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Illusory correlation, group size and memory

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HIGHLIGHTS

- A multi-component, connectionist model of illusory correlation is tested.
- Novel extensions are introduced to IC paradigm to allow a test of the model.
- A mixed logistic regression approach to signal-detection analysis is introduced.
- Predictions regarding episodic and evaluative information are largely confirmed.
- Evaluative group judgements unrelated to behavioral memory as predicted by the model.

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ABSTRACT

Two studies were conducted to test the predictions of a multi-component model of distinctiveness-based illusory correlation (IC) regarding the use of episodic and evaluative information in the production of the phenomenon. Extending on the standard paradigm, participants were presented with 4 groups decreasing in size, but all exhibiting the same ratio of positive to negative behaviours. Study 1 ($N = 75$) specifically tested the role of group size and distinctiveness, by including a zero-frequency cell in the design. Consistent with predictions drawn from the proposed model, with decreasing group size, the magnitude of the IC effect showed a linear increase in judgments thought to be based on evaluative information. In Study 2 ($N = 43$), a number of changes were introduced to a group assignment task (double presentation, inclusion of decoys) that allowed a more rigorous test of the predicted item-specific memory effects. In addition, a new multilevel, mixed logistic regression approach to signal-detection type analysis was used, providing a more flexible and reliable analysis than previously. Again, with decreasing group size, IC effects showed the predicted monotonic increase on the measures (group assignment frequencies, likability ratings) thought to be dependent on evaluative information. At the same time, measures thought to be based on episodic information (free recall and group assignment accuracy) partly revealed the predicted enhanced episodic memory for smaller groups and negative items, while also supporting a distinctiveness-based approach. Additional analysis revealed that the pattern of results for judgments though to be based on evaluative information was independent of interpersonal variation in behavioral memory, as predicted by the multi-component model, and in contrast to predictions of the competing models. The results are discussed in terms of the implications of the findings for the proposed mechanisms of illusory correlation.

Introduction

Humans sometimes show an unsettling insensitivity for actual relationships between events and often seem to perceive a covariation when there is none, a bias that has been labeled *illusory correlation* (*IC*). This bias has important practical consequences as it has been suggested that it contributes to stereotyping (Hamilton, 1981), faulty clinical judgments (Chapman & Chapman, 1967; Dawes, 1989), depression (Seligman, 1975) and minority discrimination (Hamilton & Gifford, 1976). The paradigmatic demonstration of this IC bias in social psychology comes from a study on the formation of group stereotypes by Hamilton and Gifford (1976). In their study, participants read behavioral statements about members of a majority group, labeled A, and a minority group, labeled B. Both groups revealed the same ratio of desirable to undesirable behaviors (9:4), but twice as many statements referred to members of group A than to members of group B. As such, there was no objective correlation between group membership and desirability of behavior. Nevertheless, after reading all statements, participants showed greater liking for the majority group A than for the minority group B. In addition, perceivers

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overestimated the frequency with which members of the minority group B had engaged in the less frequent undesirable behaviors. This result demonstrated that a simple asymmetry in information sampling can lead to differential perception of social groups.

Distinctiveness account

The most dominant theoretical explanation for IC in the last decades has been the distinctiveness-based explanation (DBE; Hamilton & Gifford, 1976). Its basic premise is that infrequent or otherwise salient items are encoded more extensively at exposure and are therefore more accessible later, when judgments are made. According to this reasoning, in a typical IC experiment, the small number of minority and undesirable behaviors makes them more salient or distinctive, leading to an overestimation of the frequency of these behaviors and less liking of the minority group B.

A number of studies seem to support this premise. Hamilton, Dugan, and Trollier (1985) showed that IC only occurs if information is presented in a typical sequential fashion (statement per statement) and not when information is presented in a summary table that tends to attenuate the saliency of undesirable minority (or B-) behaviors. Further evidence for the enhanced encoding of distinctive items comes from a study by Stroessner, Hamilton, and Mackie (1992), who found that participants spend more time reading distinctive B− items than the other items. Several studies also found that B− items are better retrieved in free recall tasks (Hamilton et al., 1985; McConnell, Sherman, & Hamilton, 1994; Stroessner et al., 1992) and assigned faster to their group than the other behaviors (Johnson & Mullen, 1994; McConnell et al., 1994). Hamilton et al. (1985) found a high correlation between recall of group B behaviors and evaluative judgments of group B, indicating that the high accessibility of group B behaviors influenced evaluative judgments about this group. Most of the empirical support for the basic assumption of the DBE, namely that IC results from distinctive items being more extensively encoded and more accessible in memory, has been obtained in experiments using only one large and one small group. In a notable exception, Sherman, Hamilton, and Roskos-Ewoldsen (1989) found that including a third group C that was smaller, identical or larger in size than group B diminished, but did not eliminate the IC effect involving group B. Importantly, this was the case both when B− behaviors were the most distinctive (when group C was larger or identical in size) as well as when they were not (when group C was smaller) — a finding that clearly challenges the original DBE. The need for a more conclusive definition of "distinctiveness" was further illustrated by a recent study by Risen, Gilovich & Dunning (2007): In a number of studies, they revealed the emergence of one-shot illusory correlations, by showing that a single instance of unusual behavior by a member of a rare group is sufficient to create an association between group and behavior. Using real groups, their results showed that single unusual behaviors committed by members of rare groups were processed differently than other types of behaviors, and were more memorable. In sum, these studies suggest that a more thorough exploration of how distinctiveness drives IC is in order. Our studies are, in part, designed to do this.

Alternative accounts

A number of authors have suggested alternative accounts of IC that differ drastically from the original DBE. Fiedler's Information Loss Account (Fiedler, 1996; Fiedler, Kemmelmeier, & Freytag, 1999) states that illusory correlation results from better extraction of information about the majority than the minority group, leading to greater regression to the mean in perceptions of the positive-to-negative ratio of the minority group. More specifically, it is argued that group judgments are based on traces that are retrieved from stored exemplars in memory and then aggregated, according to a simple weighted linear summation. This aggregation process cancels out unsystematic information or encoding errors and so reinforces systematic tendencies. It is sensitive to group size: as the amount of observations on which decisions are based increases, less error variance is left in the aggregate, rendering perceptions of the group more accurate and leading to less biased judgments (see Fiedler, 1996, p. 200–201, section on "*Illusory correlation simulation*"). Within the typical IC design, this process results in an evaluative bias that favors the majority group, as its larger group size allows better reproduction of its aggregate, evaluative characteristics (i.e. more desirable than undesirable information). Because of its smaller size, the true ratio of positive to negative behaviors is learned less well for the minority group, leading to a more extensive regression to the mean in judgments about the minority group. A number of studies (Fiedler, 1991, 1996) have supported this account, basically showing the occurrence of IC in the *absence* of distinctive behavior and *without better memory* for infrequent events.

McGarty, Haslam, Turner, and Oakes (1993) have suggested that IC results from a differentiation process, in which perceivers accentuate differences between the groups based on the valence of the behaviors (see also Berndsen & Spears, 1997). Given that there is more information on the positive behaviors of group A, there is more evidence for the hypothesis that group A is better than group B, than for the opposite hypothesis. This forms the basis for further accentuating the apparent evaluative differences between the groups, leading to an IC effect (Berndsen & Spears, 1997; Haslam, McGarty, & Brown, 1996; McGarty et al., 1993). According to this perspective, strictly speaking, the distinction that achieves the greatest differentiation involves assigning all positive behaviors to group A and all negative behaviors to group B. A number of studies have provided support for this account. It has been found that the IC disappears when two well-known groups differ on a non-evaluative dimension that does not provide a meaningful (i.e., clear and separable) distinction between behaviors and groups, such as right- versus left-handedness (Haslam et al., 1996) or group members' gender (Klauer & Meiser, 2000). The constructive nature of the categorization process has been illustrated by data showing that participants actively interpret the behavioral statements over the course of the stimulus presentation in light of the developing group differentiation and that the IC develops and strengthens towards the end of the experiment (Berndsen, Spears, McGarty, & van der Pligt, 1998).

Recently, Sherman and colleagues (2009) proposed a theoretical framework based on Attention Theory (Kruschke, 2001, 2003) that integrates a number of the previous accounts. Their model extends the traditional distinctiveness explanation, by positing that differentiation occurs via a focus on *contextually* distinct information. Because there is more information about the majority group, features of the majority group are learned before features of the minority group. The features of the minority group that subsequently stand out, are those that most distinguish it from what has been established about the majority group, serving to further differentiate the groups. Consistent with this, they found that participants paid more attention to common (positive) than rare (negative) behaviors when reading about majority group members, but rare traits received more attention when reading about minority group members (see Sherman et al., 2009, Experiment 5). So as with the distinctiveness account, special attention is paid to infrequent behaviors performed by members of the minority group. However, unlike that account, and more in line with the differentiation account, this model proposes that the basis for that attention is contextual distinctiveness in relation to the majority group, rather than absolute numerical distinctiveness. As such, the Attention Theory model, or AT model, is a combination of a distinctiveness and differentiation approach.

Multiple component model

Each of the above explanations has received considerable empirical support, where support for any particular account over others is typically found with some manipulations and measures, but not with others. The models of Fiedler (1991) and McGarty et al. (1993)