Relational models theory: A confirmatory factor analysis

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Abstract

Descriptive taxonomies of social relationships typically propose independent, bipolar dimensions, such as warmth/hostility, equality/inequality, and formality/informality. Relational models theory (Fiske, 1991), in contrast, proposes four potentially correlated, unipolar relational models. Features of the four models were subjected to confirmatory factor analyses that tested the unipolarity and non-independence assumptions on a large sample of social relationships. Findings supported the hypothesis that the models correspond to coherent, correlated, and unipolar factors.

Many theorists and researchers have attempted to develop taxonomies that allow relationships to be described and compared economically. Commonly, these taxonomies emerge from exploratory multivariate analyses of samples of role terms, adjectives or actual relationships, and contain a small number of factors or dimensions. These dimensions may be taken as representations of laypeople's perceptions of their relationships, or as conceptual tools appropriate for use by relationship scholars. By capturing the primary sources of variation among relationships, they offer a parsimonious and empirically driven way to map the relational domain.

When such descriptive relationship taxonomies are developed, similar bipolar dimensions tend to emerge repeatedly. The most commonly obtained dimensions are warmth, intimacy, or solidarity versus coldness or hostility; power, authority, or inequality versus equality; and formality versus informality (e.g., Burton & Romney, 1975; Haslam, 1995; Marwell & Hage, 1970;

White, 1980; Wish, 1976; Wish, Deutsch, & Kaplan, 1976). Although such work has yet to develop a consensual representation to rival such well-established schemes as the circumplex model of interpersonal behavior (e.g., Kiesler, 1983), its level of convergence is reasonably high, and it has generated empirically and theoretically fruitful understandings of the structure of relationships.

Despite their virtues of agreement and economy, inductively developed dimensional schemes for describing relationships suffer from the methodological problems that weaken exploratory analyses. Their lack of motivating theory, for instance, necessitates post hoc interpretation of whatever dimensions emerge. Similarly, the dependence of the dimensions on an initial, atheoretical choice of relational features to include in the analysis may limit their scope. Finally, the multivariate analyses that have been conducted to establish the dimensions, such as factor analysis and multidimensional scaling, have constrained the dimensions to be uncorrelated, although these methods do not always require investigators to do so. Although this constraint is a sensible one for descriptive purposes, ensuring that the descriptive axes are inde-

pendent, it is conceivable that underlying relational elements are systematically associated and will therefore be misrepresented by orthogonal dimensions. In sum, although exploratory analyses of relational dimensions have demonstrated their descriptive, theoretical, and empirical utility, they may also have limitations in regard to interpretation, scope, and independence.

One so far untested response to these potential limitations is to subject theories of basic relational forms to confirmatory tests, in which the hypothesized composition and interrelations of the dimensions are directly examined. Such confirmatory tests would avoid the risk of post hoc interpretation, allow a systematic assessment of relational features, and enable investigation of possible associations between dimensions. Although confirmatory analyses have their own limitations, such as the potentially restricted range of relational features that their motivating theories propose, they offer a promising alternative to the exclusively inductive analyses conducted to date.

One theory that is amenable to such analyses is the theory of relational models (Fiske, 1991, 1992). This theory proposes four elementary cognitive models in terms of which social relationships are represented, comprehended, evaluated, and constructed. Social relationships may be governed by combinations of the models, so the models do not simply describe types of relationships. The models are not, therefore, empirically independent in principle; the degree to which they are associated or combined is a contingent matter of the "implementation rules" operating in a culture. According to Fiske (1991), cultures vary in how they employ and combine the four models, implementing them for differing social tasks in differing combinations.

The *Communal Sharing* model organizes relationships in terms of collective belonging or solidarity. Members of an in-group are treated as equivalent elements of a bounded set; consequently, individual distinctiveness is ignored. By contrast, the *Authority Ranking* model organizes relationships in asymmetrical terms. Parties to relationships governed by this model are hierarchically ordered, with higher-ranked individuals authorized to command, protect, dominate, and precede, and lower-ranked individuals expected to defer, obey, and show loyalty and respect. The *Equality Matching* model organizes relationships with reference to their degree of balance or imbalance; it is manifested most distinctly in turn-taking, reciprocity, distributions of equal shares, democratic voting, and tit-for-tat retaliation. The *Market Pricing* model, finally, organizes relationships with reference to a common scale of ratio values such as money. Emphasis is on proportions—earning a wage based on hours worked, getting a good return on an investment of effort, or efficient use of time—and social transactions are reckoned as rational calculations of cost and benefit.

Relational models theory has received considerable empirical support (Fiske & Haslam, 1996). The role of the models in everyday social cognition is supported by research demonstrating that when people make confusions between their acquaintances, and when they seek alternative interactants when an intended one is unavailable, they substitute people with whom they have the same kind (model) of relationship (Fiske, Haslam, & Fiske, 1991; Fiske & Haslam, 1998). The universality of the models is supported by replication of the former finding in four cultures (Fiske, 1993). The models also appear to correspond well to the mental organization of relationships. When people freely classify their relationships into groups, the groups tend to share the same relational model (Haslam & Fiske, 1992), and when they freely recall a list of their acquaintances, the lists tend to contain clusters of relationships of the same model (Fiske, 1995). Strong evidence for the claim that the models are discrete relational categories has also been obtained (Haslam, 1994a, 1994b).

Although the existing empirical support for relational models theory is extensive, it is weak on the questions of whether the posited features of the models cohere empirically, and whether they compose structures that correlate systematically with one an-

other. Only one study has directly addressed these questions, and did so in a purely exploratory manner (Haslam, 1995). In a factor analysis of relational features drawn from relational models theory and Foa and Foa's (1974) resource exchange theory, two bipolar factors emerged, with Communal Sharing and Market Pricing features forming poles of a communality dimension, and Equality Matching and Authority Ranking features separating on an equality/inequality dimension. Although the study generally supported the empirical coherence of the relational models, its findings are inconclusive for several reasons.

First, the inclusion of relational features drawn from an alternative theory obscures the interpretation that two bipolar factors underlie the four models. Such an interpretation runs contrary to relational models theory, which argues that the models are elementary (mutually irreducible), rather than being linked pairs on more basic dimensions. Second, there was some evidence that the orthogonal factors did not adequately represent the interrelations of the models, with Equality Matching items tending to be more closely related to Communal Sharing items than were Authority Ranking items, which were more closely associated with Market Pricing items. Finally, the study was methodologically impaired by sampling student participants only and by an unsystematic construction of the relational models items. All in all, exploratory factor-analytic examination of the relational models theory supported the coherence of the models, suggested that they might not be empirically independent, but was ambiguous on the adequacy of an orthogonal bipolar representation of them.

As the earlier study, like the previous exploratory research whose methodological limitations we have noted, yielded orthogonal bipolar factors of uncertain validity, we conducted another study to demonstrate the confirmatory research strategy that we favor. To this end, we subjected an improved and more comprehensive set of items written by Fiske to a series of confirmatory factor-analytic tests, using a more diverse sample of participants. These tests focused on three issues: the empirical coherence of the relational features of each model (i.e., whether they co-occur systematically); the relative adequacy of bipolar and unipolar factor solutions (i.e., whether the models are linked pairs on more basic dimensions or are elementary relational forms); and the adequacy of orthogonal representations of the models (i.e., whether they are better captured by correlated, or "oblique" factors). We hypothesized that confirmatory analyses would show that the features of the respective models cohere into four distinct, correlated, unipolar factors, rather than the orthogonal bipolar factors that have emerged from exploratory analyses. Bipolar solutions should be inadequate because they challenge the claim that the relational models are elementary and distinct, and orthogonal solutions should be inadequate because they fail to allow that associations among the models are free to vary according to a culture's implementation rules.

The confirmatory factor-analytic tests were performed on a large sample of relationships gathered from a sample of adult participants. Because of the prohibitiveness of obtaining one representative relationship from each of several hundred participants, 10 relationships were sampled from each participant. Systematic differences between participants in relationship attributes were statistically removed prior to the factor analyses so as to safeguard the statistical independence of the relationships.

Method

Participants

To achieve a diverse sample of social relationships, a diverse sample of volunteer participants was recruited from four distinct sources. Twenty-three participants were obtained from several employment settings: a computer business, a communications consultancy, a real estate office, a bank, and a mental health facility. Nine participants were obtained through suburban newspaper advertisements, and a further nine

through advertisements at an urban university. Finally, three participants were obtained from a senior citizens center. All recruitment sites were in the New York metropolitan area. After excluding three participants whose responses were incomplete, the final sample contained 42 paid ($10) participants, including 23 women and 19 men, with a mean age of 46.2 years (range 19 to 83 years). Although a larger sample of participants would have been ideal for safeguarding the generalizability of the analyses, the sample of relationships drawn from the participants was sufficiently large to safeguard their statistical reliability.

Materials

Participants completed a two-part questionnaire entitled "Study of social relationships." In the first part they were instructed to list 40 acquaintances with whom they interacted in any way, no matter how superficially or infrequently. Previous work (e.g., Haslam, 1995; Haslam & Fiske, 1992) indicated that 40 was approximately the largest number of acquaintances that all participants would be sure to exceed, and indeed none of them failed to list that number. Participants were then instructed to select every fourth acquaintance, starting with the second, in order to representatively sample as broad a variety of relationships as possible in a standardized fashion. Previous work indicated that participants tended to list closer relationships first.

In the second part of the questionnaire, participants rated the 10 sampled relationships on 52 randomly ordered items using a scale of 0 ("not at all true of this relationship") to 6 ("very true of this relationship"). No items were retained from Haslam's (1995) earlier study, but the same rating scale was used. The items belonged to four sets, one for each of the relational models. Within each set, eight items (nine for Equality Matching) were constructed by Fiske to represent central features of the models, and additional items were constructed to represent features that are often confused with the models but which are merely cul-

ture-specific implementations of them. Despite considerable content overlap, items representing the models differed from the earlier study (Haslam, 1995) in that they were systematically sampled from eight diverse domains in which the relational models operate (exchange, distribution and use of resources, work, morals, decisions, social influence, identity, and miscellaneous [the Equality Matching item set contained two miscellaneous items]). The 19 culture-specific implementation items were included for cross-cultural comparison purposes only and are not relevant to the factor structure of the relational models, so all analyses were conducted on the 33 central feature items. The data for analysis therefore contained an effective sample of 420 relationships rated on 33 relational features.

Results

Prior to conducting the factor analyses, systematic differences between participants in the profile of relational features had to be statistically removed so that the covariation of relational features was not contaminated by statistical dependencies. Consequently, between-participant variance in the items was controlled by performing a series of 33 regression analyses. In each analysis, one item was regressed on 41 dummy variables collectively representing the 42 participants, and the unstandardized residuals were retained. These residuals represent the deviation of each relationship from a participant's mean rating of his or her 10 sampled relationships on a given item. Therefore, each relationship's score on each item was uncontaminated by mean differences in participants' ratings on that item.

The confirmatory analyses sought to compare three models of the covariation of the 33 items. The three models all shared a common matrix of factor loading constraints (the "lambda" matrix). This matrix was constructed by constraining the items of each relational model to load positively on a single factor and to load zero on the other factors. Each factor, then, represented a single relational model. The three factor-ana-

lytic models differed only in the constraints imposed on the intercorrelations among these factors (i.e., the "phi" matrix). Model 1, which represents the solutions containing independent closeness and equality dimensions obtained in previous work (e.g., Haslam, 1995), constrained all factors to have zero interrcorrelation, with the exception of the Authority Ranking/Equality Matching and Communal Sharing/Market Pricing pairs, which were constrained to correlate -1.0 (i.e., polar opposition). This model, then, tests the fit of the data to two orthogonal bipolar factors. Model 2, by contrast, constrained all factor intercorrelations to zero, therefore representing a solution in which models do not form polar pairs, but are instead independent unipolar factors. Model 3, finally, imposed no constraints on the factor intercorrelations, allowing for the possibility that some factors may be significantly correlated or "oblique."

Comparison of the fit to the data of Models 1 and 2 allows a judgment on the relative merits of bipolar versus unipolar factor solutions under the assumption that the factors are independent. Relational models theory implies that a solution containing four unipolar factors should yield superior fit, as the models should represent distinct sources of variance between social relationships rather than simply representing poles on superordinate dimensions of closeness or equality. Comparison of the fit of Model 3 to that of Models 1 and 2, conversely, allows a judgment on the adequacy of orthogonal versus oblique factor solutions. Although Model 3, having fewer constraints, must have better fit than Models 1 and 2, a statistical test can be performed to assess whether this advantage is

significant (Jöreskog & Sörbom, 1989). If it is not, then an orthogonal factor solution is adequate, but if it is, then the associations between the relational models are systematic. Finally, parameter estimates derived from Model 3 would allow us to determine which models tend to associate.

The three confirmatory factor-analytic models were tested on a covariance matrix of the 33 residualized items using LISREL 7 (Jöreskog & Sörbom, 1989). A summary of the three models, including three alternative fit indices (Jöreskog & Sörbom's goodness-of-fit index, root mean square residual, and χ^2), is presented in Table 1. As smaller-fit indices indicate better fit of the model, it is immediately apparent that Model 2 is greatly superior to Model 1, suggesting that a bipolar orthogonal two-factor model is not well matched to the latent structure of the relational models. Four distinct unipolar factors appear to yield a better fit. Inspection of the estimated loadings generated by Model 1 indicates that although it captured the Communal Sharing and Authority Ranking models adequately, it failed to yield consistently positive loadings for the Market Pricing and Equality Matching items.

Analysis of Model 3 sheds some light on the limitations of Model 1. Model 3 yields a fit that is markedly superior even to Model 2 ($\chi^2(6) = 232.76, p < .0001$). The reasons for this superior fit can be seen in Table 2, which presents the factor intercorrelations estimated from Model 3. Five of the six correlations differ systematically from zero, demonstrating the inadequacy of the orthogonal four-factor solution (Model 2). Moreover, the further departure of these correlations from those embodied in Model 1, where the Communal Sharing/Market Pricing and

Table 1. *Details of confirmatory factor analyses*

Model	Factors	Goodness-of-fit Index	Root Mean Square Residual	*df*	χ^2
1	2 Orthogonal	.61	.322	495	3141.87
2	4 Orthogonal	.73	.305	495	2449.15
3	4 Oblique	.75	.243	489	2216.39

Table 2. *Factor intercorrelations for Model 3*

	Communal Sharing	Equality Matching	Authority Ranking	Market Pricing
Communal Sharing	1.00			
Equality Matching	.60**	1.00		
Authority Ranking	.01	−.17*	1.00	
Market Pricing	−.18*	.36**	.27**	1.00

* $p < .01$. ** $p < .001$.

Equality Matching/Authority Ranking correlations were set at −1.0, shows the degree to which that model is procrustean. Authority Ranking is only weakly negatively related to Equality Matching, as is Communal Sharing with Market Pricing. Indeed, Table 2 indicates that most associations between factors are positive, rather than negative, as the existence of bipolar factors would suggest. Communal Sharing and Equality Matching appear to be distinct relational models that often occur together, while Equality Matching and Authority Ranking also commonly occur in tandem with the Market Pricing model.

Inspection of the loading matrix for Model 3, presented in Table 3, indicates that most items loaded substantially, and all significantly ($p < .001$), on their appropriate factor. Only two of the 33 items loaded less than the conventional .30 criterion for a substantial loading, indicating that the items collectively captured the relational models well. In general, the Communal Sharing and Authority Ranking items performed best. Nevertheless, although the confirmatory factor analyses supported relational models theory hypotheses concerning the unipolarity and obliqueness of the factors, the results offer less striking support for the empirical coherence of the four models. Whereas loadings in Model 3 were generally high, its goodness of fit was only modest by conventional standards. Although this modest level of fit can be explained in part by the use of theoretically derived single items covering diverse social domains—in which superior levels of fit are commonly achieved using empirically refined multi-item scales of

more restricted breadth—it also indicates that the measurement of the relational models was less than ideal. Inspection of the internal consistency of the four item sets indicates that the measurement of Equality Matching and Market Pricing in particular needs to be improved (alpha = .74 and .66, respectively). The reliability of the Communal Sharing and Authority Ranking scales appear to be more adequate (alphas = .80 and .81). A revised 40-item instrument for measuring the relational models, based in part on the preceding analyses, is available from the authors.

Discussion

The findings of this study support the validity of relational models theory. Although the items used in the factor analyses represented a broad variety of social domains—decision making, social influence, morals, exchange, the organization of work, and so forth—they cohered into four factors as predicted, though to a relatively modest extent in the cases of Equality Matching and Market Pricing. Thus, these analyses indicate that when interacting with any given person, there is a pronounced tendency for people to use the same relational model across diverse domains.

With regard to the confirmatory analyses, the comparative success of Model 3 supports the hypotheses that the relational models are unipolar and that they may be systematically associated. Consequently, it argues against the possibility that the models represent the ends of orthogonal bipolar dimensions, a position implied by previous

Table 3. *Factor loadings for Model 3*

Item	Factor			
	CS	EM	AR	MP
Communal Sharing				
1	.73	0	0	0
2	.44	0	0	0
3	.38	0	0	0
4	.56	0	0	0
5	.36	0	0	0
6	.74	0	0	0
7	.72	0	0	0
8	.71	0	0	0
Equality Matching				
1	0	.62	0	0
2	0	.62	0	0
3	0	.64	0	0
4	0	.20	0	0
5	0	.47	0	0
6	0	.54	0	0
7	0	.41	0	0
8	0	.39	0	0
9	0	.47	0	0
Authority Ranking				
1	0	0	.42	0
2	0	0	.36	0
3	0	0	.86	0
4	0	0	.27	0
5	0	0	.73	0
6	0	0	.84	0
7	0	0	.48	0
8	0	0	.59	0
Market Pricing				
1	0	0	0	.50
2	0	0	0	.34
3	0	0	0	.42
4	0	0	0	.69
5	0	0	0	.49
6	0	0	0	.39
7	0	0	0	.33
8	0	0	0	.40

Note: CS = Communal Sharing; EM = Equality Matching; AR = Authority Ranking; MP = Market Pricing.

exploratory work on relationship taxonomy. The models appear to be associated systematically in ways that are sensible in light of their implementation in North American society. In that society, egalitarianism is a valued ideal, although many social arrangements depart from it, and it commonly governs aspects of close communal relationships as well as more formal organizational and workplace settings, such as those in which Market Pricing predominates. Turntaking, egalitarian fairness norms, and some form of democratic organization pervade both relational realms in North American society in a way that might seem peculiar to members of other societies.

Similarly, the positive association between Authority Ranking and Market Pricing is sensible in light of the degree to which workplaces and formal organizations are governed hierarchically. Indeed, the conjunction of Authority Ranking and Market Pricing that we see here probably corresponds in most cases to the bureaucratic form of organization so pervasive in modern societies. However, the extent to which the work environment is the principal domain of operation in North American society for the Authority Ranking model may seem odd to members of cultures in which rank and social precedence are accepted and highly valued ways of organizing a much broader range of social relations, especially those of a communal kind. The associations among the relational models are sure to vary cross-culturally, and it is possible that this study's findings of non-independence and unipolarity might not be supported in other cultures.

The confirmatory analyses support the existence of several distinct but systematically correlated unipolar factors, and they raise questions about inductively derived orthogonal dimensions. Although from a descriptive standpoint independent dimensions are very desirable, from an explanatory point of view they may be misrepresentations. If the latent variables that give rise to the outward forms of social relationship—cognitive models in the case of relational models theory—are systematically associated, then descriptive analyses based on orthogonal dimensions might fail to capture them. Several problems may follow.

One such problem is that correlated explanatory variables could tend to be confused. This problem is pertinent to the distinction between the Communal Sharing and Equality Matching models. These mod-

els are often conflated so that egalitarian reciprocity is identified with close communal relationships, and both are treated as aspects of a single dimension. This study and earlier research (Haslam, 1994a) clearly indicate that the two models are distinct, although in North American culture they are used together to structure many relationships. Descriptive analyses in this culture will therefore be likely to miss an important distinction because of a culturally contingent association between the two models.

A second problem that can arise in the development of relationship taxonomies is implied by the first. If the latent explanatory variables are correlated, then orthogonal descriptive schemes will tend to be overly economical, conflating positively associated variables or representing distinct but negatively correlated variables as poles of a single bipolar dimension. This possibility might explain the tendency for previous work on the descriptive taxonomy of social relationships to invoke only two or three, generally bipolar, dimensions (see references in Fiske, 1991), when research inspired by relational models theory has found evidence of four. Although it would be premature to cast serious doubt on more parsimonious taxonomies on the strength of a single study, it is at least possible that the assumption of orthogonal dimensions partly underlies their superior economy.

If, as suggested above, spurious bipolar dimensions may be obtained when two negatively correlated relational dimensions are bound together by the assumption of orthogonality, a further problem might arise. When this happens, one end of the "bipolar"

dimension is treated as simply the negation of the other end, although they might be better understood as distinct entities. This tendency can be seen in the relation between Equality Matching and Authority Ranking, which have often been paired in one bipolar dimension, interpreted as equality on the one hand and power, dominance, or control on the other. But is egalitarianism simply the absence of power or dominance, and is authority merely the negation of equality? Although such a polarity may agree with our lay perceptions of relationships, the covariation of equality and authority across social relationships appears to be more consistent with them having only a mildly negative association. Just as "common sense" bipolar accounts of masculinity/femininity and positive/negative affect appear to be mistaken (e.g., Bem, 1974; Watson & Tellegen, 1985), so might be our lay understandings of authority and equality. "Common sense" theories often have too much fondness for binary oppositions, and descriptive taxonomies that contain them may not be the best guide to a theory of basic relational forms.

In summary, the findings of this study support relational models theory in several respects: The models represent distinct and generally coherent relational forms that may correlate systematically. Although the findings are preliminary, given the prior support for descriptive schemes containing independent bipolar factors and the desirability of replication with a larger sample, the confirmatory research strategy exemplified by this study offers a fruitful alternative to the exploratory taxonomy of relationships, and may challenge some of its assumptions.

Appendix

List of items used in factor analyses (1 = exchange; 2 = distribution and use; 3 = work; 4 = morals; 5 = decisions; 6 = influence; 7 = identity; 8 and 9 = miscellaneous).

Communal Sharing

1. If either of you needs something, the other gives it without expecting anything in return

2. Many important things you use belong to the two of you together, not to either one of you separately

3. You share many important responsibilities jointly, without assigning them to either of you alone

4. You feel a moral obligation to feel kind and compassionate to each other

5. You make decisions together by consensus

6. The two of you tend to develop very similar attitudes and values

7. You feel that you have something unique in common that makes you two essentially the same

8. The two of you are a unit: you belong together

Equality Matching

1. We keep track of what we give to each other, in order to try to give back the same kind of things in return eventually; we each know when things are uneven

2. You typically divide things up into shares that are the same size

3. If you have work to do, you usually split it evenly

4. You have a right to equal treatment

5. One-person, one-vote is the principle for making decisions with this person

6. If one person does what the other wants, next time the second person should do what the first person wants

7. The two of you consider yourselves peers, fellow workers, and co-partners

8. Both of you should have even chances

9. If you can't divide something up, you take turns

Authority Ranking

1. One of us sometimes has to turn over things to the other, who doesn't necessarily have to give them back

2. One of you is entitled to more than the other

3. One of you directs the work you do together—the other pretty much does what they are told to do

4. In some respects, one of us is entitled to more than the other, and should be treated with special respect

5. One of you makes the decisions and the other generally goes along

6. One of you is the leader, the other loyally follows their will

7. One of you looks up to the other as a guide and role-model

8. One of you is above the other in a kind of hierarchy

Market Pricing

1. What you get from this person is directly proportional to how much you give them

2. You divide things up according to how much each of you has paid or contributed

3. If one of you worked for the other, they would be paid in proportion to how long they worked or how much they did

4. You have a right (you are entitled) to a fair rate of return for what you put into this interaction

5. With this person, you make decisions according to the ratio of the benefits you get and the costs to you

6. One of you often pays the other to do something

7. You expect to get the same rate of return on your effort and investment that other people get

8. Your interaction is strictly rational: you each calculate what your payoffs are, and act accordingly.

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