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DIRECTION OF COMPARISON ASYMMETRIES IN RELATIONAL JUDGMENT: THE ROLE OF LINGUISTIC NORMS

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This research documented a linguistic norm account of direction of comparison asymmetry effects in relational judgments (e.g., seeing hyenas as more similar to dogs than dogs are similar to hyenas). The asymmetry effect is magnified by discrepancies in prominence between subject and referent, and has previously been explained using Tversky's (1977) feature-matching model. Given a linguistic norm to place more prominent objects in the referent position, violation of this norm might reduce sentence clarity, which then weakens the magnitude of subsequent relational judgments. This research showed that clarity perceptions predict the magnitude of relational judgments independently of the cognitive manipulation of the features of the compared objects. The pattern of findings suggests that a linguistic norm interpretation may account for variance in relational judgments independently of Tversky's (1977) feature-matching model.

Is Canada similar to the United States? Is the United States similar to Canada? Across many experimental demonstrations, questions such as these—differing only in the order of objects to be compared—have yielded various answers. Many see greater similarity when the question is phrased as in the first case rather than the second case. Differences in the prominence or centrality of the two comparison objects predicts this asymmetry: Individuals tend to see greater similarity when a less prominent object is compared to a more prominent object than vice versa (Tversky, 1977). Logically, no such asymmetries should exist, spurring various theoretical attempts to account for them. For present purposes,

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we define the first object in a relational statement as the subject and the second object as the referent.

This direction of comparison asymmetry has been documented in various domains. For example, comparisons of self to others are systematically biased in this way (Catrambone, Beike, & Niedenthal, 1996; Holyoak & Gordon, 1983), as are comparisons among events, institutions, and procedures (Wänke, Schwarz, & Noelle-Neumann, 1995). Preferences for choices among consumer products, as well as satisfaction with them, are influenced by the direction of comparison (Houston, Sherman, & Baker, 1989). The asymmetry also governs a variety of other relational judgments, such as those involving spatial positioning (Talmy, 1983), identity (Gleitman, Gleitman, Miller, & Ostrin, 1996), and metaphor (Glucksberg & Keysar, 1993).

Tversky (1977) explained the asymmetry by pointing to the cognitive manipulation of the features of the compared objects. His Feature-Contrast Model emphasized that prominent versus less prominent objects differ in the features that individuals might spontaneously recruit from memory. The extent to which specific features map onto each other may determine perceptions of similarity as well as difference. Specifically, the more prominent object has more features overall and thus more unique features. Individuals begin the similarity judgment process by mapping the subject (first object) onto the referent (second object). If the subject is less prominent, fewer unique and more shared features will be apparent, and similarity with the referent object will be judged as higher. In contrast, when the subject is more prominent, more unique features will immediately be salient, thus reducing perceptions of similarity (Gati & Tversky, 1984; see also Gentner & Markman, 1997; Goldstone, Medin, & Gentner, 1991; Medin, Goldstone, & Gentner, 1990; Ortony, 1979). Importantly, this explanation is based solely on the differential cognitive recruitment of specific features of the objects from memory.

An alternative explanation for the asymmetry, however, centers on linguistic pragmatics (e.g., Levinson, 1983; Schwarz, 1994). According to this perspective, people assume that the referent in a comparative statement is more prominent, common or larger, and so forth, than the subject—purely on the basis of their implicit understanding of canonical linguistic practices. Indeed, Tversky (1977) articulated this point when he observed that people prefer some statement orderings over others (see also Bowdle & Gentner, 1997). Thus, there is a pragmatic norm in English usage specifying that the more prominent object should appear second rather than first in comparative phrases, a rule English speakers follow implicitly and automatically. Violation of this norm, by placing a clearly less prominent object in the privileged referent position, might then

cause uncertainty and a corresponding reduction in the confidence with which relational judgments are drawn relative to judgments regarding statements that adhere to linguistic norms. This account thus specifies expectations and the cognitive consequences of their violation, rather than cognitive manipulation of features and attributes of the objects themselves, as the mechanism underlying asymmetries in relational judgments.

The primary linchpin of this account is the documentation of a consensual norm for the structure of relational statements. This norm would be an example of a more general pragmatic rule that involves "given" (i.e., topic) versus "new" (i.e., comment about the topic) information (Clark & Haviland, 1977). All languages contain syntactic devices that illuminate given–new relations, specifying how a topic is situated in relation to context or commentary. Some languages, such as Japanese and Korean, contain words called case markers, which are tagged to nouns to indicate whether they are intended as given or new. In English, however, mere word order fulfills this same function. In a variety of contexts, English words placed first within a sentence constitute the given component, or topic of discussion, while words placed at the end of the sentence provide commentary about the topic, or in the case of relational statements, set the context for the comparison (Glucksberg & Keysar, 1990; Medin, Goldstone, & Gentner, 1993). In the case of metaphor, for example, the phrase "The butcher cuts like a surgeon" carries a rather different meaning than "The surgeon cuts like a butcher," because the subject establishes what the sentence is about, while the referent establishes the context for the intended relation. In the first sentence, "surgeon" and the attendant assumptions of operating rooms, scalpels, and anaesthetized human bodies establish the context, which then characterize the subject: butcher. The reverse ordering changes the context to that of meat lockers, cleavers, and slabs of beef, engendering a substantially different meaning (Gleitman et al., 1996; Ortony, Vondruska, Foss, & Jones, 1985). One line of research has provided direct evidence that English speakers apply expectations regarding these word-ordering rules to their interpretation of novel phrases (Gleitman et al. 1996, Experiment 5). Presented with a series of relational statements containing nonsense word objects (e.g., "The ZUM met the GAX"), participants assumed that the nonsense word occupying the referent position was more prominent, more central, more well-known, and larger than the subject word. Clearly, as nonsense words have no features, these findings cannot be explained using Tversky's (1977) feature-matching approach. Rather, this research shows that English speakers use word-ordering itself as a source of information regarding the sentence's topic, context, and intent.

The second linchpin of this pragmatic analysis is that violation of the norm regarding word-ordering has specific consequences that mediate shifts in the magnitude of subsequent judgments. Put simply, when a sentence is phrased oddly, people may pause, raise an eyebrow, and react with uncertainty to subsequent questions about that sentence. Our goal was to show that perceptions of clarity directly predict relational judgment magnitude. If individuals find a sentence unclear (because it violates pragmatic norms regarding placement of prominent versus less prominent objects within the sentence), they should make less extreme similarity, difference, and other relational judgments, relative to sentences in which the ordering matches the norm. This theoretical prediction may be directly compared to those based on Tversky's (1977) contrast model. In the present research, participants read a number of relational statements, then completed measures both of clarity and of feature-matching. These measures were then regressed onto relational judgments. We expected that judgments of sentence clarity would account for variance in relational judgments independently of feature-matching.

METHOD

PARTICIPANTS

The participants were 53 undergraduate students attending Northwestern University. They participated in the experiment in partial fulfillment of an introductory psychology course requirement.

MATERIALS AND PROCEDURE

Participants were run in groups of 1–6, completing questionnaire booklets while seated at individual tables. In the booklets, participants were presented with a series of nine relational statements followed by several ratings. Three of these statements centered on similarity ("Canada is similar to the United States," "Llamas are similar to horses," "My best friend is a lot like me"), three centered on difference ("Steffi Graf is very different from Michael Jordan," "Berlin is different from Chicago," "Chelsea Clinton is not at all like her mother, Hillary Rodham Clinton"), and three centered on spatial relations ("Santa Barbara is near Los Angeles," "Batteries are rarely included with children's toys," "The Baltic Sea is far away from Lake Michigan"). Further, these statements were varied on a within-subject basis to be ordered normally (more prominent object in the referent position) or abnormally (more prominent object in the subject position).

The primary measure was agreement with the relational statement ("How much would you agree with this statement?") answered on a 10-point scale ranging from 0 ("strongly disagree") to 9 ("strongly agree"). This question was always answered first.

Measures of both sentence clarity and feature-matching were collected. The former was composed of three ratings later averaged to create a single index: (a) "How clear or well written is this sentence?" (answered on a 10-point scale anchored by "very clear" and "very unclear"), (b) "How peculiar or unusual does this sentence seem?" (answered on a 10-point scale anchored by "very unusual" and "very normal"), and (c) "If you wanted to get this idea across, would you say it as it is written here, or rephrase it?" (answered on a 10-point scale anchored by "definitely say it as is" and "definitely rephrase it").

The feature-listing task was adapted from previous research (e.g., Medin et al., 1993). Participants were asked: "When reading the statement above, what characteristics came to mind? Below, record up to six of the most clear and obvious characteristics of X, of Y, or that are shared by both." For each statement, X and Y were the objects cited in the sentence (e.g., Canada and the United States; Santa Barbara and Los Angeles). After participants had completed the questions for all nine relational statements, a final instruction appeared in their questionnaire booklet. They were asked to go back to each of the features they had listed and record which of the two objects in the sentence it applied to, or if it applied to both. We created a univariate index of feature-matching by subtracting the total number of distinct features listed for the sentence subject from the total number of shared features. According to Tversky (1977), higher numbers on this index should predict greater similarity and weaker difference judgments.

RESULTS

We tested the degree to which both clarity and feature-matching predicted the magnitude of relational judgments by constructing three regression models, one for each of the three types of relation statements: similarity, difference, and spatial relation. Because the three different types of sentences were presented on a within-subject basis, the analyses below employ the judgment itself (9 per participant) rather than the participant as the unit of analysis.

The clarity variable was the average of the three ratings (Cronbach's $\alpha = .84$). The feature matching variable was the number of features listed by participants common to both objects minus the number of features listed that were unique to the thing occupying the subject position in the sentence. Means for all variables appear in Table 1.

TABLE 1. Clarity and Feature-Matching as a Function of Normal versus Abnormal Phrasing

	Linguistic Form	
Judgment	Normal	Abnormal
Similarity		
Agreement	5.62	5.10
Clarity	5.51	4.83
Feature-Matching	3.23	3.17
Difference		
Agreement	5.29	6.15
Clarity	4.58	4.86
Feature-Matching	0.91	0.26
Spatial Relation		
Agreement	6.97	6.63
Clarity	6.14	5.71
Feature-Matching	1.04	0.75

Note. For agreement ratings, greater values indicate greater agreement with the relational statement, as rated on a 10-point scale ranging from 0 to 9 (theoretical midpoint = 4.50). For clarity ratings, greater values indicate greater belief that the statements were phrased clearly, also rated on a 10-point scale. For feature-matching, the value is the number of shared features minus the number of features unique to the subject of the statement (i.e., greater values reflect the relatively greater salience of shared features).

To test our main hypotheses, we used regression analyses to predict variation in agreement with each relational statement on the basis of both clarity and feature-matching. For similarity judgments, the 2-factor model was significant, $F(2, 156) = 15.3, p < .001$. As can be seen in Table 2, both predictors were reliable. Clarity was positively related to similarity ($\beta = .31, t = 4.22, p < .001$), such that participants reported the two objects as more similar to the extent that the sentence was phrased more clearly. Feature-matching was also significant ($\beta = .24, t = 3.23, p = .002$), such that relatively greater shared features coupled with fewer unique features of the subject predicted greater similarity.

Much the same pattern emerged for difference judgments, which also produced a reliable model, $F(2, 156) = 10.3, p < .001$. Clarity was positively related to difference judgment magnitude ($\beta = .23, t = 3.08, p = .002$). Feature-matching was also significant ($\beta = -.27, t = 3.62, p < .001$), but as expected, it correlated with difference judgments in the opposite direction as similarity judgments. That is, relatively fewer shared features coupled with greater unique subject features predicted more extreme difference judgments (see Table 2). The model for spatial relation judgments was reliable, $F(2, 155) = 22.9, p < .001$. In this model, however, clarity was the only reliable predictor ($\beta = .47, t = 6.65, p < .001$). The feature matching variable did not reliably predict such judgments, $\beta = -.07$, ns (see Table 2).

TABLE 2. Regressions of Clarity and Feature Matching on Magnitude of Agreement with Relational Statements

Judgment	Beta	t	p
Similarity ($R^2 = .16$)			
Clarity	.31	4.22	< .001
Feature Matching	.24	3.23	.002
Difference ($R^2 = .12$)			
Clarity	.23	3.08	.002
Feature Matching	-.27	3.62	< .001
Spatial Relation ($R^2 = .23$)			
Clarity	.47	6.65	< .001
Feature Matching	-.07	.98	.33

DISCUSSION

Asymmetries in relational judgments have long interested linguists and psychologists because of their apparent divergence from rationality. From a purely logical standpoint, it does not seem possible that Canada can be more similar to the United States than the United States is similar to Canada. A prominent theoretical account has been Tversky's (1977) contrast model, which explains asymmetries by way of features associated with objects within relational statements, and the processes by which they are differentially weighed in memory. In contrast to this purely cognitive model, we tested a linguistic norm account. This account locates the source of the asymmetry in the adherence to norms governing sentence construction versus thier violation.

Past research has established the operation of a norm in which English speakers prefer and expect the referent in a relational statement to be more prominent, common, or well-known than the subject (Clark & Haviland, 1977; Gleitman et al., 1996). Our research indicates that violation of this norm, by way of placement of the more prominent of a pair of objects into the subject rather than referent position, renders the sentence less clear relative to adherence to the norm. Unclear sentences produce less extreme judgments about them. That is, participants found two objects more similar, more different, and also more spatially related to the extent that the sentence was phrased clearly. This effect occurred independently of participants' cognitive manipulation of features of the two objects. Overall, these findings demonstrate the importance of linguistic convention in mediating relational judgments and also asymmetries in such judgments.

Our perspective does not deny the viability of the feature-matching process as specified by Tversky's (1977) contrast model. We explicitly

tested both the feature-matching account and the linguistic norm account and found both tenable. That is, feature-matching predicted both similarity and difference judgments independently of clarity perceptions. Thus, our argument is that the violation of linguistic norms which influence subsequent perceptions of communicative clarity constitutes a process that independently accounts for some, but certainly not all, of the variance inherent in direction of comparison asymmetries. To achieve a more complete picture of such effects, both feature-matching and linguistic norms must therefore be considered.

Our findings suggest that clarity plays a general role in judgments which may obscure other effects. For example, past evidence demonstrated that similarity and difference judgments are negatively related (Tversky & Gati, 1982; but see also Medin et al., 1990), meaning that, as feature-matching processes produce perceptions of greater similarity, they simultaneously evoke perceptions of lesser difference. Our experiment replicated such effects, but superimposed over this basic pattern was a more paradoxical pattern indicating that reduced clarity can make two objects seem less similar but also less different, depending on how the judgments are phrased. For example, if a difference is phrased as a unipolar affirmation (e.g., "these objects are different," with more or less agreement rated on a Likert scale), linguistic norm violation will weaken such judgments of difference. But paradoxically, if the difference is phrased as a negation (e.g., "these objects are not similar"), norm violation will also reduce agreement with the judgment, rendering what appears to be the opposite judgmental conclusion. In short, predictions made from the linguistic norm perspective are context-independent: any statement phrased abnormally should engender less agreement concerning it than the same sentence phrased in a manner typical of English pragmatics.

This research is compatible with several other applications of a linguistic or conversational norm perspective to explain specific judgmental biases. For example, when answering causal questions (e.g., "Why did Bob yell at Sally?"), individuals often supply explanations in order to fill presumed gaps in the questioner's knowledge (Hilton, 1990, 1995; Slugoski, Lalljee, Lamb, & Ginsburg, 1993), thereby fulfilling a conversational norm to provide maximally relevant and informative information (Grice, 1975). The conjunction fallacy (Tversky & Kahneman, 1983) has, in addition to several other theoretical accounts, been explained by a linguistic norm perspective (Dulany & Hilton, 1991). Other research has shown that underutilization of base rates (Krosnick, Li, & Lehman, 1990; Schwarz, Strack, Hilton, & Naderer, 1991), the dilution effect (Tetlock, Lerner, & Boettger, 1996), correspondence bias (Wright & Wells, 1988), and judgments of satisfaction (Schwarz, 1994) may be rooted, at least in part, in the linguistic or conversational context established by experimental procedure, questionnaire format, and social interaction (Hilton, 1995). Our research indicates that direction of comparison asymmetries may join this list of cognitive biases, which derive at least in part from the operation of linguistic norms.

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Erratum

Due to an oversight, an error appears in M.K. Johnson, J. G. Bush, and K. J. Mitchell's "Interpersonal reality monitoring: Judging the sources of other people's memories" published in *Social Cognition* 16(2), Summer 1998, pp. 199–224.

On p. 213, under the section *Subjects and Design*, paragraph one:

OLD TEXT (*errors in bold*):

Sixty-four Princeton undergraduates participated in exchange for course credit or a small monetary payment. In addition, **64** older adults from the same population as in Experiment 1 were paid for their participation. None of the participants had taken part in the earlier experiments.

NEW TEXT (*corrections in bold*):

One hundred twenty-eight Princeton undergraduates participated in exchange for course credit or a small monetary payment. In addition, **128** older adults from the same population as in Experiment 1 were paid for their participation. None of the participants had taken part in the earlier experiments.

We apologize for the inconvenience.