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*Editor*

## Using Consensus Analysis to Measure Cultural Diversity in Organizations and Social Movements

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*Consensus analysis, a technique developed in cognitive anthropology for analyzing structured interview data, produces three useful results: (1) a measure of the degree of agreement among informants about a domain of knowledge, belief, or practice; (2) the "culturally correct" information about that domain according to the pooled answers of the informants; and (3) a score for each informant representing that person's knowledge of the domain. Consensus analysis is not just for high-agreement domains, however. This article explores a typology for conceptualizing diversity in low-consensus domains, including (1) weak agreement, (2) turbulent, (3) subcultural, and (4) contested domains, using case study examples from an English social movement, a Scottish high-technology firm, and a Scottish business support and training organization. The typology helps measure and interpret diversity and change within organizations and social movements.*

Consensus analysis (CA) was originally developed as a technique for discovering which respondents are most knowledgeable and reliable in a particular cultural context. It is based on the assumption that individuals vary in their mastery of particular domains of knowledge (Romney, Weller, and Batchelder 1986; Romney, Batchelder, and Weller 1987; Boster, Johnson, and Weller 1987; Weller and Romney 1988).<sup>1</sup> Not everyone knows the same

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information, nor does everyone construct their understanding of a social setting in the same way.

CA provides a technique for discovering patterns of agreement and disagreement concerning a domain of knowledge among individuals within a specified social setting. Depending on the level of agreement among members of a particular group, CA allows the analyst to infer whether there is either a culturally central or more diversified understanding of the domain within the local knowledge system. CA also lets us identify those individuals who are most and least competent about the domain of knowledge under consideration.<sup>2</sup> These three features of the technique—the possibility of discovering (1) patterns of agreement, (2) what information is culturally correct in the local setting, and (3) how closely each individual matches the culturally central version of knowledge—make CA a valuable tool for investigating the diversity of knowledge among individuals who participate in a setting.

The CA model does not necessitate acceptance of the outmoded idea of culture as a bounded, stable entity with an invariant set of characteristics held by a homogeneous group of individuals. On the contrary, we, ourselves, subscribe to the view that culture is situated within rather volatile terrains, rife with contestation, contradictions, and flux (see, e.g., Escobar 1992). We want to show, however, that embracing such a notion of culture does not rule out the use of methods for analysis predicated on systematic data collection; indeed, by using CA within the context of our respective ethnographic field projects, we both found evidence of variations that we might otherwise have overlooked. We are including just enough substantive material to show how CA has led to new interpretations of our ethnographic material.

## CULTURAL DOMAINS IN ORGANIZATIONS AND MOVEMENTS

A decade ago, Gamst (1989:14–5) warned against the implicit assumption that organizational cultures are homogeneous, little more than the personality of the founder writ large. To explore the diversity processes of creation and change in organizations and social movements, we propose a typology of cultural domains—symbolic categories containing other categories (Spradley 1979:100; Borgatti 1993). These might be domains of knowledge, domains of evaluation, or domains of practice. We can describe two major types of agreement (or nonagreement) in these domains: coherent, where there is a high degree of consensus, and noncoherent, where there is low consensus. Because our interest is in forms of diversity, we will suggest some additional subtypes of noncoherent domains.

I. Coherent domains, which show a high degree of consensus or homogeneity of knowledge, evaluation, or practice on the part of a population;

II. Noncoherent domains, which exhibit low consensus on the part of a population;

- A. Weak agreement domains, which fail to achieve a consensus threshold;
  - B. Turbulent domains, in which knowledge or evaluations are haphazard;
  - C. Multicentric domains, in which there are multiple centers of agreement;
1. Subcultural domains, in which there are two or more centers of agreement that are different but not oppositional; and
  2. Contested domains, in which some individuals take a perspective opposite to that expressed by others in the same population.

The typology is intended to be heuristic, to help expand our thinking about the analytic possibilities for noncoherent domains. Bohannan's (1995) concept of cultural turbulence, an "interruption in the flow of the pattern," captures what we mean by turbulent domains (p. 82). Turbulence suggests a highly differentiated domain in which each person in the population has a distinct perspective. In contrast, weak agreement might be found in the early stages of consensus formation or in a late stage of consensus dissolution in a population.

The concept of multicentric domains includes two different centers of patterned agreement, one interrelated and the other oppositional.<sup>3</sup> Note that the difference between weak agreement and turbulence is one of degree. So is the difference between contested and subcultural domains. We will suggest some technical criteria for each of these categories, but it is important to recognize that the dividing lines are not absolute. The importance of the typology is to suggest an analytic strategy that can help us to refine our understanding of our data.<sup>4</sup>

In Table 1, we suggest diagnostic criteria for each of the types of domains identified in the discussion above.

In the past, users of CA have generally emphasized coherent domains (see Romney's annotated bibliography of consensus theory at [www.socsci.uci.edu/mbs/personnel/romney/akr-con.html](http://www.socsci.uci.edu/mbs/personnel/romney/akr-con.html)), but this does not exhaust the utility of the method. We can imagine different domains within the same organization that approximate all four types; indeed, our second case study illustrates two different types of domains within the same organization.

The approach adopted here will allow a more differentiated, less homogenizing, and less judgmental understanding of organizational cultures than, for example, the simple characterization of strong versus weak cultures (Deal

TABLE 1  
Types of Domains and Identifying Criteria

Types of Domains	Identifying Criteria
I. Coherent	Ratio between first and second factors equal to or greater than 3
II. Noncoherent	Ratio between first and second factors less than 3
A. Weak agreement	Elbow-bend scree plot of eigenvalues; no negative knowledge scores
B. Turbulent	Straight line descending scree plot of eigenvalues; no negative knowledge scores
C. Multicentric	Two or more centers of opposition/agreement in matrix
1. Subcultural	Two or more "answer keys" in matrix
2. Contested	Opposite evaluations indicated by negative knowledge scores

and Kennedy 1982) might suggest. The above typology of domains helps alert us not only to possible structural and processual differences between different organizations but also to changes within organizations and social movements over time. We illustrate each of these types of domains with data from three case studies.

## CONSTRUCTING DATA

The first example comes from a study of women who were mining community activists in Yorkshire, England, during the coal dispute of 1984-1985. In this case, the CA research, conducted in 1991, six years after the end of the strike, focused on what new knowledge had been acquired through participation in collective action, knowledge that might be regarded as both individually and ultimately culturally transformative. Women activists were asked to rank order individuals, groups, and institutions that had acted as either allies or opponents of the movement during the period of the strike.

The second case comes from a study of a rapidly growing Scottish high-technology firm of more than 250 employees studied by Caulkins (1995a) and Caulkins and Scott (1991). The data were constructed in multiple interviews with the top management of Scofirm (a pseudonym) as they planned for major changes in business operations. The interviews focused on the firm's organizational culture, problems that the firm faced, and the managers' priorities for change.

The third case study deals with the organizational roles of Enterprising Futures (a pseudonym), a private-sector, self-financing, small-business research and training organization integrated into a Scottish University.

In each of these case studies, the data were constructed in the following manner. First, researchers carried out extensive interviews in the organization and supplemented the interviews with participant observation. After sifting through the information gathered in this first phase of research, one or more significant domains were selected for intensive study. Through freelist-ing, we obtained an inventory of all of the elements included in the selected domain (Borgatti 1993).

With the help of informants, we eliminated the conceptual redundancies from the list of elements. Then we asked members of the organizations (or, in the case of the strike, women identified through the snowball method who had been participants at the time) to rank these elements according to their salience. Next, we compiled and analyzed all of the responses using ANTHROPAC (Borgatti 1992) software.

This program displays the degree of variability in the judgments of the informants in several ways. First, it creates and factor analyzes a matrix of agreement (covariance, matching, or correlation) among the respondents or subjects, not a matrix of agreement among variables as is familiar in psychometric research. If there is only one factor, or if the first factor is at least three times larger than the second factor, we can say that the domain is coherent (in our terminology). The three-times rule specifies the accepted threshold for a data set that fits the model of consensus as culture. Noncoherent domains are those in which a large proportion of the variance is not attributable to one factor. Operationally, we can say that a subject-by-subject agreement matrix is noncoherent when the ratio between the first and second factors is less than three.

Second, ANTHROPAC computes a measure of cultural knowledge for each of the informants, indicating how closely they agreed with the consensus (if any) of the other informants. Third, the program reports the correct answer key or culturally central ordering of the elements. If the domain is not coherent, of course, the cultural knowledge scores and the rankings of elements of the domain are less useful. One can then subset the data according to social variables (e.g., age, sex, occupation) or culturally important dimensions. Repeating the analysis on the subsets should reveal whether new patterns emerge. Finally, we use nonmetric multidimensional scaling and average-linkage cluster analysis modules in ANTHROPAC to display the pattern of agreement (or disagreement) among the informants.

Table 2 summarizes the main information for our case studies, including the sample size from each organization, the domain selected for study, the

TABLE 2  
Case Study Organizations and Domains

<i>Social Movement or Organization (member sample size)</i>	<i>Domain Type and Domain Case Study (number of elements)</i>	<i>Ranking Domain Elements According to:</i>
1. Yorkshire, England: Activist wives of miners (N = 16)	Coherent: Agencies, persons, and institutions that supported or opposed the movement's interests (12) Turbulent: Weak Agreement: (1) Organizational culture (13) (2) Organizational problems (15) (3) Organizational changes (11) Subcultural: Contested: Organizational roles (19)	Importance as potential allies or opponents (1) Current importance (2) Seriousness of problems (3) Priority of changes Importance of each role for the operation of EF
3. Scotland: "Enterprising Futures" (EF) staff (N = 15)	Contested: Organizational roles (19)	Importance of each role for the operation of EF

number of elements in that domain, the type of domain revealed by our analysis (coherent, turbulent, contested, or overlapping), and the rank-ordering task given to the informants in each case study. Each case study will be used to illustrate a type or set of types of domains, along with some of the insights to be derived from this kind of analysis.

The samples are all quite modest by survey research standards, but CA can produce very reliable results from small samples (Weller and Romney 1988:77). We recommend using at least twenty items, particularly if they are nominal measures (yes-no, multiple choice) or rating scales. However, in cases in which it is appropriate, rank ordering is likely to produce more stable results for a small number of items than are nominal measures or rating scales (Caulkins 1998:187).

### COHERENT DOMAINS: RADICAL AND MAINSTREAM YORKSHIRE MINERS' WIVES

During the 1984-1985 coal strike, which was eventually crushed by the Conservative Thatcher government, many of the wives of striking miners in Yorkshire (a county in northern England) became politically active for the first time in their lives.<sup>5</sup> Their fight against pit closures and their work in

support of their beleaguered communities remain legendary. Not only did they participate in collective action associated with the strike-joining picket lines, marches, rallies, and other demonstrations but they also fundraised tirelessly and organized soup kitchens and other forms of humanitarian relief for families deprived of all other sources of sustenance, other than the meager strike pay provided by the union. A few of the women interviewed had been active in other causes before the strike; for others, being drawn out of their homes and into the public arena by the intensity of this conflict was a new experience.

Among the questions that Susan Hyatt hoped to address in her study was whether the women's participation in an oppositional movement had any enduring effect on their cognitive landscapes. Hyatt used CA to identify more precisely the nature of the new knowledge produced and deployed in the course of direct action to argue for a view of social movements that gives more credence to this cognitive dimension (Eyerman and Jamison 1991) than to the historical outcomes of these movements.

After extensive interviews with the activist women, Hyatt developed a list of a dozen agencies, organizations, and individuals who had been involved in the strike. She then asked sixteen women to rank order the items in this list based on their recollections of their experiences during the strike, first according to which agencies and organizations they thought were most likely to share their interests now and, second, who they thought were most likely to oppose them. The perspectives indicated by these rankings are consistent with other writings about the impact of the strike on activists. (See, e.g., Evans, Hudson, and Smith 1985; Ali 1987; Allen and Measham 1991; and Leonard 1991.) This suggests that CA is a reliable method for eliciting systematic information of this sort in conflicts that are much less well documented.)

The degree of consensus regarding the ranking of opponents among the fifteen activists was quite high, with a ratio of 4.29 between the first and second factors (see Table 3). Similarly, the domain of potential opponents is also coherent, with a ratio of 5.42 between the first and second factors. Note, too, that in both cases, the first factor accounts for a large proportion of the variance (75.2% and 79.8%, respectively). We also can see this strong first factor if we were to plot the eigenvalues of the factors (a scree plot) for both the allies and opponents sets of analysis. Each would exhibit an elbow bend curve or a steep slope with a break. For allies, for example, the eigenvalues are 9.822, 2.287, and 0.955. Clearly, the activists concur on the identity of the friends and enemies of their movement.

If we display the agreement matrix from either of these analyses using nonmetric multidimensional scaling (MDS) available in ANTHROPAC, we find several ethnographically interesting features. First, we noted that one

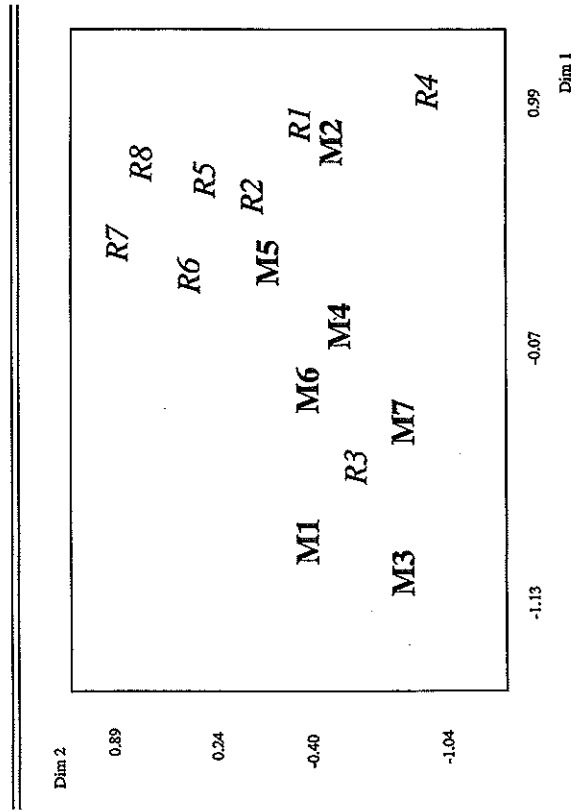
TABLE 3  
Activist Wives of Yorkshire Miners

Factor	Eigenvalue	Percentage of Variance Explained	Cumulative Percentage	Ratio
Ranking individuals, groups, and institutions as potential allies				
1	9.822	75.2	75.2	4.294
2	2.287	17.5	92.7	2.395
3	0.955	7.3	100	
Total	13.064	100		
Ranking individuals, groups, and institutions as potential opponents				
1	10.617	79.8	79.8	5.422
2	1.958	14.7	94.5	2.695
3	0.727	5.5	100	
Total	13.301	100		

woman, a nonactivist from a mining community, had a negative cultural knowledge score. Her responses differed so significantly from those of the other fifteen that she appears as an outlier in relation to the other respondents. Thus, although her responses were certainly perfectly reasonable based on her own life story (she had begun a new career as a social worker to support her family during the strike), they differed from those of the other fifteen respondents, indicating that her very different set of experiences had produced a very dissimilar set of understandings about the social setting. By omitting the nonactivist outlier from the MDS, we can zoom in and examine the fifteen activists more closely (see Figure 1).

Hyatt's ethnographic information suggested that the group could be divided into two subsets, one of which we labeled radicals and the other of which we labeled mainstream activists, in recognition of their different life experiences. The radicals were those women who had traveled outside of their communities during the strike to fundraise and to speak about the miners' cause. They came in contact with a variety of different groups, both within Great Britain and abroad, and were able to put the miners' fight within a broader context regarding systemic inequalities within British society. Some of the radicals had also been members of political groups, such as the Communist Party, prior to the strike. The mainstream activists were women who were active primarily in their own communities, operating soup kitchens and organizing local fundraisers. Visual inspection suggested that the radicals were more central or more dominant in this domain, with the mainstreamers more peripheral. The average knowledge scores for the radicals, in fact, were higher (.891) than those of the mainstreamers (.748).

FIGURE 1  
Multidimensional Scaling of Activists According to Similarity of Ranking of Allies



NOTE: M1 - M7 = mainstream activists; R1 - R8 = radical activists.

As shown in Table 4, the radical group chose feminists, gays and lesbians, trade unions, and black people as their top four allies. In contrast, the mainstreamers ranked local councilors, trade unions, the Labour Party, and the local member of Parliament as their top four allies. The mainstreamers, then, considered alliances to be formed on the basis of their primary loyalties to local institutions and their representatives; the radicals, however, saw alliances formed on the basis of marginality. They identified most strongly with other groups whom they regarded as disenfranchised as they themselves were from the state. Although the more mainstream activists still had faith in local government, they, too, now saw oppressed groups, such as black people and gays, as more likely to be their allies than either the church or the media.

In sum, the activists evidenced overlapping versions of political knowledge as shown in both the rankings of opponents and allies. Because the groups' rankings are otherwise virtually identical, the domains are still coherent. The variation in the ranking of allies showed that even several years after the end of the miners' strike, there were discernible differences in the nature of the new knowledge acquired by activists; the factor that best

TABLE 4  
Domains of Allies Constructed  
by Radical and Mainstream Activists

Radicals: Rank Order of Allies (N = 8)		Mainstreamers: Rank Order of Allies (N = 7)	
1. Feminists		1. Local councilors	
2. Gays and lesbians		2. Trade unions	
3. Trade unions		3. Labour Party	
4. Black people		4. Local member of Parliament	
5. Local councilors		5. Feminists	
6. Local member of Parliament		6. Black people	
7. Labour Party		7. Gays and lesbians	
8. Newspapers		8. Church	
9. Church		9. Newspapers	
10. Television news		10. Television news	
11. Police		11. Police	
12. Conservative Party		12. Conservative Party	

explained this outcome was not the fact of their participation in a social movement but the nature of that participation. The radicals and mainstreamers continued to agree on who their opponents had been during the strike, but they had somewhat divergent evaluations of who their closest allies were. In this instance, use of CA led to a deeper understanding of the different effects that participation in collective action had on different categories of activists and revealed an important dimension of the impact of social activism on knowledge creation that had been otherwise overlooked in the interviewing process. Our message: You are not finished with the analysis once you establish that a domain is coherent. Working back and forth between ethnographic information and multivariate analysis can produce important insights.

### WEAK AGREEMENT: PROBLEMS OF SCOTFIRM

ScotFirm was one of thirty computer technology firms in Scotland's Silicon Glen included in a study of high technology in peripheral regions of the United Kingdom (Caulkins 1992, 1995a). Silicon Glen, which was named for the heavy concentration of computer hardware and software firms, extends across the central section of Scotland from Glasgow to Edinburgh. In a restudy of ScotFirm, one of the most successful of the indigenous Scottish firms, Caulkins and the late Michael Scott found that the rapid growth of the

TABLE 5  
Factor Analysis of Ranking  
of Problems Confronting ScotFirm

Factor	Eigenvalue	Percentage of Variance Explained	Cumulative Percentage	Ratio
1	2.455	58.3	58.3	2.521
2	0.974	23.1	81.5	1.248
3	0.78	18.5	100	
Total	4.209	100		

firm meant that the previously flat administrative structure of the organization was under threat because of a perceived need for tighter procedures and planning processes.

With the number of employees in the firm increasing to more than 300 and the addition of new managers who had not shared the vision that guided the firm in its early days, the management team was in some disarray. During a recent business downturn, the management reluctantly decided to lay off a number of employees, for the first time in the firm's history. Some managers felt guilty and demoralized, particularly because they sensed that the employees no longer trusted them as they had previously.

After a series of interviews with the eight managers during this crisis, three of the most salient domains were selected for more detailed assessment: (1) the problems faced by the organization, (2) the central characteristics of the organization's culture, and (3) the changes that needed to be made in the firm's operating procedures. From the freelisting of problems with the managers, we constructed a list of fifteen important problems. These included items such as "need to prune the range of products," "need for closer links between customers and development engineers," "difficulty in recruiting experienced people," and "difficulty in putting new ideas into practice." Then we asked the managers to prioritize the fifteen problems from most to least serious. As indicated in Table 5, the factor analysis of the 8 x 8 agreement matrix shows a pattern of weak agreement, in which the ratio between the first and second factors fails the three-times rule and a plot of the (rather small) eigenvalues shows an "elbow" between the first and second factors, flattening out between the second and third factors.

As Table 6 shows, the scores of the cultural key also reinforce this interpretation of weak agreement. Because the matrix fails to reach a cultural level of agreement, we would not want to use the cultural key as more than a diagnostic device. Three of the problems ("loss of a sense of direction," "short-

TABLE 6  
Ranking of Problems in Order of Seriousness

Rank	Problem	Consensus Score
1	Loss of sense of direction	0.07
2	Short-term response, not planning	0.29
3	Need for product focus	1.99
	Gap in average ranking	
4	Lack of systems and procedures	7.06
5	Loss of confidence and trust	7.25
6	Difficult relations between divisions	8.47
7	Difficult to act on ideas	9.08
8	Difficult to enter new technology	9.1
9	Engineers need to see customers	9.76
10	Two cultures, R and D and the rest	10.55
11	Need to change the culture	10.76
12	Future structure of the firm	11.16
13	Low labor turnover, retention of dead wood	11.55
14	Need to hire experienced staff	11.73
15	Need to explain decisions once taken	13.23

term responses without planning," and "need for product focus") were clustered together (range = 2.6) with low scores, indicating that the managers could agree that these problems ranked one, two, and three. After a large gap in scores, the remaining twelve problems are bunched together (range = 6.17), indicating very weak agreement on the priority for these problems. We can see the managers' difficulty: Beyond the first three problems, which they consider the most important, they have little agreement on the order of seriousness of the problems.

## TURBULENT DOMAINS: SCOTFIRM CULTURE

In the early years of its growth, ScotFirm had established its reputation as a first-rate and highly self-confident enterprise, driven by three energetic Scots owner/managers. The firm had a reputation for egalitarianism, teamwork, high-quality products, innovation, and a commitment to employee development.<sup>6</sup> By the time of the restudy, ScotFirm had acquired an activist board of directors, expanded the management team, and nearly doubled the number of employees. After years of rapid growth, the firm began to lose its focus. The management team was split between different cohorts of old-

TABLE 7  
Factor Analysis of Ranking of Importance  
of Retention of Cultural Elements

Factor	Eigenvalues	Percentage	Cumulative Percentage	Ratio
1	3.063	47.3	47.3	1.491
2	2.055	31.7	79	1.512
3	1.359	21	100	
Total	6.477	100		

timers and newcomers and the old practice of consensus decision making no longer worked well.

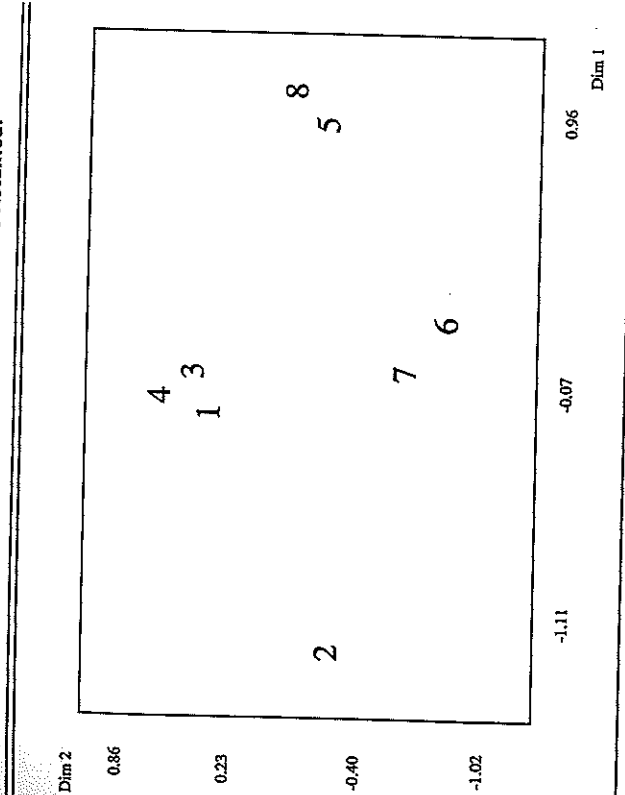
Through freelistings in interviews with the management, Caulkins and Scott obtained a list of thirteen elements claimed to be characteristic of ScotFirm culture. These items dealt with company identity, goals, sources of pride, modes of interaction, and focus on technical excellence. Although the list was not exhaustive, it provided a fair sampling of the domain of ScotFirm culture. We reasoned that although some members of the management might be less familiar with the historical culture of the organization, due to the recency of their joining the firm, all should be aware of the central outlines of the culture if, in fact, the firm were reproducing a strong (Deal and Kenney 1982) or homogeneous culture.

We asked the managers to rank order the thirteen elements according to "Which elements of the culture are most important to retain as ScotFirm grows and changes?" We then factor analyzed the 8 x 8 similarity matrix produced from the matrix of eight managers and thirteen domain elements. The results appear to be a good indicator of the "turbulence in the flow of cultural patterns" noted by Bohannan (1995). As Table 7 indicates, the ratio between the first and second factors and the second and third factors are roughly similar, and a scree plot of the eigenvalues would show a nearly smooth, straight-line decline without the sharp elbow bend characteristic of weak agreement result. Rather than regarding this data set as an example of a turbulent domain, we could characterize it as a collection of two- or three-person subcultures. To do so, however, would trivialize the concept of subculture as it is generally used.

Once again, the difference between turbulence and weak agreement is a matter of degree, but it is useful to distinguish the extremes of these types. For example, the turbulent domain of the importance of elements of ScotFirm culture is graphically revealed by processing the person-by-person



FIGURE 2  
Multidimensional Scaling of Managers:  
"What Elements of the Firm's Culture Should Be Retained?"



agreement matrix for the managers with nonmetric multidimensional scaling, in two dimensions. ANTHROPAC's MDS module provides Figure 2, which could be called, slightly whimsically, a "scattered-to-the-four-winds" form of turbulence: two managers to the east, three to the north, one to the west, two to the south, and none in the center where we would expect a concentration of individuals if there were agreement.

#### MULTICENTRIC DOMAINS I. SUBCULTURAL: SCOTFIRM ORGANIZATIONAL CHANGES

The third main domain concerns decision making and daily operations in ScotFirm. Within this domain are patterns of recruitment, decision making, and the exercise of authority. The managers were asked to prioritize eleven operating procedures items according to the urgency with which the procedures should be changed. This yields a matrix of 8 (managers)  $\times$  11 (variables).

TABLE 8  
Factor Analysis of Urgency of Changing ScotFirm Procedures

Factor	Eigenvalue	Percentage of Variance Explained	Cumulative Percentage	Ratio
1	2.403	61.7	61.7	1.611
2	1.492	38.3	100	
Total	3.895	100	100	

The factor analysis of the agreement matrix of the managers shows that the ratio between the first and second factor is only 1.611, so the domain must be considered noncoherent. As Table 8 shows, however, the first two factors between them account for all of the variance: 61.7% for the first factor and 38.3% for the second. In this case, we have two different but not diametrically opposed versions of the appropriate priorities for change. All of the managers have positive cultural knowledge (0.56, 0.03, 0.21, 0.59, 0.58, 0.73, 0.62, 0.67), indicating that none of them reverses the order of priority of other managers. The two subcultures constitute two interrelated versions of the managers' priorities for change.

Operationally, we can see these different versions in two different answer keys or culturally correct answer profiles. From a visual inspection of a two-dimensional nonmetric MDS display of the agreement matrix (not shown), we can divide the managers into two groups of near neighbors. Thus, managers 1, 5, 7, and 8 are in one group and 2, 3, 4, and 6 are in another. Each of these four-person matrices can be consensus analyzed again. The results for the two groups are given in Table 9, showing that each subculture passes the three-times rule for the ratio between the first and second factors and therefore is internally coherent. One of these subcultures stresses the need for more systematic planning procedures and recruiting a more diverse workforce, whereas the other places higher priority on daily decision making. In this domain, the two subcultures tend to divide along seniority lines, with the newer managers emphasizing the importance of instituting systematic planning and the old-timers suggesting that they need to be more decisive on a daily basis. The priorities of the two groups are otherwise similar.

Using a small data set such as the eight managers of ScotFirm creates some limitations. With a few more respondents, for example, the turbulent domain might become subcultural. (Any turbulent domain will become subcultural if you add enough respondents.) The combination of three different sets of judgments from the same managers, however, enriches the



TABLE 9  
Factor Analysis of Urgency of Changing ScotFirm Procedures

Factor	Eigenvalue	Percentage of Variance Explained	Cumulative Percentage	Ratio
Group 1				
1	2.041	79.3	79.3	3.834
2	0.532	20.7	100	
Total	2.573	100		
Group 2				
1	1.255	80	80	4.01
2	0.306	20	100	
Total	1.531	100		

interpretation, particularly when it is consistent with the results of informal interviews, participant observation, and subsequent events at ScotFirm.

An intriguing portrait of the management of ScotFirm emerges from the study of the three domains of (1) problems faced by the firm, (2) valued aspects of the firm's culture, and (3) priorities for changes in the organizational operations. Caught at a time of rapid change in the industry, the managers were in weak agreement about the seriousness of the problems confronting them. Their perspectives on the importance of various elements of the firm's culture were diverse. At most, no more than three persons shared a similar perspective about the firm's culture (see Figure 2). The firm was literally without a central vision of how cultural continuity should be maintained. The management coalesces into two closely related subcultures when faced with the imperative of making changes in their daily operations. They were, in short, close to agreement on proximate actions but were in the process of negotiating their more distant future organizational culture.

## MULTICENTRIC DOMAINS II. CONTESTED: ROLES OF ENTERPRISING FUTURES

The Scottish business assistance organization called Enterprising Futures (EF) had a staff of about thirty. It had a variety of organizational roles, centering on four main areas: assisting small businesses, providing education and training, conducting research, and offering service to the enterprise support network. In an innovative, new, complex, self-financing organization such as EF, the mission or roles of the organization are not highly routinized as they are in, say, a well-established university department.

TABLE 10  
Enterprising Futures: Importance of Roles

Factor	Eigenvalue	Percentage of Variance Explained	Cumulative Percentage	Ratio
1	4.551	58	58	2.351
2	1.936	24.7	82.7	1.428
3	1.356	17.3	100	
Total	7.842	100		

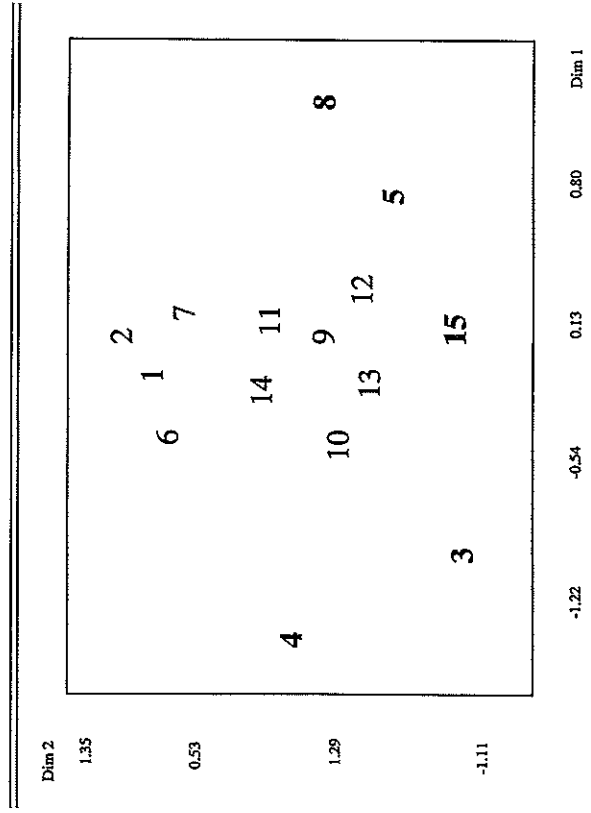
From interviews with members of staff, Caulkins developed a list of nineteen different roles that everyone agreed were part of EF's mission, such as "work with Scottish business support agencies" and "act as a resource for local businesses." Next he asked fifteen (a 50% sample) of the staff to rank order these roles in terms of their importance for the organization, in their view.

The data matrix, then, represented the judgments of fifteen staff members in about nineteen organizational roles. The sample included members of three different status groups: (1) senior staff, (2) junior staff, and (3) administrative staff. The factor analysis of the agreement matrix produced three factors, and the ratio between the first and second failed the three-times-greater test for agreement. There was no consensus on the importance of the roles of EF (see Table 10). A scree plot of the eigenvalues of the three factors would suggest a classification of very weak agreement tending toward turbulence. Three of the fifteen informants (3, 4, 8) have negative knowledge scores, however, indicating that they give some of the roles of EF an opposite ranking to that of the majority of their colleagues.

One of the distinctive features of pattern of disagreement is seen in Figure 3, which shows the MDS diagram of the person-by-person matrix of agreement scores. This is the classic "fried egg" pattern noted by Romney (1994:271-72). Those individuals in the center of the diagram had the highest cultural knowledge score, whereas those toward the periphery had the lowest. The people in the center with the highest scores are administrative junior staff, whereas the senior staff and director (3, 4, 5, 8, and 15 in boldface type) are arrayed along the periphery. Whereas 3, 4, and 8 have negative knowledge scores, 5 and 15 have very low scores (0.23 and 0.08, respectively).

This distribution clarifies what Caulkins had noted in interviews and participant observation: The senior staff all had different priorities for EF, so different that we can call this a contested domain, as indicated by the high proportion of negative and low knowledge scores of the staff. Notice that the

FIGURE 3  
Multidimensional Scaling of Fifteen Enterprising Futures (EF) Staff Members  
According to the Similarity of Their Rankings of EF Roles



senior staff are not clustered in factions or coalitions that could be regarded as important subgroups or subcultures. In the view of the director of EF, this configuration is appropriate for an entrepreneurial organization, with the senior staff balancing each other, pushing at the edges of the organization's repertory of roles to explore new opportunities. This contestation continued as a prominent feature of the organization, with the result that the resources of the organization were not focused on a consistent set of priorities. Within two years of this study, EF was forced to reduce both its staff and many of its functions. Although the organization did many things well, it failed to develop a distinctive product.

## CONCLUSION

Our intent here has been to provide some guidelines for more complete exploration of data analyzed by the CA method developed by Romney et al. (1986). To this end, we have proposed a typology that suggests a strategy for

analysis beyond the determination of whether a data set indicates a cultural level of agreement among informants. We distinguish between coherent domains in which knowledge and beliefs are widely held and three major types of noncoherent domains: weak agreement, turbulent, and multicentric domains. Within multicentric domains, we propose two subtypes: subcultural and contested.

In our case study of the coherent domain of allies of Yorkshire activists, we showed that we reach additional insights about the ways in which the political experiences of the women had shaped the construction of their assessment of their potential allies. CA and multidimensional scaling of the agreement matrix for the activists suggested that women with more radical political experience had a similar perspective within the overall consensus of the activists.

The typology introduced here draws attention to configurations of data in low-consensus domains. In ScotFirm, we found that the management was in weak agreement about the seriousness of the problems confronting the firm and had very diverse ideas about what, if anything, was important to retain in the organizational culture as the firm expanded and was forced to adapt to a more competitive global environment. The managers united around two related sets of agreement (subcultures) in dealing with immediate changes to the operations of the firm. We saw that EF as an organization had contested versions of its role priorities, with the senior staff pushing in different directions. In each case study, the use of CA allowed us to discover features of organizations and social movements that we had not grasped by other methods. We were then able to define additional research questions to extend our ethnographic exploration of other dimensions of our field settings.

As has emerged in this quick tour of different types of domains and organizations, the important question is not a simple choice between homogeneity and heterogeneity (or consensus and no consensus) in the culture of organizations and social movements. Rather, we focused on the content of the domain, the degree of diversity found in the domain, and the significance of the domain in the operation of the movement or organization. Some organizations are likely to have a higher proportion of diversified domains (weak agreement, turbulent, subcultural, or contested) than others. Some, such as a highly routinized organization with a standard, well-established product, might be expected to have a higher proportion of high-consensus domains.

Perhaps the most difficult problem in using CA in organizational research is the selection of productive domains for study. These are best identified through careful ethnography. Without this foundation, the selection of domains is likely to be arbitrary and unproductive. Used as one component of

a broader ethnographic approach, CA encourages the creation of new hypotheses and suggests new directions for research.

One final virtue of CA should be emphasized. The analyst need not commit to either methodological individualism or methodological collectivism. As we have seen, especially in Figures 1, 2, and 3, CA retains the identity of the individual informant while revealing the relationships among the knowledge of all of the informants. We also could trace individuals across cultural domains to see, for example, how each ScotFirm manager is positioned with regard to each domain. As a consequence, CA, with its dual focus on individuals and their position within a field of meanings-shared, partly shared, nonshared, or contested, encourages the researcher to explore the insights of both person-centered and collective perspectives.

## NOTES

1. For a technical discussion of consensus analysis (CA) and related theory, see Romney, Weller, and Batchelder (1986) and Romney, Batchelder, and Weller (1987) and Weller and Romney (1988). To the best of our knowledge, CA has not been used by other researchers in the manner described here. The closest example is one study, reported in two publications, by Bos-ter, Johnson, and Weller (1987) and Johnson (1990:85-9).
2. The original term used by the developers of CA to describe this agreement was "cultural competence" or "cultural correctness" (Romney et al. 1986), terms we felt uncomfortable using outside of professional circles. Answers are correct only with regard to the population under study, a point often misunderstood by those new to CA. In applied settings, we have found that the term "competence" creates difficulties because of its implication, in everyday discourse, that there is an objective standard of correctness. The developers of CA terminology, of course, are not responsible for this misunderstanding. Caulkins (1991:12) suggests the alternative term "cultural centrality" to capture this sense of relativity. This term is appropriate only with coherent domains, in which we can speak of "a culture." In noncoherent domains, perhaps it is best to speak of an individual's knowledge. As early as 1984, Romney and Weller (1984) were discussing representations of informant knowledge. Borgatti has substituted the term "knowledge" for "competence" in more recent versions of ANTHROPAC (see also Borgatti 1993).
3. Readers who are more comfortable with the concept of discourse rather than that of culture might think about dominant, weak, alternative (demotic), and contested discourses. Bauman (1996), for example, describes dominant and demotic discourses in London's Southall district. See Farnell and Graham (1998) for a discussion of discourse-centered methods.
4. Our thanks to an anonymous reviewer who helped us develop this typology. Earlier versions are found in Caulkins (1991; 1998:183). For a different typology, see Handwerker and Borgatti (1998:569).
5. A fuller ethnographic analysis of activism in West Yorkshire mining villages and council estates in Bradford appears in Hyatt with Caulkins (1992).
6. For an extended discussion of egalitarian firms, see Caulkins (1995a, 1995b) and Caulkins and Weiner (1998).

## REFERENCES

- Ali, M. 1987. The coal war: Women's struggle during the British miner's strike. In *Women and political conflict*, edited by R. Ridd and H. Callaway, 84-105. New York: New York University Press.
- Allen, S., and F. Measham. 1991. In defense of home and hearth? Families, friendship and feminism in mining communities. Paper presented at the Coal, Culture and Community Conference, Sheffield Polytechnic, September.
- Bauman, G. 1996. *Contesting culture: Discourses of identity in multi-ethnic London*. Cambridge, UK: Cambridge University Press.
- Bohannan, P. 1995. *How culture works*. New York: Free Press.
- Borgatti, S. P. 1992. ANTHROPAC 4.0. Natick, MA: Analytic Technologies.
- Borgatti, S. P. 1993. Cultural domain analysis. *Journal of Quantitative Anthropology* 4(4): 261-78.
- Boster, J. S., J. C. Johnson, and S. C. Weller. 1987. Social position and shared knowledge: Actors' perceptions of status, role, and social structure. *Social Networks* 9:375-87.
- Caulkins, D. 1991. Measuring diversity in organisational culture. *Dyn: Journal of the Anthropological Society of Durham University* 10:1-21.
- Caulkins, D. 1992. The unexpected entrepreneurs: Small high technology firms and regional development in Wales and Northeast England. In *Anthropology and the global factory: Studies in the new industrialization of the late twentieth century*, edited by F. A. Rothstein and M. Blim, 119-35. New York: Bergin & Garvey.
- Caulkins, D. 1995a. High technology entrepreneurs in the peripheral regions of the United Kingdom. In *Economic futures on the North Atlantic margin: Selected contributions to the Twelfth International Seminar on Marginal Regions*, edited by R. Byron, 287-99. Aldershot, UK: Avebury Press.
- Caulkins, D. 1995b. Stumbling into applied anthropology: Collaborative roles of academic researchers. *Practicing Anthropology* 17(1-2): 21-4.
- Caulkins, D. 1998. Consensus analysis: Do Scottish business advisers agree on models of success? In *Using methods in the field: A practical introduction and casebook*, edited by V. DeMunck and L. Sobó, 179-95. Walnut Creek, CA: AltaMira.
- Caulkins, D., and M. Scott. 1991. Measuring organisational culture. Confidential report to the directors of a Scottish high-technology firm.
- Caulkins, D., and E. S. Weiner. 1998. Finding a work culture that fits: Egalitarian manufacturing firms in mid-Wales. *Anthropology of Work Review* 19(1): 27-37.
- Deal, T., and A. Kennedy. 1982. *Corporate cultures: The rites and rituals of corporate life*. London: Penguin.
- Escobar, A. 1992. Movements. *Critique of Anthropology* 12(4): 395-432.
- Evans, J., C. Hudson, and P. Smith. 1985. Women and the strike: It's a whole way of life. In *Policing the miner's strike*, edited by B. Fine and R. Millar, 188-203. London: Lawrence and Wishart.
- Eyerman, R., and A. Jamison. 1991. *Social movements: A cognitive approach*. Cambridge, MA: Polity.
- Farnell, B., and L. Graham. 1998. Discourse-centered methods. In *Handbook of methods in cultural anthropology*, edited by H. R. Bernard, 411-57. Walnut Creek, CA: AltaMira.
- Gamst, F. C. 1989. The concept of organizational and corporate culture: An ethnological view. *Anthropology of Work Review* 10(3): 12-9.

- Handwerker, P., and S. P. Borgatti. 1998. Reasoning with numbers. In *Handbook of methods in cultural anthropology*, edited by H. R. Bernard, 549-93. Walnut Creek, CA: AltaMira.
- Hyatt, S. B., with D. D. Caulkins. 1992. "Putting bread on the table": The women's work of community activism. Occasional Paper No. 6. Bradford: University of Bradford Department of Social and Economic Studies.
- Johnson, J. C. 1990. *Selecting ethnographic informants. Qualitative research methods* 22. Newbury Park, CA: Sage.
- Leonard, A. 1991. Women in struggle: A case study in a Kent mining community. In *Working women: International perspectives on labour and gender ideology*, edited by N. Redclift and M. T. Sinclair, 125-48. London: Routledge.
- Romney, A. K. 1994. Cultural knowledge and cognitive structure. In *The making of psychological anthropology. Vol. II*, edited by M. Suárez-Orozco, G. Spindler, and L. Spindler, 254-83. New York: Harcourt Brace.
- Romney, A. K., W. H. Batchelder, and S. C. Weller. 1987. Recent applications of cultural consensus theory. *American Behavioral Scientist* 31(2): 163-77.
- Romney, A. K., and S. C. Weller. 1984. Predicting informant accuracy from patterns of recall among individuals. *Social Networks* 6:59-77.
- Romney, A. K., S. Weller, and W. H. Batchelder. 1986. Culture as consensus: A theory of culture and informant accuracy. *American Anthropologist* 88(2): 313-38.
- Spradley, J. P. 1979. *The ethnographic interview*. New York: Holt, Rinehart & Winston.
- Weller, S. C., and A. K. Romney. 1988. *Systematic data collection*. Newbury Park, CA: Sage.
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## A Systems Approach to Qualitative Data Management and Analysis

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*The basic components of qualitative data analysis are systematically organized and described. The authors propose a system centered on a database architecture with four elements that correspond to the fundamental types of information collected in the research process: (1) characteristics of the sources where answers to research questions are sought, (2) primary information collected from the sources, (3) secondary information generated to assist in the interpretation of the primary information, and (4) characteristics of the coders who generate the secondary information. The authors describe a process for constructing each of the four database elements, including criteria for inclusion of data in each element. The proposed system supports the use of quantitative and qualitative approaches to evaluate qualitative coding schemes, to assess intra- and intercoder agreement, to recognize meaningful patterns in qualitative data, and to describe the underlying symbolic and sociocultural systems reflected in the data objects.*

In this article, we outline a systematic approach to qualitative data management that emphasizes the distinctions among and relationships between the types of data generated during qualitative research. The model can be a guide for the coordination of data collection, management, and analysis tasks. It also can serve as a framework to assess strengths, weaknesses, and biases within a database by making the content explicit. This model forms the foundation for a new Centers for Disease Control and Prevention (CDC)-sponsored public domain software program called AnSWR: Analysis Software for Word-Based Records.<sup>1</sup> Both the model and AnSWR are currently being used for data management and analysis for a large, complex, multisite CDC-

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