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INTERPRETATIVE THINKING AND IMPRESSION
FORMATION IN A PRISONER'S DILEMMA GAME

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Abstract

In three experiments we examined the notion that interpretative thinking guides impression formation when playing a prisoner's dilemma game. In a first experiment, we demonstrated that an interpretation goal is spontaneously triggered upon receiving ambiguous information about an interaction partner in the context of a prisoner's dilemma game. In Experiment 2, we examined whether accessible knowledge in this context is used as an interpretation frame for judging the interaction partner. We observed that subliminally primed extreme person exemplars led to an assimilation effect in person judgment in a prisoner's dilemma game, whereas they led to a contrast effect when person judgments were made in a control condition. In experiment 3, priming a comparison goal before entering a prisoner's dilemma game led participants to use subliminally presented extreme exemplars again as a standard of comparison in the judgment of an interaction partner.

Key words: Interpretation goal, prisoner's dilemma game, assimilation, contrast, extreme person exemplars

Interpretative Thinking and Impression Formation in a Prisoner's Dilemma Game

In mutual dependence situations, in which partners make decisions that affect each other's outcomes, forming an adequate impression of one's interaction partner constitutes a very valuable step in the decision process. People will value information regarding the other person's personality characteristics or intentions, because such information may help them to predict the partner's behavior and to respond effectively. For example, participants who believed that they would interact with a hostile person behaved less cooperatively toward that person than when they believed that this other person was non-hostile (Herr, 1986; Snyder & Swann, 1978). Participants who expected their partner to be non-cooperative behaved less cooperatively than when they expected their partner to be cooperative (Kelley & Stahelski, 1970; Smeesters, Warlop, Van Avermaet, Corneille, & Yzerbyt, in press). Other research and theoretical perspectives such as interdependence theory and equity theory (e.g., De Bruin & Van Lange, 1999a, 1999b; Kelley & Stahelski, 1970; Kelley & Thibaut, 1978; McClintock, Kramer, & Keil, 1984; Messick & Cook, 1983; Van Lange & Kuhlman, 1994) also imply that cooperative behavior in prisoner's dilemma games and social dilemmas may be shaped by expectations or beliefs regarding the intentions and the behavior of the partner.

Clearly then, in mutual dependence (i.e., interdependence) situations, forming an impression of the interaction partner is an important component of the cooperative decision-making process. Therefore, individuals participating in such a situation (often captured in the lab via a prisoner's dilemma game) may be extra-motivated to make sense of the (often ambiguous) information received about the interaction partner and to figure

out who the opponent is. Consequently, a mutual dependence relationship may automatically activate an interpretation goal.

According to Stapel & Koomen (2001a), individuals with an activated interpretation goal are extra-motivated to understand and make sense of the world. Interpretation motivated individuals do not think exclusively in terms of the goal of reaching a specific outcome: resolving ambiguities with an open mind is their primary concern. Interpretation goals function as operative processing goals and they have a strong impact on the way accessible knowledge is used in the disambiguation of a target person (Stapel & Kooman, 2001a, 2001b). Thus, informing people that they will participate in a mutual dependence situation (such as a prisoner's dilemma game) may trigger an interpretation goal, especially when the information about the interaction partner is ambiguous. Consequently, this activated goal may affect the way accessible knowledge is used for judging an interaction partner.

In the past, the cognitive processes that underlie impression formation in interdependence situations such as prisoner's dilemma games or social dilemmas have hardly been investigated (but see De Bruin & Van Lange, 2000). Most research has focused on differences in impressions as a function of the social value orientation of decision makers, but this research failed to address the cognitive processes underlying impression formation (e.g., De Bruin & Van Lange, 1999a, 1999b; Liebrand, Jansen, Rijken, & Suhre, 1986; Sattler & Kerr, 1991; Van Lange & Kuhlman, 1994; Van Lange & Liebrand, 1989, 1991a, 1991b; Van Lange & Semin-Goossens, 1998). Therefore, in the present research we will examine the role of one particular type of cognitive process,

namely interpretative thinking, and its association with impression formation in a prisoner's dilemma game.

Accessible Knowledge in Person Judgment

How one judges (often ambiguous) information about an interaction partner is often a function of the kind of knowledge that is most accessible during the impression formation process. During judgment accessible information can serve either as an interpretation frame or as a comparison standard (Higgins, 1989, 1996; Schwarz & Bless, 1992; Sherif & Hovland, 1961; Wyer & Srull, 1989). When encoding ambiguous stimuli, trait concepts or stereotypes that become activated, will be used primarily as an interpretation frame. As a consequence, judgments of a target person will shift toward the activated information (i.e., an assimilation effect). Srull and Wyer (1979) used a Scrambled Sentence Test to unobtrusively prime the concepts "hostility" versus "kindness". After this task, participants judged a description of a target person (Donald) whose actions were ambiguous with respect to hostility. Results showed assimilation to the primed concepts: Donald was rated as more hostile following the priming of the hostility trait and more kind following the priming of the kindness trait (for similar results see also Bargh & Pietromonaco, 1982; Devine, 1989; Erdley & D'Agostino, 1988; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1980; Stapel & Koomen, 1998).

Accessible knowledge does not always serve as an interpretation frame in person judgments. If it is sufficiently extreme, it tends to be used as a relevant comparison standard (e.g., in case of extreme person exemplars). When a particular extreme person exemplar is activated, therefore, person judgments will shift away from the activated

information (i.e., a contrast effect). Herr (1986) primed his participants with names of famous people. He found that participants primed with person exemplars of extreme hostility (e.g., Hitler) judged Donald as being less hostile than participants primed with person exemplars of extreme non-hostility (e.g., Santa Claus), which is a contrast effect. However, when the primed person names were moderately hostile (e.g., Alice Cooper) or moderately non-hostile (e.g., Henry Kissinger) an assimilation effect occurred. This study together with others (e.g., Biernat, Manis, & Nelson, 1991; Herr, Sherman, & Fazio, 1983; Manis, Nelson, & Shedler, 1988; Stapel, Koomen, & Van der Pligt, 1996, 1997) demonstrates that the perceived extremity of the accessible knowledge acts as an essential moderator of the occurrence of assimilation versus contrast. Extreme information is more likely to be used as a standard of comparison than moderate information or more abstract concepts such as traits and stereotypes, which in turn are more likely to be used as an interpretation frame.

Interpretation Goal and Accessible Knowledge

Stapel & Koomen (2001a) have claimed that when people are extra-motivated to understand and make sense of a stimulus, accessibility-driven encoding effects are more likely to occur than when such a goal is not active. Someone who is motivated to make sense of a stimulus will find it difficult to accept that a stimulus is ambiguous. Therefore, accessible information will be used more readily and extensively in the encoding or disambiguation of a target stimulus, when an interpretation goal is active. For example, Stapel & Koomen (2001a) demonstrated that priming narrow and moderate trait concepts that were descriptively inapplicable to the interpretation of a target stimulus resulted in

assimilation when an interpretation goal was primed, but not when this goal was not activated. They also showed that priming descriptively applicable traits affected a larger range of target judgments under interpretation conditions. Stapel & Koomen (2001b) showed that a primed interpretation goal also determines the direction of knowledge accessibility effects. In several experiments, they showed that even priming of extreme person exemplars led to assimilation effects on impression formation under interpretation conditions.

Thus, an important determinant of the direction of knowledge accessibility effects is the type of processing set that is relatively active in a particular situation. Not only an interpretation goal may determine the direction of knowledge accessibility effects. Stapel & Koomen (2001b), for instance, demonstrated that when a comparison goal is activated, accessible knowledge is more likely to be used in the formation of a standard and that contrast is then more likely to occur. They showed that priming abstract traits, which normally lead to assimilation effects in impression formation, resulted in contrast effects when a comparison goal was activated.

The Present Research

We will examine whether and how interpretative thinking is active during impression formation in a mutual dependence relationship. Individuals in such a relationship should be extra-motivated to disambiguate information received about an interaction partner. Three studies were designed to explore this issue. In Experiment 1, we examined whether an interpretation goal gets triggered automatically when ambiguous information about an interaction partner is received in the context of a prisoner's dilemma

game. If we can observe this, it then follows that all accessible knowledge should be used as an interpretation frame, resulting in an assimilation effect (Stapel & Koomen, 2001a, 2001b). To demonstrate this, we designed Experiment 2 in which we introduced extreme person exemplars (e.g., Hitler, Mandela), which normally serve as a standard of comparison in person judgment, and which normally result in a contrast effect. Experiment 2 was designed to reveal whether subliminally primed extreme person exemplars would result in an assimilation effect rather than the standard contrast effect when judging an interaction partner in the specific context of a prisoner's dilemma game. Finally, we investigated whether the use of an interpretation frame during impression formation in a prisoner's dilemma game situation could be overridden by activating a comparison goal before individuals enter that situation (Experiment 3).

Experiment 1

In this first experiment, we tried to demonstrate that an interpretation goal is triggered when people are invited to play a prisoner's dilemma game. To that end we compared the presence of an interpretation goal in people who were about to play a prisoner's dilemma game to people who merely expected to play an otherwise undefined game against another person. To demonstrate that the mutual dependence present in a prisoner's dilemma game is the key factor that triggers an interpretation goal (who is my opponent?) and not just the fact that people are playing a game with another person, we added a condition in which participants expected to play a dictator game. A dictator game is characterized by unilateral dependence: an individual (the dictator) gets to allocate money to himself and another person who has no decision power. We did not expect the

presence of an interpretational goal in this condition, because it has been shown that in this game impressions about the other person do not play a strong role (Eckel & Grossman, 1996, 1998; Hoffman, McCabe, & Smith, 1996; Johannesson & Person, 2000). People in a dictator game may therefore not be extra-motivated to disambiguate an ambiguously described partner.

To measure the presence of an interpretational orientation, prior to playing the game (but following its introduction) participants had to perform a lexical decision task that measured the accessibility of words designating 'interpretation' and of unrelated words. We predicted that words designating interpretation would be more accessible and would therefore elicit shorter response latencies than unrelated words in the prisoner's dilemma game condition compared to the dictator game condition and the control condition.

Experiment 1a

Method

Participants and design. Participants were 36 undergraduate students who participated in partial fulfillment of course requirements. The experimental design included two factors. These two factors were Game context (prisoner's dilemma game vs. dictator game vs. control condition) and Target words (interpretation related vs. neutral).

Procedure and materials. On arrival in the laboratory, each participant was placed in an individual cubicle. Participants were told that they would participate in some unrelated studies. In a short while they would be playing a game with another person. The other person, however, was doing another experiment at the moment and participants were told that they had to play the game when he would arrive. Participants would already

receive a written description of the other person and some participants (those in the prisoner's dilemma game and the dictator game conditions) were first instructed about the rules of their game. We took care that no part of the instructions contained any reference to interpretation related words (or to the neutral words used in the lexical decision task). After these instructions, participants were requested to perform the other experiment (i.e., the lexical decision task) first, as they were waiting for the other person to actually play the game.

Game context manipulation. Participants in the control condition were simply told that they were going to play a game against the other person without any specification of the content of the game. They only received a written description of the other person. As in Herr (1986), participants received an ambiguous description of the interaction partner's behavior in another setting, ostensibly written by an acquaintance who had had a recent encounter with the participant's interaction partner. The description consisted of an account of "Jan", whose behavior could be categorized as either hostile or non-hostile. The description was a modification of the familiar "Donald" paragraph developed by Srull and Wyer (1979, 1980; see also Bargh & Pietromonaco, 1982; Devine, 1989). Because in the original paragraph Donald could be categorized as vaguely hostile (see Higgins, 1996), we modified this paragraph to make sure that ours was really neutral¹. Participants were then requested to rate this person on 10 unipolar trait dimensions that were adapted from Srull & Wyer (1979; 1980; see Stapel et al., 1997). Five of these dimensions implied either a high or low degree of hostility ("hostile", "unkind", "aggressive", "considerate", and "amicable"), and 5 other dimensions were unrelated to hostility ("selfish", "fretful", "intelligent", "dependable", "helpful"). Related and unrelated scales were interspersed.

Ratings were made along a scale ranging between 1 (*not at all*) and 9 (*extremely*). The unrelated scales measured several target characteristics that show no descriptive overlap with the target description. According to the literature on knowledge accessibility effects, primes should affect judgments that are relevant to the primed construct but not judgments on irrelevant dimensions (Higgins, 1996a). Thus, judgments unrelated to hostility should not show a pattern of assimilation or contrast. The unrelated measures in our experiment are also often included in research using the Donald paradigm to decrease the possibility that participants would become suspicious that the concept of interest is often hostility related (see Stapel & Koomen, 2001; Stapel et al., 1996, 1997).

Participants in the prisoner's dilemma game condition received the same description of Jan, but prior to receiving this description they received instructions relevant to the game they would play against him. The game we used was adapted from previous research (e.g., De Bruin & Van Lange, 1999a, 1999b; Van Lange & Kuhlman, 1994). Participants were told that they and their interaction partner would each receive four chips. Each chip had a value of 10 points to the participant himself or herself and a value of 20 points to the partner. The partner also received four chips of which each had a value of 10 points to the partner and a value of 20 points to the participant himself or herself. Participants had to decide how many chips to give to the partner. They were told that the partner also had to decide how many chips to give to the participant himself or herself.

Participants in the dictator game condition were also informed of the rules of their game before receiving the ambiguous description of their interaction partner. The instructions for this game were also adapted from previous research (e.g., Hoffman et al., 1996). Each participant was given eight chips, each worth 10 points. They were told that

the interaction partner did not receive anything. The participant (i.e., the dictator) could unilaterally decide about the allocation of the points. Participants could either keep the points entirely for themselves, or hand whatever proportion they wanted to the partner.

Lexical decision task. Next, participants were asked to perform a lexical decision task. This task was adapted from Dijksterhuis et al. (1998). Participants were told that they would perform a word recognition task, the goal of which was to find out how fast people could discriminate between words and non-words. They were asked to focus on the screen every time a fixation-cross appeared. A string of letters would appear on the screen and they were asked to decide as fast as possible whether this letter string was an existing word or not by pressing a key on the keyboard ('1' for an existing word, '3' for a non-existing word).

The lexical decision task consisted of 24 trials. In 12 cases, the target string was an existing word, whereas in the remaining 12 cases, the target strings were random letter strings (e.g., hibbt, truuu). Of the 12 existing target words, 6 words were associated with interpretation (e.g., understand, comprehend, grasp) and 6 were neutral words unrelated to interpretation (e.g., walk, throw, jump). The interpretation related words and the neutral words were matched for word length². The fixation-cross was presented for 500 ms. Subsequently, the target string appeared on the screen until participants responded. The computer recorded the time it took participants to respond. After participants responded, the screen remained blank for 2000 ms after which a new trial began.

After the lexical decision task, participants were informed that their interaction partner had arrived and that they could perform the game they had been instructed about. Participants in the control condition were randomly instructed with either the rules of the

prisoner's dilemma game or the dictator game. Of course, the decisions that these participants made were not of our interest. After making their decisions, participants were requested to fill out a post-experimental questionnaire, which probed their suspicion about any relatedness among the tasks and about any relatedness among the words in the lexical decision task. None of our participants reported any suspicion. Finally, participants were thanked and debriefed.

Results and Discussion

Only the results for the 'word trials' were included in the analysis. We calculated the mean latency for each of the target words (cf. De Houwer, Hermans, & Spruyt, 2001; Hermans, De Houwer, & Eelen, 1994; Mussweiler & Foerster, 2000). To reduce the distorting effect of outliers, data points that were three standard deviations above or below the mean for each word (0.7%) were considered outliers and were dropped from subsequent analysis (see Bargh & Chartrand, 2000; Blair & Banaji, 1996), together with data points from trials on which an incorrect response was given (1.1%). The remaining latencies (98.2%) were subjected to a 3 (Game context: prisoner's dilemma game vs. dictator game vs. control condition) x 2 (Target words: interpretation related vs. neutral) ANOVA with repeated measures on the last factor³.

This analysis revealed main effects of game context and target words. The main effect of game context, $F(2, 33) = 4.86, p < .05$, revealed that participants in a prisoner's dilemma game context ($M = 493$ ms) responded faster to words presented on the screen than participants in a dictator game context ($M = 507$ ms) or control participants ($M = 509$). The main effect of target words, $F(1, 33) = 6.21, p < .01$, revealed that participants

responded faster to interpretation related words ($M = 499$) than to neutral words ($M = 507$). These main effects were qualified by a significant two-way interaction between game context and target words, $F(2, 33) = 3.70, p < .05$. Mean reaction times are represented in Table 1.

Insert Table 1 about here

Participants in the prisoner's dilemma game condition ($M = 483$ ms) showed shorter response latencies to interpretation related words than to neutral words ($M = 503$ ms), $F(1, 33) = 13.38, p < .001$. In the dictator game condition and the control condition, there were no differences in reaction times to interpretation related words and neutral words, $F_s < 1, ns$. Further analyses showed that reaction times to neutral words did not differ among the different game contexts, $F(2, 33) < 1, ns$. Reaction times to interpretation related words, however, differed among the different game contexts, $F(2, 33) = 8.20, p < .01$. Planned comparisons showed that participants in the prisoner's dilemma game condition ($M = 483$ ms) responded faster to interpretation related words than participants in the dictator game condition ($M = 506$ ms), $F(1, 33) = 11.10, p < .01$, and control participants ($M = 509$ ms), $F(1, 33) = 13.39, p < .0001$. There was no difference in reaction times to interpretation related words among participants in the dictator game condition and control participants, $F_s(1, 33) < 1, ns$.

These findings clearly demonstrate that an interpretation goal gets triggered spontaneously when people are forming an impression in the context of a prisoner's dilemma game. Forming an impression in a dictator game context or in an unspecified

game context did not trigger an interpretation goal. Indeed, concepts related to interpretation were more accessible when participants formed an impression of their interaction partner in a prisoner's dilemma game than in a dictator game or in the control condition. As noted before, impressions are an important antecedent of cooperative decision-making in mutual dependence relationships (e.g., Smeesters et al., in press; Van Lange & Kuhlman, 1994). Therefore, when engaging in a prisoner's dilemma game, participants might be extra-motivated to make sense of the ambiguous information of an interaction partner. In a dictator game, impressions are not important for cooperative decision-making. As a consequence, people in such a situation are not extra-motivated to interpret ambiguous information of the other. This finding illustrates that the interdependence character of a situation is a strong cue for triggering an interpretation goal.

It might be argued that the results obtained would only hold under conditions in which participants are overtly focused on forming an impression of the interaction partner. In fact, in the experiment just described, after being handed a description of their interaction partner participants were instructed to rate that partner explicitly on 10 dimensions. Although this feature of the procedure does not by any means render the first experiment invalid (the feature was present in all conditions), it still might be the case that the differences observed would disappear in the absence of an overt impression formation task.

Past research suggests however that the effect should still be apparent. Indeed, Smeesters et al. (in press, Experiment 1) observed that impressions of an interaction partner influence cooperative decision-making in a prisoner's dilemma game in the absence of overt expressions of these impressions. Still, the claim that participation in a prisoner's

dilemma game by itself extra-motivates people to process ambiguous information of the interaction partner would be stronger, if we could demonstrate that merely having to read an ambiguous description of an interaction partner, but without having to make an overt judgment, is sufficient to trigger an interpretation goal. We conducted a follow-up experiment to test this question. Compared to Experiment 1a, we omitted the dictator game condition and focused solely on the prisoner's dilemma game condition and the control condition.

Experiment 1b

Method

Participants and design. Sixteen undergraduates participated in this experiment in partial fulfillment of course requirements. The experimental design included two factors: Game context (prisoner's dilemma game vs. control condition) and Target words (interpretation related vs. neutral).

Procedure. This experiment was identical to Experiment 1a with the exception that participants had to perform the lexical decision task immediately after having read the ambiguous description of their interaction partner. They did not have to make any person judgments. Participants did not indicate any suspicion about a relationship between the different tasks of this experiment.

Results and Discussion. As in Experiment 1a, we calculated the mean latency for each of the target words. Data points from trials on which an incorrect response was given were excluded from the analysis (0.6%), together with all data points that were three standard deviations above or below the mean for each word (1.8%). The remaining

decision latencies (97.6%) were analyzed using a 2 (Game context: prisoner's dilemma game vs. control condition) x 2 (Target words: interpretation related vs. neutral) ANOVA with repeated measures on the last factor⁴.

This analysis revealed a marginally significant interaction between game context and target words, $F(1, 14) = 4.03, p < .07$. Means are presented in Table 2. The marginal significance may be attributed to a lack of statistical power. Importantly however, participants in the prisoner's dilemma game condition responded faster to interpretation related words ($M = 481$ ms) than to neutral words ($M = 512$ ms), $F(1, 14) = 5.54, p < .05$. In the control condition, there was no difference in reaction times to interpretation related words ($M = 511$ ms) and neutral words ($M = 505$ ms), $F(1, 14) < 1, ns$. Further, participants in the prisoner's dilemma game condition showed shorter latencies toward interpretation related words ($M = 481$ ms) than control participants ($M = 511$ ms), $F(1, 14) = 4.99, p < .05$. Neutral word latencies did not differ between participants in the prisoner's dilemma game condition ($M = 512$) and control participants ($M = 505$ ms) = $F(1, 14) < 1, ns$. These results clearly replicated those of Experiment 1 and they showed that an interpretation goal is triggered even when participants are not asked to make an overt judgment of the interaction partner in a prisoner's dilemma game.

Insert Table 2 about here

Experiment 2

Experiment 1 provided encouraging support for our assumption that encountering ambiguous information about a future interaction partner goes together with interpretative thinking. It is essential however to move beyond this demonstration and to assess in a more direct manner the impact of interpretative thinking while playing a prisoner's dilemma game on actual person judgment. If a mutual dependence relationship activates an interpretative mindset, then accessible knowledge should be used as an interpretation framework when judging an interaction partner, resulting in an assimilation effect (Stapel & Koomen, 2001a, 2001b). For instance, priming extreme person exemplars should then lead to assimilation effects in person judgment, although they normally lead to contrast effects.

The present experiment will be a partial replication of an experiment by Herr (1986, Experiment 2). In his experiment, participants also had to play a prisoner's dilemma game with an interaction partner, about whom they received ambiguous information. Before judging the interaction partner, participants were primed with extreme exemplars of hostility and non-hostility. If one assumes that playing a prisoner's dilemma game triggers an interpretation goal, one would expect an assimilation effect. However, Herr observed a standard contrast effect: extreme exemplars of hostility led to less hostile judgments than extreme exemplars of non-hostility. To explain this anomalous finding it is important to observe that Herr's participants, prior to forming an impression of the interaction partner, were only told that they would be playing 'a game', without even being told that it would be a prisoner's dilemma game. In view also of the results of our own Experiments 1a and 1b, which showed that in the control ('a game') condition an interpretative orientation was

less activated, it can be argued that a pattern of judgments different from Herr's would be observed following a modification of his experimental paradigm. Specifically, when participants are informed that they will be playing the mutually dependent prisoner's dilemma game, the activation of an interpretation set of mind should yield an assimilation effect of extreme exemplar primes rather than a contrast effect.

As another non-trivial difference from Herr's study, we chose to present the primes subliminally. It has often been argued that contrast effects obtained with extreme exemplars result from the fact that extreme stimuli might be more memorable and therefore remain longer in consciousness (e.g., Carlston & Smith, 1996; Higgins, 1989; Schwarz & Bless, 1992; Strack, 1992). The resulting greater awareness of the priming event may instigate a correction-for-bias process, inducing individuals to shift their judgments in a reverse direction (Martin, 1986; Strack, Schwarz, Bless Kübler, & Wänke, 1993). However, subliminally presenting extreme exemplars will exclude such explanations. None of the effects that we would obtain with extreme person exemplars could be attributed to the fact that participants are aware of the fact that they are primed with such extreme stimuli.

Method

Participants and design. Seventy-three undergraduates participated in partial fulfillment of course requirements. They were randomly assigned to the cells of a 2 (Game context: prisoner's dilemma game vs. control condition) x 2 (Extreme exemplars: positive vs. negative) between-participants design.

Procedure and materials. Upon entering the laboratory, participants were led to a cubicle containing a computer. As in Experiment 1, all participants were told that they would participate in unrelated studies. They were told that they would shortly be playing a game with another person. The other person, however, was doing another experiment at the moment and participants were told that they had to play the game when he would arrive. Participants in the control condition were told that they would play “a game” without any further specifications about the rules of that game. Participants in the prisoner’s dilemma game condition were explained the rules of the game and received the same instructions as the participants in the prisoner’s dilemma game condition of Experiment 1.

Extreme exemplar priming manipulation. Next, participants were asked to perform the other experiment first, while waiting for the interaction partner. The task that they had to perform was a word recognition task. Participants were seated in front of a computer screen. They were told they would be presented with 14 letter strings appearing one by one on the screen. Half of these letter strings were existing words, while the other half were non-existing words. On each trial, a fixation point first appeared on the computer screen. Participants had to press the key ‘2’ to start the presentation of a trial. On each trial, they had to decide as fast as possible whether a string was an existing word or not by pressing a key on the keyboard (‘1’ for an existing word, ‘3’ for a non-existing word).

These 14 strings were preceded by subliminal primes. In the positive exemplar priming condition, each letter string was preceded by one of the following names: “Gandhi”, “Sinterklaas” (St. Nicholas), “Mandela”, “Jezus” (Jesus), “Maria” (Mary), “Damiaan” (Damian), and “Evita”. In the negative exemplar priming condition, each letter

string was preceded by one of the following names: “Hitler”, “Stalin”, “Dracula”, “Duivel” (Devil), “Dutroux”, “Saddam”, and “Mobutu”. Prime words were presented for 17 ms and masked by a row of X’s (“XXXXXXXXXXXXX”). This row remained on the screen for 225 ms and was immediately followed by the target word. In all conditions, the 7 different primes were used and all these primes were used twice.

Impression formation. After participants finished the word recognition task, they were told that an acquaintance of their interaction partner had written an account of a recent encounter with him. At this point, each participant was given the same ambiguous description of “Jan” as in Experiment 1. Next, each participant was requested to evaluate his or her partner on the basis of his or her general impression after reading the description. The rating forms were the same as in Experiment 1, with 5 trait dimensions related to hostility (“hostile”, “unkind”, “aggressive”, “considerate”, and “amicable”) and 5 trait dimensions unrelated to hostility (“selfish”, “fretful”, “intelligent”, “dependable”, “helpful”). The rating scales were presented in a random order, and ratings were made along a scale from 1 (not at all) to 9 (extremely).

Following completion of the impression measures, participants were informed that their interaction partner had arrived, and that they could perform the game they had been instructed about. Participants in the control condition then received the instructions of the prisoner’s dilemma game that the participants in the other game condition received at the beginning of the experiment. After making their decisions, participants were requested to fill out a post-experimental questionnaire, which probed their suspicion about any relatedness among tasks and for awareness of the priming stimuli. We used the funneled debriefing procedure designed by Bargh & Chartrand (2000; see also Chartrand & Bargh,

1996). None of the participants reported any suspicion. Finally, participants were thanked and debriefed.

Results and Discussion

The ratings on the five hostility related scales were combined to form a composite hostility index of Jan (Cronbach's $\alpha = 0.76$). Table 3 shows participants' mean ratings on this composite index. Because our manipulations had no effects on the unrelated ratings of Jan, they are not discussed further here.

Insert Table 3 about here

The mean hostility ratings of Jan were investigated by performing a 2 (Game context: prisoner's dilemma game vs. control condition) x 2 (Extreme exemplars: positive vs. negative) between-participants ANOVA. This analysis revealed the predicted two-way interaction between game context and extreme exemplars, $F(1, 69) = 12.34, p < .001$. In the control condition, we obtained the predicted contrast effect, $F(1, 69) = 3.98, p < .05$. Ratings of Jan were more negative when primed with positive exemplars ($M = 4.73$) than when primed with negative exemplars ($M = 4.07$). In the prisoner's dilemma game condition, however, the results represented an assimilation effect, $F(1, 69) = 8.87, p < .01$. Ratings of Jan were more negative when primed with negative exemplars ($M = 4.94$) than when primed with positive exemplars ($M = 3.96$).

These results provide further support for the hypothesis that impression formation in a prisoner's dilemma game context is associated with interpretative thinking. Accessible

knowledge, through the activation of extreme person exemplars, resulted in assimilation when judgments of the other person had to be made in a prisoner's dilemma game context, whereas contrast occurred in a non-specified game context. The latter finding replicates the finding of Herr (1986, Experiment 2). The assimilation finding that we obtain with extreme person exemplars also matches the finding of Stapel & Koomen (2001b), who primed an interpretation goal before participants had to judge the ambiguous description of another person. We extended their results by showing that an interpretation goal might also be triggered by the context of a specific situation itself. In such a context where individuals are extra-motivated to make sense of who the opponent is, extreme person exemplars seem to be used as an interpretation framework when judging this person.

The assimilation and contrast findings in our study were obtained with subliminally primed extreme person exemplars. Hence, our findings cannot be explained in terms of a conscious effect of the primes on judgments. Therefore, the classic contrast finding that we replicated in our study can only be explained via a comparison-based process and not via a correction-based process. The latter process emerges when an individual recognizes the potential of primes to bias behavioral responses (Strack et al., 1993). Most of the previous studies that investigated the effects of extreme prime stimuli used only supraliminal priming techniques (e.g., Herr, 1986; Herr et al., 1983; Stapel & Koomen, 2001b; Stapel et al., 1997, 1998). Therefore, the only way to dispel any correction-based processes is to use subliminal priming.

Experiment 3

The previous experiments showed that (a) an interpretation goal gets triggered during impression formation in a prisoner's dilemma game (Experiment 1) and (b) in the same context, the impact of accessible knowledge on the judgment of another person shifts in assimilative ways (Experiment 2). Conversely, when people are not in the context of a prisoner's dilemma game and might therefore be less motivated to interpret the ambiguous behavior of another person, priming extreme exemplars results in contrast effects on person judgment.

Stapel & Koomen (2001b) demonstrated that, aside from interpretation goals, in some settings comparison goals may steer how accessible knowledge is used. When the latter goal is activated accessible knowledge gets used as a standard of comparison, which results in contrast effects on person judgment. In the present experiment, we wanted to examine what happens when we prime a comparison goal before participants enter a prisoner's dilemma game situation. In other words, what happens when people are in a comparison mindset and enter a situation which – on its own – triggers an interpretation mindset? Will these people still use accessible knowledge as an interpretation framework or rather as a standard of comparison?

It is often argued that engagement in a comparison process overrides potential assimilation effects. Priming individuals with extreme exemplars may activate abstract concepts (e.g., priming Hitler activates the concept of hostility), thereby eliciting a potential assimilation effect, but the engagement in comparison induces a contrast effect that overrides the assimilative effect of the activated concept (Dijksterhuis et al., 1998; Stapel et al., 1997). The comparison evokes the contrast response, such that the assimilative effects

of the activated concept of hostility do not become apparent. Fiske & Neuberg (1990) have argued that when abstract constructs such as traits and stereotypes are accompanied by a concrete individual impression, these abstract constructs get overruled by the concrete impression (see also Bodenhausen, Macrae, & Sherman, 1999). Along similar lines Bodenhausen, Dijksterhuis, Fiske, Stapel, and colleagues argue that at the level of knowledge accessibility, interpretation processes may be dominated by comparison processes (such as with extreme person exemplars). We believe that the same may happen at the level of the antecedent information-processing goals, such that that an interpretation goal may be dominated by a comparison goal, i.e. a comparison goal may determine the direction of knowledge accessibility effects on person judgment even in a situation that triggers an interpretation goal.

In the present experiment, all participants had to judge their interaction partner in the context of a prisoner's dilemma game, after being subliminally primed with extreme person exemplars. However, for half of the participants a comparison goal was primed by having participants partake in a "language experiment" in which words related to a comparison goal were presented (as in Stapel & Koomen, 2001b), before entering a prisoner's dilemma game situation. For the other half of the participants no specific information-processing goal was primed in the language experiment. We predicted a contrast effect on person judgment in the comparison goal condition, and an assimilation effect in the control condition (which is a replication of the prisoner's dilemma game condition in Experiment 2).

Method

Participants and design. The participants were 64 undergraduates who participated in partial fulfillment of course requirements. The experimental design included two between-participants factors: Goal (comparison goal versus control condition) and Extreme exemplars (positive vs. negative).

Procedure and materials. Participants arrived in the laboratory, were led to individual cubicles and told that they would participate in a series of unrelated studies. The experiment started with a “language experiment” in which either a comparison-processing goal or no specific goal was primed.

Comparison goal priming. For this task we used a version of the Scrambled Sentence Test (Srull & Wyer, 1979). The task was introduced to the participants as a “language skill” test. We used 14 items, each requiring the participant to form a grammatically correct sentence with four of five words presented in a scrambled order. Prime words were embedded in 8 of the 14 items. We created two versions of the Scrambled Sentence Test, one with comparison related words and another one with words unrelated to any specific information-processing goal. In the comparison goal condition participants were presented with words such as “compare”, “distinguish”, “differ”, or “contrast”. In the control condition these words were replaced by neutral words.

Next, participants received the same instructions and materials as participants in the prisoner’s dilemma game condition of Experiment 2. Participants were informed of the rules of the prisoner’s dilemma game. Then, they were asked to participate in a lexical decision task in which they were randomly assigned to either the positive exemplar condition or the negative exemplar condition. Subsequently, they received the ambiguous

description of Jan, who was supposed to be their opponent in the prisoner's dilemma game. After rating Jan on the same hostility-related and unrelated scales as in Experiments 1 and 2, participants performed the prisoner's dilemma game. Finally, before they were thanked and fully debriefed, participants were subjected to the funneled debriefing procedure (Bargh & Chartrand, 2000) to probe their suspicion about any relationship between tasks or their awareness of priming stimuli. None of the participants indicated any suspicion.

Results and Discussion

The ratings on the five hostility related scales were again combined to form a composite hostility index of Jan (Cronbach's $\alpha = 0.74$). Table 4 shows participants' mean ratings on this composite index. Our manipulations had no effects on the unrelated scales for ratings of Jan, therefore they are not discussed any further.

Insert Table 4 about here

The mean hostility ratings of Jan were investigated by performing a 2 (Goal: comparison goal vs. control condition) x 2 (Extreme exemplars: positive vs. negative) between-participants ANOVA. This analysis revealed the predicted two-way interaction between game context and extreme exemplars, $F(1, 60) = 10.85, p < .001$. In the control condition, we obtained the predicted assimilation effect, $F(1, 60) = 6.97, p < .01$. Ratings of Jan were more negative when primed with negative exemplars ($M = 4.96$) than when primed with positive exemplars ($M = 4.11$). When a comparison goal was primed before participants entered a prisoner's dilemma game context, we found a contrast effect, $F(1, 60)$

= 4.07, $p < .05$. Ratings of Jan were more negative when primed with positive exemplars ($M = 4.83$) than when primed with negative exemplars ($M = 4.18$).

In correspondence with our predictions, priming a comparison goal before bringing participants in a prisoner's dilemma game context led to a contrast effect in person judgment. As we used a subliminal technique to prime extreme person exemplars, this finding cannot be explained through a correction-based process. Therefore, primed exemplars must have been used as a standard of comparison. Priming a comparison goal had a strong effect on person judgments even when people are brought into a situation that by itself triggers an interpretation goal. In such a situation, the activated comparison goal rather than the activated interpretation goal determines the direction of the knowledge accessibility effect.

General Discussion

Three studies were designed to examine whether interpretative thinking is part of impression formation in a mutual dependence relationship. Being in a situation that requires cooperative decision-making from both partners may increase people's motivation to figure out with whom they are interacting. In such a situation, individuals might engage in interpretative thinking to make sense of their social environment.

Experiment 1a revealed that an interpretation goal is triggered when forming an impression of an interaction partner in a prisoner's dilemma game. For these participants, reaction times were shorter toward interpretation related words than toward neutral words. This finding was not obtained for control participants or individuals participating in an interpersonal game, in which the interdependence character is minimized (i.e., dictator

game). Importantly, the increased accessibility of interpretation-related words in the prisoner's dilemma game condition occurs even when people do not have to make overt judgments of the interaction partner (Experiment 1b). Earlier research on social perception has demonstrated that people often consciously or unconsciously go beyond the information given without being asked for overt judgments. Upon receiving rather unambiguous information about a person, one immediately tries to make sense of that person by inferring abstract constructs such as traits or stereotypes (e.g., Winter & Uleman, 1984; Winter, Uleman, & Cunniff, 1986). Making sense of ambiguous information is admittedly very difficult, but the results of Experiment 1 suggest that people in a prisoner's dilemma game nevertheless engage in this process spontaneously.

In Experiment 2, we demonstrated that priming extreme person exemplars resulted in an assimilation effect in person judgment in a prisoner's dilemma game context, whereas the classic contrast effect appeared in the control condition. We attributed the assimilation effect to the activation of an interpretation goal when playing a prisoner's dilemma game. In such a context, accessible knowledge will be used as an interpretation framework such that assimilation occurs. Finally, in Experiment 3 it was shown that priming a comparison goal before entering a prisoner's dilemma game situation led to a contrast effect. The effect of an activated interpretation goal seems to be overridden in such a situation. Instead of being used as an interpretation framework, following the priming of a comparison goal extreme person exemplars are used again as a standard of comparison.

Experiments 1 and 2 support the notion that individuals playing a prisoner's dilemma game engage in interpretative thinking to judge their interaction partner. Only Experiment 2, however, demonstrated in a direct manner that this process affects the use of

accessible knowledge. We showed that playing a prisoner's dilemma game elicits interpretative thinking by predicting and observing that in such a context primed extreme exemplars lead to assimilation in person judgment instead of contrast. Future research might also investigate other ways to demonstrate that an interpretation goal plays a role in a prisoner's dilemma game context. For instance, a demonstration that priming narrow or moderate trait terms that are descriptively inapplicable to the interpretation of an interaction partner (and which normally do not lead to any priming effects on person judgment), leads to assimilation effects when judging a person in a prisoner's dilemma game would corroborate our results (cf. Stapel & Koomen, 2001a).

Further, the results of Experiments 2 and 3 were obtained with subliminally presented extreme person exemplars. This is important, as we were able to demonstrate that the classic contrast effect we obtained in the control condition of Experiment 2 could not be attributed to a correction-based process. In a context with primes presented below conscious awareness, participants can definitely not be aware of (a) the fact that there were any primes presented and (b) any relationship between the priming procedure and the judgment process (Bargh & Chartrand, 2000). Hence, the contrast effect observed can only be attributed to a comparison-based process, in which accessible information is used as a comparison standard (Stapel & Koomen, 2001c).

An interesting implication of Experiment 3 is that the activation of a comparison goal can inhibit the occurrence of assimilation effects typically set in motion by an interpretation goal. Several authors (Bodenhausen et al., 1999; Dijksterhuis, Spears, et al., 1998; Fiske & Neuberg, 1998; Stapel et al., 1997) already suggested that a comparison process overrides an interpretation process at the level of accessible knowledge. Our

results suggest that this overriding process might also occur at the level of information-processing goals. Future research might investigate whether other information-processing goals also interact with an interpretation goal. Past studies demonstrated that assimilation accessibility effects due to interpretation (such as with primed traits) vanish when people had an accuracy goal, i.e., the goal to accurately form a particular impression about the person one is judging (Ford & Kruglanski, 1995; Stapel, Koomen, & Zeelenberg, 1998; Thompson, Roman, Moskowitz, Chaiken, & Bargh, 1994) or a communication goal, i.e., the goal to communicate a particular impression about the person one is judging (Sedikides, 1990). Then, these goals might not only have an influence on assimilation effects associated with knowledge accessibility (traits and stereotypes) but could also have an influence on assimilation effects associated with an interpretation goal. To demonstrate this, one could, for instance, examine whether the activation of an accuracy goal or a communication goal inhibits the assimilation effects we obtained with extreme person exemplars in a prisoner's dilemma game context (an effect associated with an interpretation goal).

The findings of our experiments are also congruent with Bargh's (1990, 1997) theorizing on auto-motives. He argued that goals are represented mentally and are capable of becoming automatically activated by environmental features. Many studies have shown that goals can indeed become automatically activated by subtle situational, though artificial features such as supraliminal or subliminal priming (e.g., Chartrand & Bargh, 1996; Stapel & Koomen, 2001a, 2001b). Stapel & Koomen (2001a) primed an interpretation goal, but they were keen to observe that their unobtrusive exposure to interpretation related words "seems to be a crude proxy for the motive to try to make sense of the world" (pp. 928). In

the present research, we tried to introduce a less “crude proxy” to activate an interpretation goal. A prisoner’s dilemma game seems to be a situation, which by its very nature of interdependence is strongly associated with interpretative thinking. As such, we were able to demonstrate that an interpretation goal can also become automatically activated by a less artificial, more naturalistic environment than was the case in prior research.

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Footnotes

¹ To ensure that the description was in fact neutral, it was presented to 24 students who were asked to evaluate the hostility of “Jan” along a 9-point scale with the endpoints labeled not at all hostile and extremely hostile. The mean rating was approximately at the midpoint of the scale ($M = 4.63$).

² Although the interpretation-unrelated words seem to be shorter in word length than the interpretation-related words, this is only the case in English and not in Dutch.

³ Because reaction time data are often skewed, we also ran an analysis on logarithmic transformations of our reaction time data. A log transformation is sometimes applied to normalize the data to meet the assumptions of the statistical tests (as suggested by Fazio, 1990; see also Bargh & Chartrand, 2000). However, this transformation analysis was similar to our original analysis.

⁴ As in Experiment 1 we also conducted an analysis on log transformed reaction times, which revealed similar results.

Table 1.

Mean Reaction Times (in Milliseconds) as a Function of Game Context and Target Words(Experiment 1a)

Game context	Target words	
	Interpretation related	Neutral
Prisoner's dilemma game	483	503
Dictator game	506	509
Control condition	509	510

Table 2.

Mean Reaction Times (in Milliseconds) as a Function of Game Context and Target Words(Experiment 1b)

Game context	Target words	
	Interpretation related	Neutral
Prisoner's dilemma game	481	512
Control condition	511	505

Table 3.

Mean Hostility Judgments of Jan as a Function of Game Context and Extreme Exemplars(Experiment 2)

Game Context	Extreme exemplar	
	Positive	Negative
Prisoner's dilemma game	3.96	4.94
Control condition	4.73	4.07

Note. Scale range is from 1 to 9. Higher scores indicate more negative ratings.

Table 4.

Mean Hostility Judgments of Jan as a Function of Goal Condition and Extreme Exemplars(Experiment 3)

Goal Condition	Extreme exemplar	
	Positive	Negative
Control	4.11	4.96
Comparison	4.83	4.18

Note. Scale range is from 1 to 9. Higher scores indicate more negative ratings.