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A Constraint Satisfaction Model of the Correspondence Bias: The Role of Accessibility and Applicability of Explanations

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Abstract

A parallel distributed processing model was used to simulate a central bias in social reasoning, the correspondence bias (Jones & Harris, 1967). This bias is the tendency to overattribute social behavior to the actor's personality and to underestimate the impact of situations. Simulations indicate that the extent of the correspondence bias can be understood as due to differences in the accessibility of explanatory concepts and the strength of causal links between potential explanations and behavior.

Introduction

In 1967 Jones and Harris discovered one of the most robust and replicable phenomenon in social psychology, the correspondence bias. This bias is the tendency to make a dispositional attribution for a person's behavior, despite the presence of a strong alternative situational explanation that is sufficient to explain the behavior. Many social psychologists view this as a serious problem or flaw in social thinking, because it suggests that there is a pervasive tendency for social perceivers to badly underestimate the extent to which social behavior is influenced by the situation and to overestimate the role of an individual's personality.

In the now classic attitude attribution paradigm, Jones and Harris (1967) showed participants a target's essay written in favor of or against Fidel Castro (e.g., pro-Castro vs. anti-Castro essay). Participants were told whether the target was given a choice on which position to take or whether he was randomly assigned to one position (e.g., choice vs. no-choice). Contrary to predictions, participants who were told that the target was assigned the topic still made a dispositional inference congruent with the pro- and anti-Castro essay positions. Thus, these participants paid insufficient attention to situational factors that were sufficient to explain the target's behavior. These participants were said to have committed the correspondence bias.

Since then, numerous studies have explored a variety of possible artifactual explanations for this bias (Fleming & Darley, 1989; Miller, Ashton, & Mishal, 1990; Schneider & Miller, 1975; Jones, Worchel, Goethels, & Grumet, 1971; Reeder, Fletcher, & Furman, 1989; Snyder & Jones,

1974) but it has proved to be fairly robust. Ten years after its discovery, Lee Ross (1977) termed this phenomenon the "fundamental attribution error," both to emphasize its importance in social interaction and to emphasize that the prominence of this bias was not due to a self-serving motivation by the perceiver but rather faulty cognitive processing.

Recently, several authors (e.g., Leyens, Yzerbyt, & Corneille, 1996; Read & Miller, 1993) have suggested that the correspondence bias can be understood in terms of the accessibility (or priming) of dispositional explanations and the strength of causal relationships between potential causes and the behavior being explained. In this paper, we will use Read and Miller's (1993; Miller & Read, 1991) constraint satisfaction model (see Thagard, 1989, 1992) of social inference to examine the role of accessibility and causal strength. However, before we proceed, we consider several theoretical accounts proposed for this bias.

Originally, the correspondence bias was explained in terms of Heider's (1958) hypothesis of behavior engulfing the field. The contention of this hypothesis is that the behavior and the actor are salient against the situation, or ground, which causes the actor and his behavior to be perceived as a single unit. This single unit perception causes attributions for a behavioral act to be made to the actor. A handful of studies have tested this perceptual salience hypothesis by manipulating the relative visual orientation of actors and observers (Storms, 1973; Taylor & Fiske, 1975) and the relative brightness, movement, complexity, and novelty of the actor (McArthur & Post, 1977). Although salience often increased attribution to the actor, in some cases it increased attribution to the situation (McArthur, 1981) suggesting that salience is only part of the story.

Quattrone (1982) identified other issues that were problematic for the engulfing hypothesis. He noted that in the essay assignment paradigm (Jones & Harris, 1967) only the essay is available to participants, with the target and his situation being completely absent beyond any information provided by the experimenter. Yet participants continue to make dispositional attributions for the actor's behavior. Quattrone also pointed out that the correspondence bias may be affected by other factors independent of salience such as whether participants are informed that the target wrote the

essay from scratch or merely copied it (Snyder & Jones, 1974). Moreover, he also pointed out that the engulfing hypothesis did not specify the attitudinal dimension for which the correspondence bias might occur. As shall become evident, the attributional dimension is an essential element for producing the correspondence bias.

With these issues left unanswered by the engulfing hypothesis, Tversky and Kahneman's (1974) anchoring and adjustment heuristic model was used to describe the occurrence of the correspondence bias (Jones, 1979; Quattrone, 1982). The basic argument is that the correspondence bias simply reflects an insufficient adjustment by participants when they infer the target's true attitude on some dimension such as the "opposition to" or "favoring of" Fidel Castro's dictatorship. Specifically, participants who are informed about the target's assigned position (pro-Castro vs. anti-Castro) use that position as an anchor or a point of departure from which they make an inference about the target's true attitude. Since the anti and pro anchors are located at opposite ends of the attitudinal dimension (extremely in favor of vs. extremely opposed to), participants adjust for situational constraints from different starting points. Unfortunately, this adjustment from opposing anchors towards a neutral position in the middle falls short and participants are said to be overattributing the assigned anti and pro positions to the target's true attitude.

The anchoring and adjustment explanation also provided the impetus for Gilbert's account of the correspondence bias (Gilbert, Pelham, & Krull, 1988). Gilbert proposed a model of person perception composed of three stages, where the initial stage was fairly automatic while subsequent stages required the perceiver to engage in more deliberative thinking, expending more cognitive effort. The first stage is categorization in which perceivers are said to identify the behaviors of the actor. This stage is followed by characterization where perceivers draw dispositional inferences about the actor based on these behaviors. And the third and final stage is correction, where inferences drawn in the characterization stage are adjusted by taking into account the situational constraints on the target. According to Gilbert, it is this final correction stage that falls prey to the perceiver's lack of cognitive resources because he is cognitively busy. In short, Gilbert posited that the adjustment for situational constraints falls short because people are unable to expend the extra cognitive effort required for this correction stage.

Recently, however, several theorists have proposed that the correspondence bias can be better understood in terms of accessibility of potential causes (Higgins, 1989; Higgins, Rholes, & Jones, 1977) and their degree of applicability to the behavior. Leyens, Yzerbyt, and Corneille (1996) have suggested that previous research on the correspondence bias may have unintentionally "capitalized" on the priming of dispositional concepts by experimental instructions and the explanatory match or applicability between these primed concepts and the attitudinal dimension on which participants are asked to make a judgment about the target. They note that frequently the experimental instructions strongly emphasize, and presumably prime, a personality or attitude explanation that is highly applicable to the target behavior. For instance, if the essay issue is abortion and a

highly applicable concept such as personality is primed in the instructions, participants will use personality as a point of departure from which to make an attitude attribution about the target. Using the essay-assignment paradigm, Leyens et al. (1996) have clearly demonstrated that the presence or absence of an applicable dispositional concept in instructions to participants is all it may take to produce or eliminate the correspondence bias, respectively.

A Constraint Satisfaction Model of the Correspondence Bias

Our constraint satisfaction model of dispositional inference is based on previous work by Read and Miller (1993; Miller & Read, 1991) which integrates work on a knowledge structure approach to understanding (e.g., Galambos, Abelson, & Black, 1986; Schank & Abelson, 1977; Wilensky, 1983) with Kintsch's (1988) construction-integration model of discourse comprehension. Read and Miller propose that constructing causal explanations involves the repeated application of two steps.

The first step involves a generative process conceived as a spreading activation of concepts and their associations in a semantic network (Collins & Quillian, 1969; Collins & Loftus, 1975) that is "triggered" by initial input stimuli. For instance, learning that the target wrote a pro-Castro essay may activate traits and other related concepts as well as "communism", "radical", and "Berkeley, California". This network may also include the activation of the target's environment or situational constraints for the behavior. These concepts are activated promiscuously with little attention paid to the way in which they are related to one another (Kintsch, 1988). The activation of concepts in the network is a function both of their chronic accessibility (due to frequency of use; Higgins & King, 1981) and their priming or activation by incoming stimuli and their associations to other activated concepts.

These activated concepts can be related in one of three ways. First, there may be a positive or excitatory link between concepts that are consistent with one another. Second, there may be a negative or inhibitory link for concepts that are inconsistent with one another, such as contradictory or competing explanations. We use the term *competition* to emphasize the idea that alternative explanations for the target's behavior may not be mutually exclusive or completely contradictory but simply differ in the extent to which they are concurrently possible. Finally, there may be no relation between concepts, which is represented by the absence of a link.

The second step involves the integration of these concepts into a coherent representation about the person. This is done by satisfying the constraints imposed by the different concepts and their relations in a parallel distributed process (e.g., Rumelhart, McClelland, & the PDP Research Group, 1986). Thagard's (1989, 1992) Theory of Explanatory Coherence (TEC) and its computational implementation (ECHO; Explanatory Coherence by Harmany [sic] Optimization) embody this integration process in a recurrent, constraint satisfaction network. For our present purposes, the nodes represent whole concepts such as behaviors, situational constraints, and attitudes. The

weights on inhibitory and excitatory links between nodes can vary so that the degree of competitiveness or support between concepts can also be represented in the network.

Applying the Model

Before we proceed with the simulations, we'll describe the basic network which is based on the essay-assignment paradigm. In this paradigm, the experimenter first provides participants with two pieces of information; the position advocated in the essay (which is in opposition to or in favor of some issue), and whether the position was assigned or freely chosen. Participants are then asked to infer the target's true attitude about the issue. Hence, participants are trying to reconcile two pieces of information: for example, that the written essay is pro-Castro and that the target had no-choice in the matter. A simplified representation in terms of our model is shown below.

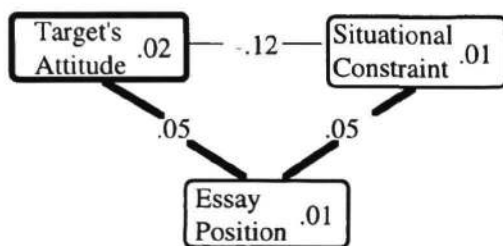


Figure 1: A network of the essay-assignment paradigm.

Each node represents what may be a set of related concepts. One node represents the behavior being explained, the essay and its position, which is initially activated by cues in the behavior during the first step of the model. Further, there are two other nodes corresponding to alternative explanations for the behavior; one for the target's true attitude and one for the situational constraints. If the participants are told that the target was assigned to write a pro-Castro essay (a situational constraint) and then the target subsequently wrote a pro-Castro essay (activating a pro-Castro attitude as a possible explanation), then both causes have positively weighted links (.05) to the behavior (pro-Castro essay position) as they are possible explanations of it. These positively weighted links are represented by dark lines. Since the situational constraint and the target's attitude are alternative explanations for the behavior, there is a negatively weighted link (-.12) between them to represent that they are competing explanations. This negative link is represented by a thin line. The weights on these links can vary from -1.0 to +1.0 as a function of causal strength between nodes. However, by default, excitation weights are set at 0.05 and inhibition is set at -.12. Thus, the activation sent among these nodes depends on the strength of these causal links as well as their polarity (- or +).

The strength of the alternative explanations is evaluated by passing activation among the nodes in parallel until the activation asymptotes. This occurs by processing activation values with Paul Thagard's (1989, 1992) ECHO algorithm designed to satisfy constraints imposed by the activated nodes and their causal relations.

All unit activations are set to an initial starting value of 0.01. This initial starting value can be adjusted upward to represent initially activated or highly accessible concepts in the first step of the model. Since the essay position is given to participants as a fact, this unit is linked to the special evidence unit which is clamped at an activation of 1.0. The equation that updates the network is itself constrained by the decay parameter (\emptyset), which decrements all the units at every iteration, and a minimum (*min*) and maximum (*max*) possible activation value of the units (a_j) ranging between -1.0 and +1.0 respectively:

$$a_j(t+1) = a_j(t)(1-\emptyset) + \begin{cases} \text{net}_j(\text{max}-a_j(t)) & \text{if } \text{net}_j > 0 \\ \text{net}_j(a_j(t)-\text{min}) & \text{otherwise} \end{cases}$$

$$\text{where } \text{net}_j = \sum w_{ij} a_i(t)$$

Hence, net_j is the net input to a unit (a_j) that is determined by the sum of the weighted links ($\sum w_{ij}$) multiplied with the input from other units. This activation is sent with the addition of the unit's previous activation (a_j) at time t . The propositions in the network are updated simultaneously until constraints imposed by the various relations of coherence and incoherence (negative and positive links) are satisfied as well as possible. This best fit or constraint satisfaction occurs when activation values for evidence and proposition have reached asymptotic levels. The asymptote criterion is set at 0.001. The acceptability of individual propositions (target's attitude vs. situational constraints) can then be inferred from final activation values. A unit that is positively activated indicates that it has more acceptability while a unit that is negatively activated indicates that it has less acceptability in the system.

The Simulations

Given that the essay assignment in the no-choice condition is sufficient to explain the essay position, why do subjects still commit the correspondence bias? Our model suggests several possibilities. First, it may be that the target's true attitude is initially more accessible or activated. Consistent with this possibility, Leyens et al. (1996) have shown that in many correspondence bias studies, the instructions to subjects focus very heavily on the task of figuring out the target's true attitude and little attention is paid to the situation. This could lead to stronger priming of dispositional concepts. If the dispositional explanation starts with a higher activation (see figure 1) it should win the competition between the two alternative explanations. Second, it may be that subjects view the true attitude as a more applicable explanation than is the situation. That is, they may think that the assignment to condition is not completely sufficient as an explanation for the target's essay position, whereas the true attitude is. In terms of our model, the true attitude would have a stronger link to the essay position than would the assignment to condition. Third, it may be that subjects do not view the two explanations as completely contradictory. In fact, they may view them as compatible. In such a case, the link between them would be either nonexistent or perhaps even positive.

This third possibility is currently being further investigated.

In these simulations, we will focus on the effects of accessibility and applicability of alternative explanations. First, we'll simulate the basic essay assignment network in figure 1 with a highly accessible dispositional explanation. Second, we will simulate what happens when the dispositional explanation is both more accessible and more applicable, as in the work by Leyens et al. (1996). Third, we'll simulate a network where the dispositional explanation is more accessible, but the situational explanation is more applicable, as may be the case in Fein's (1996; Fein, Hilton, & Miller, 1990; Hilton, Fein, & Miller, 1993) work on the impact of ulterior motives on the correspondence bias. In this third case, accessibility and applicability are working in opposite directions.

Accessibility. A simulation of accessibility alone was implemented with a network as shown in figure 1 where "target's attitude" is given an initial level of activation of .02, while "situational constraint" is left at a default value of .01 to indicate higher initial accessibility of the attitude. Inhibitory and excitatory causal relations are left at default values of -.12 and .05 respectively. The resulting activation values are shown in figure 2.

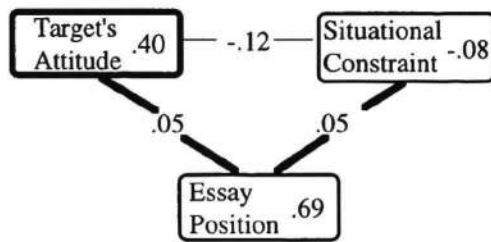


Figure 2: The resulting set of activations where the target's attitude is highly accessible.

The final activation values in the network are consistent with the general pattern of results in work with the correspondence bias. The dispositional explanation is highly activated or more acceptable (.40; node in bold) while the situational constraint explanation is slightly suppressed (-.08). This slight suppression of the situational constraint explanation is also consistent with work on the correspondence bias because although participants fail to completely correct for situational constraints, the pattern of results show evidence that they are taking them into consideration.

This simulation is also relevant to work by Quattrone (1982) and Krull (1993) showing that instructions that focus on figuring out the impact of the situation lead to overattribution to the situation, the reverse of the correspondence bias. Simply by flipping the labels of the two explanations in Figure 2 one can see the results of simulating these studies with higher accessibility for the situation.

Accessibility and Applicability. In a set of five studies, Leyens, Yzerbyt, and Corneille (1996) varied the applicability of concepts primed in the instructions. The applicability of different concepts (i.e., personality, formal

education, sociology, etc.) was pre-determined in study one by asking participants to rate the impact they would have on people's positions for different issues. In the studies that followed, applicable and inapplicable primes in the instructions as well as no primes were crossed with an essay issue. Their results showed that priming "personality" (applicable concept) when the issue was euthanasia produced the correspondence bias while priming "formal education" (inapplicable concept) eliminated the correspondence bias.

These pattern of results were simulated with the essay-assignment network shown in figure 1 with the addition of one modification to implement applicability. To represent the applicability of a dispositional concept, the link between the "target's attitude" and "essay position" was adjusted slightly upward to .055. The greater accessibility of a dispositional explanation was implemented as in the previous simulation with a slightly higher initial activation level for the "target's attitude" set at .02. The resulting network was one with a highly accessible and applicable concept such as "personality" for the essay position on euthanasia. The resulting set of activations are shown in figure 3.

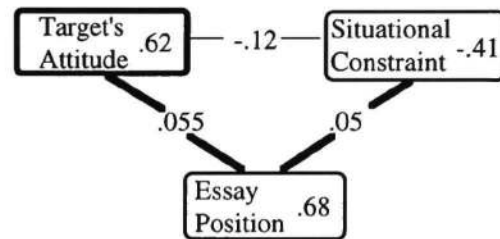


Figure 3: The resulting set of activations where the target's attitude is highly accessible and applicable.

As expected, making an accessible concept highly applicable has an additive effect for the acceptability of a dispositional explanation (.62). Specifically, a concept that is both accessible and applicable is given higher activation than when it was just accessible. This highly applicable dispositional explanation has also moderately suppressed the alternative situational explanation (-.41). This set of final activation values are consistent with the pattern of results obtained by Leyens, Yzerbyt, and Corneille (1996) where the effect size for the correspondence bias is greater when the primed concepts are applicable.

Ulterior Motives as Highly Applicable. Fein (1996; Fein, Hilton, & Miller, 1990; Hilton, Fein, & Miller, 1993) and colleagues have identified a situational constraint manipulation that eliminates the correspondence bias. They have introduced an "ulterior motives" condition where participants are led to believe that the target may have chosen to write in favor of a particular issue in order to ingratiate himself with a professor. In this condition, participants are unwilling to make a dispositional inference for the target's behavior (i.e., writing of a pro-essay). Fein (1996) interprets these findings in terms of suspicion. He posits that ulterior motives induces a "mind-set" which makes participants ruminate about alternative situational causes for the target's behavior. According to Fein (1996),

this increased thought then facilitates a correction for situational constraints which eliminates a correspondent inference. In a similar manner, work by Alicke, Zerbst, and LoSchiavo (1996) has also demonstrated the attenuation of the correspondence bias by associating stronger incentives with behavioral choices made by the target.

However, in terms of our model, ulterior motives may just be a stronger or more *applicable* explanation for the target's behavior than a "random assignment to position" explanation. That is, rather than leading subjects to engage in more deliberative thought, ulterior motives may just have a stronger link to the behavior and thus would be able to send and receive more activation to the behavior. Our next simulation demonstrates that such a stronger link is sufficient to eliminate the correspondence bias.

The essay-assignment network shown in figure 1 was also used for this simulation, however, the applicability of "ulterior motives" as an alternative explanation is implemented by a slightly stronger excitatory link between the "situational constraint" node and the "essay position" node. To provide a rigorous test of this model, we made the "target's attitude" slightly more accessible with an initial activation of .02 and left the "situational constraint" node at the default level of .01. The resulting activation values for this simulation are shown in figure 4.

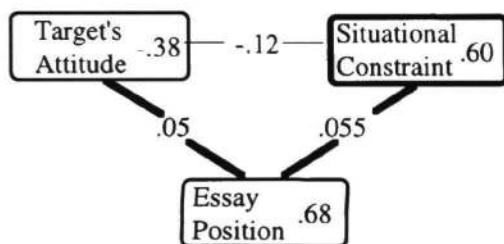


Figure 4: The resulting set of activations where situational constraints are highly applicable.

These final activation values are consistent with the pattern of results obtained by Fein (1996; Fein, Hilton, & Miller, 1990). Although dispositional concepts were more accessible, with an initial activation level of .02, "ulterior motives" was a much more applicable alternative situational concept for the target's essay position and resulted in a much more acceptable explanation for the target's essay position.

Discussion

Although a number of accounts have been given for different aspects of the correspondence bias, no unified account of the cognitive processes involved has been presented. In this paper, we have shown that a simple constraint satisfaction network, in conjunction with a reasonable set of assumptions, can provide such a unified account, successfully simulating both the correspondence bias itself, as well as various factors that influence it. Moreover, our model has shown that a set of basic cognitive principles, the accessibility of concepts and their applicability, can illuminate what has often been taken as a somewhat unusual or surprising set of findings.

One other interesting aspect of our findings is that changes in applicability of a cause seem to have much greater impact than changes in accessibility. For example, in our simulation of the impact of ulterior motives, we found that when a more applicable situation competed with a more accessible dispositional cause, the more applicable cause totally overwhelmed the more accessible cause. In retrospect this makes sense. Increased accessibility will only affect the initial processing of a concept, whereas increased applicability will have an effect that continues throughout processing.

Constraint satisfaction networks, such as that presented here, have the potential for providing a unified account of many aspects of social explanation (Read & Miller, 1993). In previous work, we (Read & Lincer-Hill, 1998; Read & Marcus-Newhall, 1993) have shown that many of the principles of explanatory coherence embodied in Thagard's (1989, 1992) ECHO model were highly applicable to social explanation. In this paper we have shown that such a model can also incorporate a central phenomena in social explanation, the correspondence bias.

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