sup>b</sup>
	<i>SD</i>	1.52	2.04	2.70	2.08
2. Attention	<i>M</i>	20.49 <sup>a</sup>	15.38 <sup>b</sup>	15.92 <sup>ab</sup>	13.53 <sup>b</sup>
	<i>SD</i>	11.18	6.57	6.16	4.64

*Note.* Attention is measured in seconds. Unequal superscripts per row are significantly different ( $p < .05$ ) according to Duncan's multiple range test.

means and standard deviations appear in rows 4 and 5 of Table 5. A  $2 \times 2$  ANOVA on reading time revealed a main effect for Category Label, indicating that subjects looked longer at the information when they were confronted with a business rather than a religion major,  $F(1, 56) = 3.86$ ,  $p < .05$ . Also, ambiguous information attracted somewhat more attention than nondiagnostic attribute information,  $F(1, 56) = 2.85$ ,  $p < .087$ .

#### Discussion

Experiment 3 supports the conclusion that people in mixed-motive interdependence behave according to their social stereotypes when they can interpret attribute information as consistent with their stereotype-based beliefs. When this confirmatory interpretation is not possible, we observe the dilution effect found in the first two experiments. Thus, Experiment 3 bridges research on the dilution effect with research revealing that people seek confirmation of their social stereotypes.

It should be noted that effects of ambiguous information were more pronounced when the target individual was a business rather than religion major. Subjects cooperated significantly less compared to the nondiagnostic information conditions when the interdependent other was a business major. No such differences were present when the interdependent other was a religion major. One possible explanation for this interesting finding is that business majors contain more negatively connotated attribute information (i.e., opportunistic, competitive) than religion majors and therefore attract more attention and more extreme reactions (Fiske, 1980). This is consistent with research showing that people attend more closely to negative rather than positive stimuli about other people (Pratto & John, 1991), and that people behave in a more competitive manner following a hostile rather than nonhostile prime

(Herr, 1986). Thus, we may have evidence for a *negativity effect* in the stereotype-consistent interpretation of ambiguous attribute information. Of course, we cannot yet exclude alternative explanations having to do with the relative strength of the one stereotype over the other, or with the specific setting investigated. But future research may be undertaken to examine whether people are indeed more likely to construe information as stereotype-consistent when the stereotype implies potential threat of loss, rather than promise of reward.

An interesting question is whether ambiguous information fails to dilute stereotype-based cooperation, or whether it actually helps people gain confidence in their stereotype-based judgments. In the latter case, one might expect even stronger stereotype-based cooperation than in case of categorical information only (cf., Darley & Gross, 1983). Experiment 3 did not include a condition in which only categorical information was provided, so a definite answer awaits further research. However, comparisons with the category information-only conditions of our first two experiments shows that ambiguous information leads to approximately equal extreme judgments compared to Experiment 1, and less extreme judgments compared to Experiment 2. This may suggest that ambiguous information in the third experiment failed to dilute rather than increased confidence in stereotype-based judgment and cooperation.<sup>3</sup>

### CONCLUSIONS AND GENERAL DISCUSSION

The present research dealt with stereotype-based cooperation in mixed-motive interdependence. All three experiments provided evidence for a dilution effect, i.e., the fact that stereotype-based judgments exert little influence on perception and behavior when nondiagnostic attribute information is presented. In addition, the current study showed that people are ready to interpret ambiguous attribute information in terms of their stereotype-based beliefs. Hence, the present series of experiments indicate that the dilution effect generalizes to settings of social interaction, that it influences cognition as well as social behavior, and that it occurs when attribute information cannot be interpreted in terms of initial stereotype-based beliefs. These conclusions have important implications to the field of person perception research, as well as to interdependence theory and research concerned with mixed-motive decision making. We will consider each in turn.

#### *Implications for Person Perception*

In social interaction settings, people may have quite different goals than in settings characterized by nondependency between judge and target (Hilton & Darley, 1990; Leyens et al., 1994; Snyder, 1992). Wright and Dawson (1988),

<sup>3</sup> We are grateful to an anonymous reviewer for pointing out this issue.

for example, argued for a "satisficing" principle suggesting that observers strive for their behavioral predictions to have adequate rather than optimal accuracy. This "bounded rationality" view of person perception is closely related to pragmatic views of social judgment. People are motivated to judge on a "need-to-know" basis, and in that respect may rely on stereotype-based judgments to decide whether or not to cooperate. Assuming that stereotypes are in part pragmatic judgments (Leyens et al., 1994), the current series of experiments provided results consistent with this position. Social stereotypes not only influence person perception and the interpretation of ambiguous attribute information, they also influence cooperation in mixed-motive interdependence.

Another implication for person perception research relates to the fact that the current experiments revealed evidence for the dilution effect. Consistent with many studies (e.g., Leyens et al., 1994), the current research showed that nondiagnostic attribute information dilutes the impact of stereotype-based judgment and additionally demonstrated the dilution effect at the behavioral level in settings of mixed-motive interdependence, thus adding to the effect's generality. More importantly, however, the current research may provide some clues about the reasons for the effect. As noted in the introduction, the dilution effect is generally explained by arguing (1) that nondiagnostic attribute information adds noncommon features to the target individual, reducing its representativeness, and (2) that nondiagnostic attribute information emphasizes the feeling that relevant personalized information is lacking, making a judgment "not done."

Especially in light of our third experiment, one may argue that nondiagnostic attribute information adds more noncommon features to the target individual than ambiguous information. In addition, nondiagnostic attribute information emphasizes the lack of relevant personalized information to a greater extent than does ambiguous attribute information. Hence, the dilution effect observed here may be due to the fact that people cannot find a match between their social stereotypes and the (nondiagnostic) attribute information provided. Even in mixed-motive interdependence with its concomitant need for closure and high implication of the self, people refuse to make stereotype-based judgments.

A final implication for person perception is the previously discussed negativity effect observed in Experiment 3. This negativity effect suggests that in settings of social interaction, people more readily act on the basis of negative, self-threatening stereotypes, than on the basis of positive, self-beneficial stereotypes. This suggestion is consistent with the robust observation that people are motivated to a greater extent to avoid losses than to attain gains (Taylor, 1991; Tversky & Kahneman, 1991). More importantly, it suggests that more information is needed to disconfirm negative, self-threatening stereotypes, than to disconfirm positive, self-beneficial ones. This effect adds to the idea that although stereotype-based judgment may contribute to

collective well-being, its detrimental effects should by no means be underestimated.

#### *Implications for Mixed-Motive Decision Making*

As mentioned at the outset, mixed-motive interdependence characterizes many forms of social interaction including interpersonal negotiation (Carnevale & Pruitt, 1992; De Dreu & Van Lange, 1995). There is abundant evidence that exaggerated assessments of the opposing disputant's competitiveness correlates with conflict escalation, i.e., increased mutual irritation, and shifts from few to many conflict issues (Deutsch, 1973; Rubin et al., 1994). The present findings add to this stream of research by showing that stereotype-based beliefs may already affect expected cooperation thus pointing to the very fundamental role of person perception in conflict escalation. Future research might continue this by considering the effects of stereotypes on the interpretation of other's cooperative behavior. That is, would cooperation by a business major be interpreted as pro-social behavior as readily as cooperation by a religion major, or would people suspect some kind of trick?

Another implication of the current findings is that in social conflict and negotiation people readily confirm their initial stereotype-based beliefs, especially when it concerns negative stereotypes. Thus, people rather automatically confirm their initially negative stereotypes, making escalation of the social conflict more likely than de-escalation. The present experiments increase our understanding of why social conflict more readily escalates than de-escalates.

Finally, our experiments did not reveal strong effects of Game-structure. It is very well possible, however, that our subjects failed to notice the small but important differences between the games employed (i.e., PDGs and CDGs). We explained the game-structure only by means of an example of the PDG, and subsequently provided subjects with PDGs and CDGs in random order. For the moment, we cannot exclude that our data are particularly applicable to prisoner's dilemmas, and less to chicken dilemmas or related kinds of mixed-motive games. Future research might address these questions by using more carefully designed instructions increasing subject's awareness of the differences between games.

#### *Some Strength and Weaknesses*

Two limitations to the current research need to be discussed. The first limitation has to do with the fact that the game-experimental paradigm employed in the present experiments study has little "mundane realism" (Nemeth, 1972). That is, it involves an abstract situation with the absence of many features of daily life interactions such as free communication between participants. We should thus be very careful when generalizing findings to social interaction settings in which participants can see each other and can communicate freely. A related limitation is that we employed a noniterated



method (i.e., no feedback about other's decisions was given during the games). This was done to secure a pure and unconfounded test of our hypotheses. However, it means that we have little information from these experiments about the pervasiveness of social stereotypes in ongoing social interaction. As noted in previous sections, future research should examine the interactive effects of social stereotypes and other's behaviors.

Although limitations are readily acknowledged, we also believe the currently employed game-experimental setting counters many of the drawbacks today's person perception research suffers from. That is, experimental games provide a nice conceptual and methodological tool for studying cognition, motivation and behavior in a coherent manner. Thus, they allow us to bridge various areas of social psychological research that are currently conducted in isolation.

### Conclusion

Complementing interdependence theory (Kelley & Thibaut, 1978; McClintock & Liebrand, 1988; Pruitt & Kimmel, 1977), our research indicates that people cooperate more when their stereotype-based beliefs suggest that their interdependent other will cooperate rather than compete. Complementing person perception studies revealing that social interaction draws attention to attribute information and enhances the tendency to individuate rather than categorize others (e.g., Fiske & Neuberg, 1990), we show that stereotype-based cooperation dilutes when nondiagnostic attribute information is presented. Finally, and consistent with the idea that people are motivated to interpret information as consistent with their initial beliefs (Kunda, 1990; Kunda & Sherman-Williams, 1993), the present series of experiments showed that people interpret ambiguous attribute information as consistent with their stereotype-based judgment and that they cooperate accordingly.

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Statement of ownership, management, and circulation required by the Act of October 23, 1962, Section 4369, Title 39, United States Code. of

JOURNAL OF EXPERIMENTAL SOCIAL PSYCHOLOGY

Published bimonthly by Academic Press, Inc., 6277 Sea Harbor Drive, Orlando, FL 32887-4900. Number of issues published annually: 6. Editor: Dr. John M. Levine, 822 LRDC Building, University of Pittsburgh, Pittsburgh, PA 15260.

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