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Determinants of intergroup differentiation in the illusory correlation task

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Illusory correlation refers to the perceived (but erroneous) relation between stimuli. In social psychology this phenomenon has been related to stereotype formation. Recent research in this area has shown that the perception of illusory correlation between two groups and their behaviours can be a product of understandable attempts to differentiate between these groups. This is due to participants' interpretations of the experimental task and to features that draw attention to group differences. In the first study we showed that the task instructions presented to participants can induce expectations of differences between the stimulus groups, which helped to produce illusory correlation. We also demonstrated that giving precedence to the behaviours, rather than to the groups, resulted in attenuated illusory correlation effects. In the second study we investigated how aspects of the stimulus distribution affected the perception of illusory correlation. In line with the first study, we showed that increasing the focus on the stimulus groups can enhance illusory correlation, whereas focusing on the behaviours can reduce this effect. The present findings support the self-categorization explanation of illusory correlation that proposes it to be the product of a meaningful category differentiation process.

Judgments of covariation are of interest in different domains of psychology including cognitive development (e.g. Inhelder & Piaget, 1958), clinical assessment (e.g. Chapman & Chapman, 1967), attribution theory (e.g. Kelley, 1967), learning theory (Bandura, 1977) and social stereotyping (e.g. Hamilton & Sherman, 1989). Detecting covariations between stimuli is an essential requirement for adaptive behaviour. The information derived from these relationships allows us to make sense of the world by 'explaining the past, controlling the present, and predicting the future' (Crocker, 1981). All of these are important for our well-being (Alloy & Tabachnik, 1984). In this study the authors focus on conditions that bias the perceived covariation of social stimuli, resulting in so-called 'illusory correlations'. The term *illusory correlation* refers to the perception of covariation between two classes of events that are

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uncorrelated (or less strongly correlated than perceived). Thus, despite the absence of a relationship between stimuli, people still report the perception of such a relationship (hence 'illusory'). The perception of illusory correlation has been widely researched in social psychology, not least because this mechanism could offer an explanation for the acquisition of stereotypes about minorities (Hamilton & Gifford, 1976). The purpose of the present research is to investigate the pragmatic context of the illusory correlation task in producing illusory correlation effects.

Hamilton & Gifford (1976; Study 1) developed the now familiar paradigm to demonstrate the illusory correlation effect in social perception. They informed participants in their experiment that they would be shown behavioural descriptions about members of two groups, group A and group B, and that in the real world group B is smaller than group A. Consequently, statements describing members of group B would occur less frequently in the stimuli presented. In their study, these two groups exhibited the same ratio of (more) positive to (fewer) negative behaviours (group A positive: 18; group A negative: 8; group B positive: 9; group B negative: 4). Thus, there was no correlation between type of behaviour and group. Despite this, participants associated the minority group B with negative (i.e. minority) behaviour, producing what is termed 'distinctiveness-based' illusory correlation. Distinctiveness is determined by statistical infrequency, therefore the perceived correlation involves an association between the distinctive group (the minority group B) and the distinctive behaviours (the negative behaviours), and consequently a relatively negative evaluation of this group.

Hamilton & Gifford (1976) argued that the co-occurrence of statistically infrequent categories is particularly distinctive to the perceiver, that they receive more attention, are efficiently encoded during stimulus presentation and are consequently more available in memory than non-distinctive categories. Thus, the co-occurrence of distinctive events can result in a negatively biased impression of the minority and subsequent research has shown that this effect is a reliable phenomenon (see e.g. McConnell, Sherman & Hamilton, 1994; Mullen & Johnson, 1990). However, a number of studies have identified factors that can weaken the distinctiveness-based illusory correlation effect (Schaller & Maass, 1989; Spears, van der Pligt & Eiser, 1985), or have shown that illusory correlation effects can occur without statistical infrequency of a particular category (Berndsen, Spears & van der Pligt, 1996*a*; Spears, van der Pligt & Eiser, 1986).

Recent research has offered alternative explanations of the effect demonstrated by Hamilton & Gifford. According to Smith (1991) and Fiedler (1991; see also Fiedler, Russer & Gramm, 1993), the illusory correlation phenomenon is a result of memory biases. By means of computer simulations, Smith demonstrated that memory traces involving the positivity of group A are more easily activated by a prompt than the positivity of group B, because of their greater frequencies. This explanation is closely related to that of Fiedler, who has argued that the illusory correlation pattern is a result of information loss that affects the majority and minority groups differentially. Because of information loss, people's responses are subject to regression effects that are stronger in small samples (group B) than in large samples (group A). As a consequence, participants' responses result in the typical illusory correlation pattern.

In contrast to these explanations based on biased information processing, McGarty, Haslam, Turner & Oakes (1993) proposed that illusory correlation resulted from attempts to differentiate meaningfully between stimulus groups. Their explanation is based on the categorization perspective advanced by Tajfel (e.g. Tajfel & Wilkes, 1963), which assumes that people seek underlying regularities when perceiving stimuli. One way to achieve this is to detect similarities and differences, such that between-category differences and within-category similarities are accentuated. According to self-categorization theory (Turner, Hogg, Oakes, Reicher & Wetherell, 1987) people form categories by maximizing both the differences between groups and similarities within groups. This process is based on 'comparative fit' (or the match between the categories and the comparative properties of the stimuli; Oakes, Turner & Haslam, 1991). Following this line of reasoning and drawing on the concept of *differentiated meaning* (McGarty & Turner, 1992), McGarty *et al*. (1993) argued that participants in the illusory correlation paradigm try to make sense of the stimulus situation by attempting to allocate the stimuli to meaningful (i.e. clear and separable) categories. In their view, the task situation creates expectations such that respondents ask themselves *how* the groups differ on the underlying evaluative dimension.

In order to accentuate differences between group A and B in the illusory correlation task, participants need to perceive some contrast or difference between the two groups (i.e. comparative fit). McGarty *et al*. showed that in the original illusory correlation task there is more evidence for the hypothesis that group A members are 'good' and group B members are 'bad' (18+ 4 stimuli) than for the opposite hypothesis (9+ 8 stimuli), presenting a basis for the usual 'bias' found in this task. In short, the stimuli presented in the illusory correlation task provide a basis for the idea that there are genuine differences between the stimulus groups.

The purpose of the present study is to investigate McGarty *et al*.'s proposal that illusory correlation is at least partly the product of a process based on intergroup differentiation by investigating features of the illusory correlation task that might contribute to such differentiation. One of these aspects relates to the very nature of the experimental situation, and how participants interpret what is expected from them in the task. This view fits in well with ideas put forward by a number of researchers about the effects of the conversational context (Bless, Strack & Schwartz, 1993; Grice, 1975; Hilton, 1995). In our view the conversational context also plays a role in experimental settings where the experimenter communicates information to the participants. Participants try to make sense of the situation and the task before them. In doing so they draw on their previous experience and a repertoire of social rules and conventions. When the meaning or the purpose of the task is insufficiently specified or explained, participants often feel forced to 'go beyond the information given' in order to make sense of the task they are engaged in. Unfortunately, researchers do not always take this into account (cf. Tajfel, 1972). For example, Stapel, Reicher & Spears (1995) showed that the availability bias is partly a product of participants' misunderstanding about the true nature of the experimental task, and that the bias was largely eliminated when the purpose of the task became clear. Thus, experimental settings can create expectations about the task that can be different from those originally envisaged by the researchers who devised the paradigm. With respect to the illusory correlation task, it seems reasonable to expect differences between the stimulus groups because they are presented by different names. If so, the observed illusory correlation effects may be a product of these expectations rather than of biased information processing (Berndsen & Spears, 1997). In the present study we investigate participants' expectations by means of manipulating the instructions presented to them.

STUDY 1

The first study tests whether the instructional context of the standard illusory correlation task affects the perception of covariation between group membership and the desirability of behaviour. This involves both participants' interpretation of the instructions and the use of the group labels A and B. With respect to these labels, participants might reason to themselves 'presumably there must be a difference between the two, otherwise why should they be separate groups, and why would the experimenter be asking me to study information about them?' (see also McGarty & Turner, 1992). Moreover, the fact that research on covariation detection suggests that people find it very difficult to detect non-contingency (Peterson, 1980) might reflect this general expectation. Peterson argued that participants' failure to recognize non-contingency is due to the expectations that they bring to experiments that preclude randomness as a potential description of the experimental task. Nevertheless, researchers working in this field have generally paid very little attention to the possibility of such expectations, presumably because there is no obvious reason for expectations to take a particular direction or form (one of the few exceptions is the work of McGarty & de la Haye, 1997).

This line of reasoning suggests that illusory correlation might even disappear once this general assumption of group difference is undermined. Recent research by Haslam, McGarty & Brown (1996) provided some support for this idea by demonstrating that the illusory correlation effect is eliminated when the stimulus groups consist of right- and left-handed persons rather than groups A and B. Presumably the evaluative dimension is not relevant in helping to differentiate between these groups. However, it is possible that the study of Haslam *et al*. (1996) does not deal with stereotype *formation* as is the case in the standard illusory correlation task, because participants might know (from interactions) that there are no clear evaluative differences between left- and right-handed people (although there could be other bases to differentiate between them). The knowledge or pre-existing stereotype that there are no differences may have led to attenuated illusory correlation effects. In the present study we used stimulus groups of which participants have far less direct knowledge, namely students from previous study years (1993, 1994). Of course, some participants might know some particular students from '93 or '94, but the point is that there is no obviously general shared knowledge about these student groups as to how they might differ. Thus, we argue that participants *expect* that these student groups will not be different from each other, rather than *know* they do not differ based on experience. These stimulus groups are therefore more directly related to the issue of stereotype formation than may have been the case for Haslam *et al*. (1996).

In one condition of the present study the stimulus groups were presented as group

A and group B (as in the standard illusory correlation task), and we predict that participants in this condition expect to find differences between the groups. We refer to this condition as the 'expectation condition'. In the other condition the stimulus groups consisted of students who started their university study in either 1993 or 1994. We predict that the latter would *undermine* participants' expectations of finding differences between the groups of students because of the absence of any meaningful or *a priori* basis for intergroup differentiation. This condition is therefore termed the 'no-expectation condition'.

The second factor investigated in the present study is also related to the instructions provided in the illusory correlation task. The authors attempted to undermine intergroup differentiation by manipulating the instructions. The authors therefore created an instruction in which participants' attention would be drawn to differences in behaviour *within* each group, the idea being that participants should thereby be distracted from differentiating between the stimulus groups. This condition is termed the 'weak intergroup condition'. Participants in the other condition received the standard instructions as in the study of Hamilton & Gifford (1976). We refer to this condition as the 'standard condition'. If intergroup differentiation does play a role in the formation of illusory correlation, participants in the standard condition should display more illusory correlation than participants in the weak intergroup condition. This is because the standard instruction will encourage differentiating comparisons between the groups. An instruction that emphasizes intragroup differences should reduce attempts to differentiate between the groups and attenuates the illusory correlation effect.

With respect to the perception of illusory correlation, the authors predict an interaction between instruction and expectation such that expecting group differences will lead to illusory correlation when participants received the traditional instructions, but not when they received weak intergroup instructions. Expecting no differences between the stimulus groups should attenuate the perception of illusory correlation. In other words, the authors only predict an illusory correlation effect in the condition where participants are presented with the traditional instructions and where they also expect to find group differences. In all other conditions, an illusory correlation effect is not predicted.

Method

Participants and design

Participants were 93 students of the University of Amsterdam who were paid for their participation. This study formed a 2 (instruction: traditional vs. weak intergroup) $\times$ 2 (expectation vs. no-expectation) between-participants factorial design. Participants were randomly assigned to one of the four experimental conditions.

Stimulus materials and procedure

In the expectation condition, participants were presented with similar instructions as to those of Hamilton & Gifford (1976). No-expectations were induced by informing participants that the behaviour came from students of the University of Amsterdam who started their study either in 1993 or in 1994, and that this experiment was part of a large-scale research project in which students of the 1980s were being compared with students of the 1990s. Furthermore, participants were told that, because there were fewer students in 1993 than in 1994, statements describing students of 1993 would occur less frequently. Next, all participants were asked to what extent they expected the groups to be different on a 9-point scale ranging from 'not at all different' (1) to 'extremely different' (9).

Participants in the weak intergroup condition were asked to detect two distinct types of people (students) in each group (year), in contrast to the traditional condition in which no additional information was provided. Next, participants were provided with the statements (16 positive and 8 negative behaviours from group A or 1994 students, and 8 positive and 4 negative behaviours from group B or 1993 students). After viewing the statements, participants were asked how salient particular information was during the presentation of the stimuli. They indicated their opinions on the following four items using 9-point rating scales ranging from 'not at all salient' (1) to 'extremely salient' (9):

1. The difference between the positive and negative behaviours in group B.
2. The difference between the positive and negative behaviours in group A.
3. The difference in positive behaviours between group A and group B.
4. The difference in negative behaviours between group A and group B.

Items 1 and 2 were designed to measure the degree of *intragroup* differences, and items 3 and 4 measure the degree of *intergroup* differences. Finally, the participants completed the three measures of illusory correlation. In the assignment task, participants again received all the statements without group membership. They were asked to indicate group membership of the person who performed each of the behaviours. For the frequency estimation task, participants were informed that 24 behaviours were from members of group A and 12 behaviours from members of group B. They were asked to estimate how many of the statements about members of both groups described desirable and undesirable behaviours. In the final task, the trait rating task, participants were asked to evaluate groups A and B on four 9-point rating scales: 'unpleasant' (1)–'pleasant' (9); 'friendly' (1)–'unfriendly' (9); 'unsympathetic' (1)–'sympathetic' (9); 'reliable' (1)–'unreliable' (9).

Results

Manipulation checks

Our prediction that presenting the stimulus groups as group A and B would result in higher ratings of expected differences between these groups ($M = 4.93$), as compared to the stimulus groups presented as students from 1993 and 1994 ($M = 2.88$), was supported: $t(91) = 5.56$, $p < .001$. In other words, the manipulation of expectation was successful.

With respect to the salience of the presented stimuli, an analysis of variance (MANOVA) with expectations and instructions as between-subjects factors and two within-subjects factors was conducted. The results showed a significant interaction between instruction and intra- vs. intergroup salience (within-subjects factor) ($F(1,89) = 20.70$, $p < .001$). As expected, with the traditional instructions the between-groups differences ($MA^+B^+ = 4.95$; $MA^-B^- = 4.61$) were more salient than with the weak intergroup instructions ($MA^+B^+ = 3.51$; $MA^-B^- = 3.61$) ($F(1,89) = 8.19$, $p < .01$). This effect was reversed for the within-group differences, which were more salient ($F(1,89) = 14.30$, $p < .001$) for the weak-intergroup ($MA^+A^- = 5.84$; $MB^+B^- = 5.94$) than for the traditional instructions ($MA^+A^- = 4.09$; $MB^+B^- = 4.48$). In short, the manipulation of salience via instructions was successful. Furthermore, expectations about differences between the stimulus groups resulted in higher salience ratings of between-group differences as compared to no-expectations ($F(1,89) = 6.69$, $p < .05$).

Illusory correlation measures

Table 1 reports the means on the three measures of illusory correlation for each condition, with the actual numbers given in parentheses in the first column. In order to test for illusory correlation, a phi coefficient was computed from each participant 2×2 contingency table derived from the responses on the assignment task and the frequency estimation task. Although it is common practice to transform the phi coefficients to Fisher's Z scores (e.g. Hamilton & Gifford, 1976), research by Haslam & McGarty (1994) showed that such transformations are not justified when the phi and Z scores have no normal distributions. Because of this, we checked the distributions of these scores. After establishing that both phi and Z had generally normal distributions, the phi coefficients were converted to Fisher's Z scores and compared to zero. From Table 1 it can be seen that these scores differed significantly from zero only in the condition with the traditional instructions and expected differences between the stimulus groups.

After recoding the rating scales for 'friendly–unfriendly' and 'reliable–unreliable', one evaluative index score was computed based on the four scales of the evaluative rating task (Cronbach's alpha of group A is .74, and of group B is .68). The possible range of the index score was from 1 to 9, a higher rating indicating a more positive evaluation. The mean ratings for group A and group B are presented in Table 1. As expected, only in the traditional instruction–expectation condition was group B evaluated more negatively than group A.

The predicted interaction between instruction and expectation was significant for the assignment task ($F(1,89) = 7.71$, $p < .01$) the evaluative rating task ($F(1,89) = 6.18$, $p < .05$) and approached significance on the estimation task ($F(1,89) = 3.09$, $p < .09$). As predicted, participants who expected to find differences between the stimulus groups displayed illusory correlation effects when they were presented with the traditional instructions, but not with the weak intergroup instructions (assignment task: $F(1,89) = 4.89$, $p < .05$; estimation task: $F(1,89) = 5.48$, $p < .05$; evaluative rating task: $F(1,89) = 8.85$, $p < .01$). Having no expectations concerning differences between the groups did not result in significant differences in illusory correlations between the traditional and weak intergroup instruction (assignment task: $F(1,89) = 2.69$, n.s.; estimation task: $F(1,89) = .01$, n.s.; evaluative rating task: $F(1,89) = .11$, n.s.).[1] Moreover, planned contrasts supported our prediction involving the occurrence of illusory correlation in the condition with the traditional instructions and where differences between the groups were expected, as compared to the other conditions (assignment task: $F(1,89) = 5.25$, $p < .05$; estimation task: $F(1,89) = 6.64$, $p < .05$; evaluative rating task: $F(1,89) = 13.28$, $p < .001$).

Accuracy of assignments

The bottom row in Table 1 reports the proportion of correct responses on the assignment task. With respect to the overall accuracy in recall, there were no significant main effects of instruction ($F(1,89) = .12$, n.s.) or expectation ($F(1,89) = .90$, n.s.), and there was no significant interaction between these factors ($F(1,89) = .20$, n.s.).

[1] Analysis of variance also revealed a significant effect of expectation ($F(1,89) = 4.55$, $p < .05$) and the effect of instruction approached significance ($F(1,89) = 3.32$, $p < .08$) on the evaluative rating task.

Table 1. Illusory correlation as a function of instructions and expectations (Study 1)

	Instruction			
	Traditional expectation		Weak intergroup expectation	
	A/B[b] ($N = 22$)	93/94[b] ($N = 22$)	A/B[b] ($N = 22$)	93/94[b] ($N = 27$)
Assignment task				
Positive A (16)	15.05	13.64	13.00	14.67
Negative B (4)	5.86	4.36	5.05	5.37
*Z*phi[a]	.14*	−.07	−.04	−.06
Estimation task				
Positive A (16)	14.95	13.95	13.77	14.78
Negative B (4)	5.91	5.14	5.05	4.81
*Z*phi[a]	.12*	.01	−.00	.02
Evaluative rating				
Mean A	6.25	5.34	5.32	5.49
Mean B	5.15	5.59	5.48	5.55
Difference[a]	1.10**	−.25	−.16	−.06
Mean proportion recalled accurately	.70	.68	.71	.66

*$p < .05$; **$p < .001$.
[a]Level at which mean is different from zero (based on one-tailed *t* tests).
[b]A/B refers to the expectation involving intergroup differences, 93/94 refers to no-expectations.

Discussion

The results of the present study show that labelling the stimulus groups as A and B increased the expectation that these groups would differ as compared to the case where the groups were labelled as students of '93 and '94. As expected, the weak intergroup instructions emphasized the salience of intragroup differences at the expense of intergroup differences in contrast to the traditional instructions as shown by the differential salience ratings. Moreover, the salience of intergroup differences (caused by both the traditional instructions and expectations) tended to be associated with increased illusory correlation effects. The salience of intragroup differences (caused by the weak intergroup instructions) resulted in reduced illusory correlation effects as compared to the traditional instructions. Thus, the standard instructions seemed to enhance intergroup differentiation although participants were not explicitly asked to do so.

The differential effects of instructions and expectations on the perception of illusory correlation cannot be derived from the ideas of Hamilton & Gifford (1976), Fiedler (1991; Fiedler *et al.*, 1993), and Smith (1991), because ostensibly these approaches would predict similar levels of illusory correlation in all our conditions.

The finding that the illusory correlation effect occurred only in the condition that is similar to the standard illusory correlation task (e.g. Hamilton & Gifford, 1976) indicates that features of the standard task such as the traditional instruction and group labels A and B are important elements in producing intergroup differentiation. This supports the ideas of McGarty *et al*. (1993) that the illusory correlation effect can arise from meaningfully differentiating between the stimulus groups. In the case of an unusual situation such as the illusory correlation task, it seems perfectly rational to expect group differences between groups with different names and, consequently, to differentiate between these groups.

The fact that stimulus groups simply identified by A and B help to *create* expectations about differences between them is ironic, because the group labels A and B were originally used with the intention of eliminating expectations associated with real groups which might otherwise explain illusory correlations (see Hamilton & Rose, 1980). In this study, however, meaningful labels eliminated the illusory correlation effect compared to the meaningless label condition. This suggests that the general expectation that there should be a difference between the groups plays an important role in data-based as well as expectation-based illusory correlations. These two types of illusory correlations are usually treated separately because expectation-based illusory correlations are considered as explanations for maintaining stereotypes about socially meaningful groups (e.g. Hamilton & Rose, 1980), whereas data-based illusory correlations are seen as explanations for the formation of stereotypes (e.g. Hamilton & Sherman, 1989). Based on the present findings, we would argue that these two types of illusory correlation are not independent, but both deal to some extent with expectations concerning differences, irrespective of whether the groups are socially meaningful or meaningless.

There is one possible alternative explanation for the results of the intragroup manipulation. It could be that asking participants to detect two different sorts of people within each group induces an additional task demand that increases cognitive load and that this, rather than salience *per se*, explains the elimination of illusory correlation. Although it is possible to argue that the illusory correlation effect actually depends on some degree of load for its operation (i.e. to prevent perfect recall), Stroessner, Hamilton & Mackie (1992) argued that when load is too high this can prevent distinctiveness detection. Although their research used a rather indirect manipulation of load (mood induction), it seems important to consider this possibility. We think that cognitive load cannot explain the present result for two reasons. First, the salience manipulation checks are consistent with the salience-based interpretation. Second, the overall level of accuracy in recall[2] was not significantly lower for the weak intergroup instruction than for the traditional instruction,

[2] It is worth noting that the *overall* level of accuracy in recall was not associated with different levels of illusory correlation. Although it is customarily assumed that lack of illusory correlation is related to more accuracy than the occurrence of illusory correlation, the present studies do not support this view. These findings are consistent with other research suggesting that the absence of illusory correlation can be associated with just as much error as significant illusory correlations (McGarty & de la Haye, 1997). Berndsen, van der Pligt, Spears & McGarty (1996*b*) also demonstrated that the absence of illusory correlations is not necessarily related to more accuracy in recall of the stimuli than when illusory correlations are present. The present findings involving accuracy are also consistent with evidence that covariation biases are not easily eliminated by incentives to be accurate (e.g. Chapman & Chapman, 1982).

suggesting that load had no significant impact on the ability to recall or encode information *per se*. The argument that weak intergroup instruction *distracted* attention from the intergroup comparison is of course precisely the position we are proposing. Taken together, we think that our interpretation in terms of reduced category salience is the most parsimonious and plausible one.

To summarize, the first study showed that different aspects of the instruction in the standard illusory correlation task affect the perception of illusory correlation. Both the group labels A and B, and the traditional instructions encourage expectations about intergroup differences. In the next study we investigate another feature of the illusory correlation task, namely the stimulus distribution.

STUDY 2

According to McGarty *et al*. (1993), participants test whether one group is 'better' than the other group. Results of our first study support this view by showing that drawing attention to intragroup differences undermined intergroup differentiation, and expecting no intergroup differences reduced the illusory correlation effect. These results imply that the *group dimension is more focal* and has more impact in producing illusory correlation than the behavioural dimension.

Based on this, it seems useful to investigate whether the dominance of the group dimension over the behaviour dimension is affected by the distribution of the stimuli presented to participants. Therefore, the purpose of the present study is to disentangle the relative contribution of the group and behaviour dimensions of the stimulus distribution to the perception of illusory correlation. In line with the first study, we expect that any emphasis on the group dimension will stimulate comparison between the stimulus groups, resulting in stronger illusory correlations. With respect to the stimulus distribution, one such factor is relative group size. Following Grice's (1975) work on conversational norms as well as our analysis of participants expectations about group differences (Study 1), participants might reason that 'the presence of a majority and minority group suggests that these groups should differ on a certain dimension otherwise such a group distinction would not exist.' Greater disparity in group size is likely to provide at least one salient dimension on which the groups already differ, providing a cue for further differentiation.

We hypothesize that large differences in group size will increase the salience of the group dimension, and that large differences on the behaviour dimension will increase the salience of the behaviour dimension. It then follows from the dominance of the group dimension that the salience of this dimension will result in stronger illusory correlation effects as compared to the salience of the behaviour dimension.[3] In the

[3] This prediction is in line with research by Ford & Stangor (1992) who showed that group stereotypes emerge when the intragroup differences in terms of behaviours are small rather than large. However, an important difference between our experiment and that of Ford & Stangor is that in the present study stimulus groups do not differ from each other, either in their variability of behaviours, or in their means (in all of Ford & Stangor's studies the groups differ from each other on one or both of these dimensions). The present study therefore adds a novel perspective to research on stereotyping, namely that the group dimension has more impact on stereotyping than the behaviour dimension, and that within the illusory correlation paradigm this should lead to enhanced illusory correlation.

Table 2. Distribution of the presented positive and negative behaviours for the three conditions (Study 2)

	Group prominence		Behaviour prominence		Standard	
	Positive	Negative	Positive	Negative	Positive	Negative
Group A	20	10	20	4	16	8
Group B	4	2	10	2	8	4

latter case the focus will be more on intragroup differentiation at the expense of intergroup differentiation. We manipulated the salience of each of the two dimensions by varying either the relative frequency of the minority group (group B) or that of the minority behaviour (negative behaviour) according to the distribution in Table 2.

In the 'group-prominent condition' the group dimension is presumed to be more salient than the behaviour dimension because the number of group B members is smaller (6) than the number of negative behaviours (12), and this increases the difference between the groups in terms of group size. This is reversed in the 'behaviour-prominent condition' in which the number of negative behaviours is smaller (6) than the number of group B members (12), thereby increasing the difference on the behaviour dimension. In the 'standard condition', the number of negative behaviours is equal to the number of group B members (12), creating equal salience of the group and behaviour dimensions. We expect that the increased disparity in group size (the first condition) increases the salience of the group dimension, and consequently, facilitates the differentiation between groups, leading to greater illusory correlation. With respect to the behaviour-prominent condition, we expect the increased salience of the behaviour dimension to inhibit intergroup differentiation, resulting in weaker illusory correlation effects as compared to the standard condition.

These predictions add to the original explanation of illusory correlation addressed by Hamilton & Gifford (1976), because their explanation makes no explicit distinction between the relative contribution of the group and behaviour dimension. Based on their distinctiveness hypothesis, we would predict more illusory correlation in both the group-prominent and behaviour-prominent conditions as compared to the standard condition, because the negative behaviours from group B should be more distinctive to the perceiver (cell frequency 2) than in the standard distribution (cell frequency 4). Furthermore, no difference between the group-prominent and behaviour-prominent conditions should be expected because they have the same number of distinctive stimuli.

The information loss account proposes that to the extent that the positivity of behaviours is more difficult to detect, the minority group is likely to suffer most from this effect. This means that information loss is stronger for small samples than for large samples resulting in illusory correlation. Following this line of reasoning, the illusory correlation effects should be the strongest in the group-prominent condition because of the smallest minority group (6 members) compared to the behaviour-prominent and standard conditions (12 members). Because of the equal group sizes in the latter conditions, a similar level of illusory correlation should be expected. Smith's (1991) explanation that the illusory correlation effect is a result of selective access to information in memory suggesting the positivity of group A over group B would lead to similar predictions as the (selective) information loss account.

To summarize, the aim of the second study is to investigate the relative weight of the group dimension and behaviour dimension in the perception of illusory correlations. We predict stronger illusory correlations in the group-prominent condition than in the behaviour-prominent and standard conditions, and stronger illusory correlations in the standard than in the behaviour-prominent condition. This prediction is consistent with the explanation of McGarty *et al*. (1993).

As in Study 1, participants rated the salience of the intragroup and intergroup differences. We expect that the manipulation of statistical distribution would be reflected in the reported salience. This should result in interactions between the conditions and salience ratings. More specifically, participants in the group-prominent condition should judge the intergroup differences to be more salient than participants in the other conditions, whereas the intragroup differences should be judged to be more salient in the behaviour-prominent condition than in the other conditions.

Method

Participants and design

Participants were 71 psychology students at the University of Amsterdam, who were paid for their participation. Participants were run in groups of no more than 10 people per session. They were randomly assigned to the three experimental conditions: group-prominent condition, the behaviour-prominent condition and the standard condition.

Stimulus materials and procedure

In the experiment each participant sat in front of a personal computer. Participants were provided with the same instructions as in Study 1, and presented with stimuli according to the distribution in Table 2. As shown in this table there is no correlation between group membership and behaviour in any condition. Furthermore, the total number of stimuli presented is the same in the conditions. The stimuli were shown at a rate of 7 seconds per statement. The particular behaviours were rotated between the groups in each distribution while maintaining these distributions. After viewing the statements, participants completed the three measures of illusory correlation as in the first study with an exception involving the frequency estimation task. Participants in the group-prominent condition were informed that 30 behaviours were from members of group A and 6 behaviours from members of group B. Participants in the behaviour-prominent and in the standard conditions were informed that 24 statements came from group A members and 12 from group B members. All participants were asked to estimate how many of the statements about members of both groups described desirable and undesirable behaviours. Finally, they completed the salience questions involving intergroup and intragroup differences (see Study 1). In the present study we changed the order of these post-test questions compared to the first study. We did this because we were concerned with the reactivity of the questions and in particular whether asking about particular saliences might cause participants to remain committed to their responses on the subsequent illusory correlation measures.

Results

Manipulation check

The mean ratings for the four post-test items concerning the salience of the presented stimuli are shown in Table 3. An analysis of variance (MANOVA) resulted in a significant interaction between condition (between-subjects factor) and the intra- vs. intergroup salience (within-subjects factor) ($F(2,68) = 10.36$, $p < .001$). Further analyses revealed a significant interaction between condition and the intra-items ($F(2,68) = 6.52$, $p < .01$), and between condition and the inter-items ($F(2,68) = 7.12$, $p < .01$). As predicted, participants in the group-prominent condition judged the behavioural differences between the stimulus groups to be more salient than other participants (compared to behaviour-prominent condition: $F(1,68) = 13.92$, $p < .001$; compared to standard condition: $F(1,68) = 8.58$, $p < .01$). There were no significant differences in salience of intergroup differences between the behaviour-prominent and standard conditions ($F(1,68) = .32$, n.s.). Furthermore, and as predicted, differences within the stimulus groups were more salient in the behaviour-prominent condition than in the other conditions (compared to group-prominent condition: $F(1,68) = 3.91$, $p < .05$; compared to standard condition: $F(1,68) = 9.13$, $p < 01$). The group-prominent and standard conditions did not differ significantly in their salience ratings of within-group differences ($F(1,68) = .03$, n.s.). In short, the manipulation of salience was successful.

Table 3. Manipulation check: Means for post-test items as a function of stimulus distribution (Study 2)

	Group prominence $N = 22$	Behaviour prominence $N = 25$	Standard $N = 24$
Intragroup salience			
Positive vs. negative behaviour in group B	4.46	6.12	4.54
Positive vs. negative behaviour in group A	5.41	6.84	5.58
Intergroup salience			
Positive behaviour between group A and B	6.18	4.48	4.75
Negative behaviour between group A and B	5.91	4.48	4.67

Note. Scale is from 1 to 9; higher means indicate more salience.

Illusory correlation measures

Table 4 shows the means concerning the attribution of behaviours and frequency estimates of positive and negative behaviours in the two groups, for each condition, with the actual numbers given in parentheses. In all conditions the negative behaviours in group B were over-represented. As in Study 1, the phi coefficients on the assignment task and the frequency estimation task were computed from each participant's 2×2 contingency table. Again, the phi and Fisher's Z distributions were generally normal (Haslam & McGarty, 1994), and Z scores were used. In each condition the mean transformed phi scores on both tasks were compared to zero, and nearly all of these scores differed significantly from zero, except that these differences approached significance on the assignment task in the behaviour-prominent and standard conditions.

Table 4. Illusory correlation as a function of stimulus distributions (Study 2)

	Group prominence $N = 22$	Behaviour prominence $N = 25$	Standard $N = 24$
Assignment task			
Positive A	19.50 (20)	19.32 (20)	14.50 (16)
Negative B	4.00 (2)	2.56 (2)	5.38 (4)
Z phi[a]	.17****	.06*[b]	.05*[c]
Estimation task			
Positive A	21.36 (20)	16.40 (20)	15.25 (16)
Negative B	2.86 (2)	4.60 (2)	5.38 (4)
Z phi[a]	.16****	.07**	.08***
Evaluative rating			
Mean A	6.51	6.03	6.12
Mean B	4.60	5.53	5.17
Difference[a]	1.91****	.50*[d]	.95***

**$p < .05$; ***$p < .01$; ****$p < .001$.
[a]Level at which mean is different from zero (based on one-tailed t tests).
[b]*$p < .07$.
[c]*$p < .09$.
[d]*$p < .06$.

With respect to the evaluative rating task, the rating scales for 'friendly–unfriendly' and 'reliable–unreliable' were recoded to yield one evaluative index score based on the four scales. These rating scales yielded a Cronbach's alpha of .69 (group A) and .75 (group B). The mean ratings for group A and group B are presented in Table 4. It can be seen that in nearly all conditions group B is evaluated more negatively than group A, although this was nearly significant in the behaviour-prominent condition.

The predicted effect of condition approached significance on the assignment task ($F(2,68) = 2.82$, $p < .07$) and estimation task ($F(2,68) = 2.51$, $p < .09$). The interaction between condition and the evaluative ratings of group A and B (within-subjects factor) was significant ($F(2,68) = 4.86$, $p < .05$). Planned comparisons revealed that participants in the group-prominent condition displayed generally more illusory correlation as compared with participants in the other conditions. The difference in illusory correlation between the group- and behaviour-prominent condition was significant on all measures (assignment task: $t(68) = 2.01$, $p < .05$; estimation task: $t(68) = 2.10$, $p < .05$; evaluative ratings (after computing the difference between group A and B): $t(68) = 3.07$, $p < .01$). The difference in illusory correlation between the group-prominent and standard condition was also significant on the assignment task ($t(68) = 2.13$, $p < .05$) and on the evaluative ratings ($t(68) = 2.08$, $p < .05$), and approached significance on the estimation task ($t(68) = 1.78$, $p < .09$).[4] In contrast to our prediction, there were no significant differences between the behaviour-prominent and standard condition on the three illusory correlation measures (all $t < 1$).

Relation between intragroup and intergroup salience and illusory correlation

According to Tajfel (Tajfel & Wilkes, 1963) categorization occurs to the extent that between-category differences and within-category similarities are accentuated. Although we measured the salience of the between-group and within-group differences after the illusory correlation measures, we hypothesized that the effect of condition on the perceived covariation depends upon the salience ratings of these differences. Testing the hypothesis assumes a linear relationship between the perceived salience and illusory correlation. However, the relation between the illusory correlation scores and salience might be curvilinear: high salience ratings of intergroup differences and low salience ratings of intragroup differences could be associated with both positive and negative illusory correlation effects (i.e. group A is evaluated more positively than group B, or the reverse). This is because in the post-test items we asked for the *degree* of differentiation between and within the groups, and not for the *direction* of differentiation.

In a regression analysis we tested the curvilinear and linear relationships between both the salience ratings of intergroup differences and the illusory correlation scores, and the salience ratings of intragroup differences and the illusory correlation scores. The results revealed no significant curvilinear or linear relations between the ratings of intragroup differences and the scores on either of the illusory correlation measures. The results for the ratings of intergroup differences are reported in Table 5. From Table 5 it can be seen that there were significant linear relations between the salience ratings of intergroup differences and the illusory correlation scores on all three measures. Only on the evaluative rating task was there also a significant curvilinear relation. The occurrence of linear, rather than curvilinear, relationships is not surprising because the few negative illusory correlation scores were only slightly negative.

Next, we tested the hypothesis that the effect of condition on the perceived illusory correlation is mediated by the salience of intergroup differences in path analyses

[4] This relatively high p value is due to the limited sample size. Power analysis (Stevens, 1986) yielded a power of approximately .28, indicating a very poor chance of finding a significant difference in this case. In order to obtain adequate power here, twice as many participants would be required.

Table 5. Results of hierarchical regression analysis of the salience ratings of intergroup differences on three measures of illusory correlation (Study 2)

	Salience ratings of intergroup differences			
	Linear		Curvilinear	
Predictor	β	R^2	β	R^2 change
Assignments	.30	.09**	−.01	.00
Frequency estimates	.24	.06*	.09	.01
Evaluative ratings	.39	.15***	.35	.12**

*$p < .05$; **$p < .01$; ***$p < .001$.

according to the procedures of Baron & Kenny (1986). As shown before, there was a significant effect of condition on the mediator (i.e. the salience scores) ($F(2,68) = 7.12, p < .01$), as well as on illusory correlation on the evaluative ratings ($F(2,68) = 4.86, p < .05$). The effect of condition approached significance on the assignment task ($F(2,68) = 2.82, p < .07$) and on the estimation task ($F(2,68) = 2.51, p < .09$). After controlling for salience of intergroup differences, the effect of condition on illusory correlation decreased to a non-significant level for each measure of illusory correlation (assignment task: $F(2,67) = 1.08$, n.s.; estimation task: $F(2,67) = 1.17$, n.s.; evaluative ratings: $F(2,67) = 1.91$, n.s.). In other words, the perception of illusory correlation rests upon the salience of between-group differences.

GENERAL DISCUSSION

Results of the second study show that when the group dimension is emphasized by the infrequency of the minority group (group-prominent condition), intergroup differences are seen as more salient than without such emphasis on this dimension. An analogues effect occurred when intragroup differences were judged as particularly salient. These results support our assumption that skewed distributions can increase the salience of either the group or behaviour dimension.

This study further demonstrates that different statistical distributions affect the perception of covariation (while the total number of perceived stimuli remains the same). As predicted, participants in the group-prominent condition displayed stronger illusory correlation on all measures of illusory correlation as compared to participants in the behaviour-prominent condition and also on two measures of illusory correlation (see footnote 4) as compared to participants in the standard condition. In other words, the findings of the present study generally indicate that the group dimension has more impact on the perception of illusory correlation than the behaviour dimension.

Unfortunately, our prediction concerning lower levels of illusory correlation in the behaviour-prominent than in the standard condition was not supported. There are a number of possible candidates for explaining this finding, for example, memory processes (Fiedler, 1991; Fiedler *et al*., 1993; Smith, 1991), and the distinctiveness account (Hamilton & Gifford, 1976). However, the present study extends the distinctiveness explanation because there is less illusory correlation in the behaviour-prominent than in the group-prominent condition despite the fact that the size of the most infrequent cell remained constant. Therefore, the finding that different statistical distributions produce differential illusory correlation effects indicates at least a modification of the paired-distinctiveness explanation such that infrequency on the group dimension has more weight in producing illusory correlation than infrequency on the behaviour dimension.

The similar levels of illusory correlation in the behaviour-prominent and standard conditions suggest that the salience of the group dimension is the main determinant of the illusory correlation effect, independent of the behaviour dimension. That is, although these conditions are dissimilar with respect to the frequency of the different behaviours, the overall frequency of the behaviours in the groups is equal. Indeed, participants in these conditions indicated no significant differences in the judged salience of intergroup differences. Moreover, the strong impact of the group component is also supported by the finding that the perception of illusory correlation depends upon the salience of intergroup differences rather than on the salience of intragroup similarities. Covariation analysis revealed that the manipulation of the statistical distribution affected the level of illusory correlation by increasing the salience of intergroup differences. In other words, illusory correlation increases as a function of perceived between-group differences.[5]

The finding that the perception of illusory correlation is not affected by the salience of intragroup similarities in the present study (see also Tajfel & Wilkes, 1963) is in contrast with the effects of the weak intergroup instructions in the first study. These opposing findings could be due to the different manipulations, such that the weak intergroup instructions have more impact in reducing the illusory correlation effects than extreme disparities on the behaviour dimension of the stimulus distribution. This suggestion is supported by the illusory correlation scores in Tables 1 and 4. The finding that participants in the behaviour-prominent condition still displayed a certain level of illusory correlation could be attributed to the traditional instructions

[5] One might question whether illusory correlation rests upon the task order making the intergroup differences salient. This would also call into question the validity of the manipulation check. We would argue that participants' responses on the post-test statements are not confounded with the preceding perception of illusory correlation. First, in introducing the post-test items, we referred to participants' experiences during the stimulus presentation stage. Second, support for the validity of the manipulation check is provided by the differential judgments of intragroup salience between the behaviour-prominent and standard condition. This finding can be explained by the statistical manipulation, but not by the preceding illusory correlation effect because the conditions do not differ in that respect. With respect to the covariate issue and in particular the order of the tasks, we tested whether the judged salience depends upon the preceding perception of illusory correlation. In general, we did not find support for this. An analysis of variance with illusory correlation as the covariate and salience of intergroup differences as the dependent variable revealed that the effect of condition remained significant on all measures of illusory correlation (assignment task ($F(2,67) = 5.13$, $p < .01$; estimation task ($F(2,67) = 5.55$, $p < .01$); evaluative rating task ($F(2,67) = 3.98$, $p < .05$). Thus, the judged salience of intergroup differences could seem not to rest upon the preceding perception of illusory correlation. In short, even though judgments of salience were given after completing the illusory correlation tasks, there is no strong evidence that this order threatened the validity of the manipulation check and the determining role of intergroup salience in the perception of illusory correlation.

that enhance intergroup differentiation. Thus, this confound could have undermined the expected attenuation of illusory correlation. In summary, with the traditional instructions it is the skewness of the group dimension that drives the illusory correlation effect, irrespective of a greater skewness on the behaviour dimension. With the weak intergroup instructions the impact of the group dimension disappears.

To summarize, the present studies show that focusing on the group dimension rather than on the behaviour dimension enhances intergroup differentiation. In judgment tasks involving two groups, participants try to differentiate between groups but their responses will also be determined by intragroup differences and their expectations about these groups. This conclusion is consistent with self-categorization theory. Our research supports the view that factors drawing attention to the intergroup dimension and intergroup differences (by means of instructions or by increasing the skewness on the group dimension) will increase illusory correlation, whereas factors drawing attention to the intragroup dimension and intragroup differences will undermine it. Default expectations that the group *may* differ may also facilitate the perception of such illusory correlation.

The relevance of these studies is that they show how judgments are governed by the context in which the information is presented and processed. This can be related to the early work of Asch (1952), who demonstrated that differential interpretations of a statement are heavily influenced by the conversational context in which the statement appeared. With respect to the pragmatics of communication in the illusory correlation task, we have shown in a paradigm traditionally proposed to tap a basic cognitive information-processing bias, that the meaning of the presented stimulus material is not fixed but shaped by participants' inferences about the task. In other words, the construal of the social situation of the experiment and communicative processes help to shape the occurrence of categorization. Rather than reflecting the unwanted product of an information-processing bias, illusory correlation can be regarded as a process of meaningful categorical differentiation in which people use features of the data, the instructions and their expectations to make sense of the task. This then can be considered as evidence of rational and sensible behaviour (Berndsen & Spears, 1997).

This view of illusory correlation also has implications for the general issue of stereotyping. The most common view of stereotypic beliefs within social psychology is that they result from cognitive information-processing biases. This is based on the assumption that the information in our social environment is too complex for our processing capabilities, hence we need to simplify this information, which then results in stereotypes (see e.g. Fiske & Taylor, 1984, 1991; Hamilton, 1981). According this view, stereotypes are erroneous generalizations based on distorted or illusory perceptions of individuals as group members. The illusory correlation has certainly served to reinforce this view of stereotype formation. However, we have demonstrated that illusory correlations and stereotypes are also dependent upon the interpretation of the experimental task. Even though stereotypes can be exaggerated and erroneous, it is important to understand that they can arise from a rational sense-making process. If so, the problems associated with stereotyping (prejudice, ethnocentrism) may be better located in social and evaluative factors than in the deficiencies of psychological functioning.

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