Communicative Action In
Group Decision Support Systems

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Abstract

This paper addresses some issues of communication in group settings. The contribution of the paper is in relating group decision making to Habermas' theory of communicative action. This is a rich sociological theory of how communication and distortions of communication occur in social communities. The paper introduces the background of this theory and develops a structure from the theory within which to embed group dynamics. This structure was used to evaluate the results of several group interactions during which masters level students solved a complex case using a prescribed systems methodology. Group membership was manipulated in two ways: first by giving a Myers/Briggs type personality test and second by asking the students to answer questions about their perceptions about the characters and situations appearing in the case. The results reveal that group diversity and homogeneity may after the quality of group outcomes.

The paper is divided into five sections. The first section gives some background of Habermas' theory from the perspective of the philosophy of science. The second develops a specific interpretation of Habermas' theory for the purposes of this paper. The third describes the individual and group tasks while the forth gives an interpretation of the results. In the final section, some tentative conclusions and directions for further research are discussed.

1. Theoretical Background

The interpretivist methodology grew out of a discontent and uneasiness with the positivist school of thought in the philosophy of science. Under positivism, or scientism as it is sometimes called, the researcher in a particular field uses an established body of knowledge to deduce testable hypotheses. The purpose of the hypotheses is to quantify the implications of the body of knowledge in a domain of research interest, presumably the researcher's own field of speciality. After conducting the empirical tests of the hypotheses, and assuming the tests are valid and reliable, a failure to accept the implications of the body of knowledge will confront the researcher with the result that, in some way, the implications of that knowledge are incorrect. This may be due to incorrect inference, to errors in the particulars of the knowledge, etc. Corrections must be made which allow the observed results to be explicated. Of course this is a somewhat 'pure' description since it was supposed that the method of performing the empirical test was not in error.

The interpretivist find the following criticisms in positivist methods of science, especially as it pertains to the social sciences. First, that it presupposes a body of knowledge. This creates an atmosphere in which the researcher not only becomes an appendage to past observations but also to the constructions of the past. In a physical science such as astronomy, this may not appear as a weakness to the underlying method of scientific progress, but in the social sciences, it is an observable phenomena that human beings have the natural inclination to reconstruct their social relations through time.

This was the problem that Weber [1958] addressed when he began his study of organizational behavior. Weber noted that during the preceding century the industrial progress occurring in Western Europe and the United States had given rise to bureaucratic forms of organization which had not formerly been necessary in the act of organizing economic activity. But these bureaucracies could also be interpreted through their effects on the social relations which they served to structure and regulate. There was at that time, however, no body of knowledge from

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which to draw appropriate hypotheses. Consequently, Weber constructed his theory from observation alone. After his work had achieved a certain amount of recognition, other researchers in organization behavior became interested in his method as well as his conclusions. From this interest came studies which use observations of the behavior of groups and individuals in their natural environments to explain and understand social relationships.

At the turn of the century and into its first quarter, Edmund Husserl, a German philosopher, was developing his theory of phenomenology. This proceeded as a reaction to the attempted systemization of all mathematics, culminating in Russel and Whitehead's *Principia Mathematica*. Husserl attempted to define the absolute foundations of knowledge through experience. He sought to bring about this state of knowledge through a suspension of belief in the world as it appears to the observer. This suspension, or bracketing as he called it, is meant to cleanse the ego of its unconscious attitudes about the object observed. It possesses a marked similarity to Kant's concept of a priori knowledge. Only through such a process could the mind clear a way into an understanding of the timeless processes which occur beneath the image of the everyday world. Only after this process was completed could a true description of the object be given.

In the United States, phenomenology was mainly expounded in a modified form by a student of Husserl's, Alfred Schutz. Schutz modified the pure phenomenology by taking the structures of individuals or groups as a given, that is, by maintaining the conceptualizations of others as the bracketed form. He formalized this through a theory of typification. Under this method, the researcher attempts to find the important 'typical' constructions, ideas, or concepts which are being used by an individual or group. These types are then used as the mediating events in the study of the object of interest. In Schutz's own work, he often used the concepts from Weber's work, such as the ideal bureaucracy, as the foundation of his own phenomenological study.

Besides criticizing positivism for its reliance on a pre-existing body of knowledge, the interpretivist also object to the derivation of hypotheses through strict application of a deductive calculus on that body of knowledge. In some ways this is a natural extension of the first criticism since the absence of a clear body of knowledge severely limits any attempt to build hypotheses by inference. In another way the criticism is more fundamental. The interpretivist seeks to provide a description of a particular social situation. This description is meant to be deep and satisfying of itself and, in many areas of interpretivist research, the researcher will explicitly state that a precondition to the use of the methodology is that no hypotheses are considered before the observations begin (since this would be an imported attitude) and no derivable hypotheses are possible from the results (since the results are a description of the observations at a point in time and therefore not generalizable).

The final criticism of positivism by the interpretivist is perhaps the most devastating of them all. This criticism rests upon a difference as to the true underlying nature of the phenomena being studied. It is especially germane to and utilized in criticisms of positivism as it is applied in the social sciences, and will be considered in that manner here. Positivism posits an underlying, discoverable and unchanging order in social reality. It attempts to interpret the everyday world as a reflection of logical and calculable processes. The interpretivist, however, views social reality as a constant process of the construction and reconstruction of itself in a dynamic interaction of all of its components. Therefore, the very objects of interest, the components which must, in some form, be quantifiable to the positivist, are seen by the interpretivist to be in a constant state of change in and of themselves.

In the business world, people often experience uncertainty during an interpersonal encounter. This uncertainty may take the form of doubt about what just transpired at a meeting, how a problem has been addressed, or what certain figures indicate in a report. All of these examples of uncertainty arise from uncertainties of communication. Communication is critical in business because the entire concept of business is based on exchange. When communication is thought of as fundamentally interpersonal in nature, the leap to viewing communication as the natural medium through which business can be conducted is obvious since communication is a method for transferring information between individuals and business is a method for transferring goods (including information) between individuals. The following paragraphs explores the nature of communication in accounting. Specifically, it uses concepts and ideas of communication in Simon and in Lakoff and Johnson, informed by and through Habermas' theory of communicative competence.

The concept of intersubjectivity as distinct from monological forms of intersubjectivity frames a basic difference between Simon's approach to information processing and communication and Habermas' theory. Simon's

work[1] is basically monological in conception. His use of the term "utterances" in regards to 'nativist' linguists is a veiled reference to Chomsky's work. This view, however, can be criticized in the same way that Habermas[2] has criticized Chomsky's work: neither can explain the nature of intersubjectivity because both ignore a posteriori universals and the effects of socialization on communication. Simon has an elemental view of communication since he pictures all communication as arising from the individual and all individuals as having identical language processing structures which are inherent to the individuals at birth. This might all be safely brushed aside if Simon's underlying message wasn't the grounding for much of the work in accounting which relies on, whether explicitly or implicitly, a communicative component.

Simon's reliance on monological universals leads him to make normative statements about the role of communication and intelligence in society. This is demonstrated by his use of model of human learning and understanding. Simon argues that his models can be used as surrogates for the mind even though the processes of the mind and the processes used by the models are not equivalent because the models can lead to insights about the functioning of the mind. Models have this capacity, according to Simon, when they produce the same outputs from given inputs as a human being does. Yet it does not follow from this that human behaviors can be modeled from the behaviors of computer systems, no matter how complex. But this is precisely Simon's move when he attributes a priori specifications necessary to model human learning or understanding on a computer in the form of the "programming" humans as monological universal models.

According to Habermas, consensus must precede communication. This consensus is based on the validity claims of truth, legitimacy, veracity, and comprehensibility. When all four of these claims are not met, the communication must precede on the level of discourse. Habermas' theory seems to miss those situations where we agree to disagree, that is, those times when one enters into a discourse and comes away with (some) information about another person or that person's point of view.

Such a sequence of events is inevitable as the "scientific method" decomposes, separates and bureaucratizes. Basically, a blockage has taken place in the consequences of dialogue. This results in society becoming a technically controlled medium for exploitation, implemented consistent with Taylor's conceptualization as a strict technical, materialistic means of attaining efficiency. An alternative conception is a organizational structure that facilitates communicative action, that is, one that provides a means for evaluation with the objective of coming to a consensus and in assisting in carrying out the resulting program.

The work of Habermas implies that discourse is the manifestation of conflicts inherent in the economic system and, as these conflicts intensify, crises arise. Habermas also argues that the acquiescence to the control emanating from enhanced individual "visibility" brought about through advanced technology, is not necessarily a <u>fait accompli</u>. According to the theory of communication action, as long as technologically manifested evaluations can be grounded using traditional norms contained within the socio-cultural system (lifeworld), an emancipatory possibility exists. That is, as long as the validity claims are questioned within the context of communication action, the systemic encroachments can be evaluated and mediated in terms of individual sovereignty as well as instrumental objectives.

2. Communicative Action

In order to operationalize some of Habermas' theorizing to a small group dimension, this paper concentrates on the linguistic, as opposed to the socio-economic, aspects of the theory of communicative action. As previously discussed, Habermas envisions three types of action. The first type is instrumental action which is an action oriented to success in a nonsocial situation. The second type is strategic action which is an action oriented to success in a social setting. The last type is communicative action which is action oriented to reaching understanding in a social situation. Habermas terms all language which occurs while accomplishing these actions as discourse except for a single exception. Language which is used to accomplish communicative action is termed communication.

Habermas says that all communication must be valid (correct) in four ways. First, it must be performed correctly to be comprehensible. This validity claim is often assumed to be true so we will not consider it further here.

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[1] Simon *The Sciences of the Artificial*, 1981, pp. 90f.
[2] Habermas "A Theory of Communicative Competence" *Inquiry*, 1970, pp. 360-375.

Second, it must be socially valid, that is, legitimate. This claim is based on the social position of the person who is communicating. That person must be in a legitimate social position to perform the specific speech act. Consider the social position one needs to legitimately close a university for a snow emergency. The third validity claim is that of truth, that is, that the statement made is true. The last claim is that the utterance is said sincerely, without irony or malice.

When people are members of a group, their actions and therefore their speech acts may be oriented to a successful pursuit of their own interests rather than achieving an understanding of the interests of other group members. This propensity was used in designing this study by manipulating the diversity of interests in the groups formed. As the membership of the group increases in diversity it is expected that the individual group members would tend to rely more on strategic action rather than communicative action. This idea was further elaborated by manipulating two dimensions of diversity. The first is diversity of basic personality type. The second is diversity of outlook (worldview) concerning the specific task at hand. Here the task was coming to a group solution to a case involving both technical problems and cultural problems.

3. The Individual and Group Tasks

Students enrolled in a masters level accounting program at a state institution were first given a Meyers-Briggs type personality profile. The results of profile were used to form four groups consisting of similar and dissimilar individuals. The students were also given an accounting information systems case to read and asked prepare an individual solution. The solutions were structured in the following manner. The class was a seminar on accounting information systems. The class material concentrated on different methodologies for solving problems or situation in business systems. The methodologies ranged from hard system approaches (engineering solutions) to soft systems approaches (crafting sociological/cultural solutions).[3] The students were asked to use Checkland's Soft System Methodology (SSM) as a framework to solve the case.

Checkland's methodology consists of 7 interactive stages. The first stage is to develop a rich picture of the unstructured problem situation. This involves a "neutral" view of the situation from the standpoint of an outsider (the consultant). It is tightly linked to the second stage during which the worldviews (Weltanschauung) of the different constituencies is developed. The second stage consists of what is known as the CATWOE analysis and provides a picture of the problem situation as it is expressed by the actors. CATWOE consists of the (C)ustomer, the (A)ctor, (T)ransformations, (W)orldviews, (O)wners, and (E)nvironmental constraints. Interactive elicitation and creation of the CATWOE elements allows the constituents to develop primary task and issue-based root definitions in stage 3. Primary task root definitions define what the organization should be in order to exist. Examples of primary task root definitions might be "customer service" or "efficient production." Issue-based root definitions focus on purposeful activities that must be accomplished. Examples are "information processing" and "resource allocation." Stages 1 and 2 are a representation of the current situation, in which problems abound. Stage 3 allows the organization to define what it would *like* to be.

Stage 4 of the SSM involves building a conceptual model. This is an account of the activities that the system must do in order to be the system described in stage 3. Checkland sees a lot of interaction between stages 2, 3, and 4 as the different worldviews of different constituencies within the organization emerge and refine their self-definitions. At the end of this process, the expressed problem situation of stage 2 is compared with the ideal conceptual model of stage 4 in stage 5 of the methodology. The method focuses here on whether the activities described in stage 4 are present in the real world and if they should be included on the agenda for later stages. Stage 6 focuses on the feasibility and desirability of agenda items which have reached this stage. Stage 7 is largely an implementation stage during which actions to promote the agenda are determined.

Each student solved the case individually before coming to class by filling out the instrument (Exhibit 1). The actual instrument contained much more space for answers than the one shown in the exhibit. After coming to class, the students were given the pre-questionnaire shown in Exhibit 2. They were then divided into groups and asked to prepare a group solution to the case. They prepared a group solution by again using the instrument shown in Exhibit 1. They were also asked to answer questions I and II on their individual responses after coming up with a group decision. Question I is "I agree with the group's resolution of the messy problems" and question II is "My

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[3] See Robert Flood and Ewart Carson's *Dealing with Complexity* for a good introduction to systems methodologies.

group reached consensus." Students responded to these two questions on a 5 point Likert scale. Exhibit 3 summarizes the students' tasks.

4. Interpretation of the Results

The interpretation of the results begins first by an examination of the group composition. With respect to the personality type indicator, Group 2 has the most homogenous composition if we consider either the average standard deviation across personality dimensions (3.91) or the sum of the standard deviations (15.63) across dimensions as can be seen in Table 1. By the same criteria, Group 3 has the highest diversity of personality types with an average standard deviation of 6.79 and a sum of standard deviations of 27.16. Members of a relatively disparate group in terms of personality types are more likely to question the validity claims of other members of the group. We would expect that the more disparate groups (Groups 3 and 4) would exhibit a greater loss in the number of individual responses appearing in the group response. We would also expect that members of such a group are less likely to participate in communicative actions. These issues are addressed below.

The Pre-questionnaire was designed to scale how similar individual attitudes were towards the interpretation of the particular case the students were solving. Table 2 reports measures across the 6 questions concerning the case context. Again using average standard deviation and the sum of the standard deviations across the 6 questions we can see that the members of Group 1 were in complete agreement on 4 of the 6 questions consequently making Group 1 the most homogenous group in terms of agreement on case context. This group was also relatively similar in personality types. Group 2 provides an interesting contrast since it is the most homogenous group in personality but the most diverse group in terms of the worldviews of the individual members towards the case context. Group 3 has mixed measures with the most heterogenous personalities but the second most homogenous worldviews with respect to the case. Group 4 has members who are consistently heterogeneous in both personalities and attitudes towards the case context. Table 3 summarizes the results of the group composition.

Table 4 reports the number of unique responses by the four groups. Unique responses were tabulated by looking at the group answers and eliminating any response to a specific question which repeated in that question. There were not many repetitious responses for the questions but the problem did arise and was probably due to recording error. Notice that question 5 of the SSM was not coded. This was due to the nature of the question since the students were supposed to compare stage 4, the conceptual model, with stage 2, the expressed problem situation. This is largely a mechanical function and the groups used a variety of methods to accomplish it. The table shows that Group 2, the antithetical group, developed the fewest number of unique responses while Group 4, the group that was diverse in both personalities and worldviews, recorded the most unique responses. The homogenous group, Group 1, had the second highest number of responses while Group 3, the mixed group, had the second lowest. These results point towards the potential conflicts in a group of similar personalities who hold different worldviews. The results of individual response loss and group synthesis for each group are presented next.

Tables 5 through 8 show the individual personality types and dispersion measures for each group for reference. The lower panel in each table represents the coded responses of individuals and of the group across each stage of the SSM. The codes represent different responses to individual questions only so the code "a" does not represent the same response across all questions. The code "a" does represent the same response by individuals and the group within a particular question, however. The last two columns of the tables represent a count of the individual responses not found in the group's response (Loss) and group responses not found in any individual response (Synthesis). The group has a percentage score relating synthetic responses to lost responses. This represents the relative amount of creativity in the group compared with the amount of lost ideas and is used as a creativity index in the following interpretation. Under each individual's column is a number showing the percentage of individual responses which were lost during the composition of the group response. Under the group's column is a number showing the percentage of group responses which were synthetic. To aid in interpretation, the lost individual responses are underlined in the individual columns and the synthetic group responses are in bold.

Table 5 reports the results for Group 1. Individuals in all groups typically lost 50% or more of their responses when crafting a group response. This group had the highest percentage of synthetic answers in its group response, 26% of the group responses were not derived from individual responses. This group also had the lowest number of lost responses (40) although this is undoubtably due to the fact that it contained only 3 individuals. It also had the highest percentage of synthetic responses to lost responses (28%). This group consisted of individuals who had the most homogenous worldviews and the second most homogenous personality types.

Table 6 shows the results for the second group which was the antithetical group. This group had the least number of synthetic responses (2) and the lowest creativity indicator (S/L = 4.3%). The group also scored second lowest of synthetic responses to total responses with a score of 7%. It is interesting to note that individual 3 of this group tied for the lowest loss percentage across all individuals in all groups with a score of 30%. This may be an indication that this person dominated the group as the other members legitimized the validity claims of one person rather than attempted to forge a new, common worldview through communicative action.

Table 7 shows the results for the third group. Group 3 was the mixed group with the most diverse personality types and the second most homogenous worldviews. In some ways its composition was very similar to Group 2, the antithetical group, except that it was homogenous in world view where Group 2 was diverse and it was diverse in personality type where Group 2 was homogenous. The consensus in worldview of the members of this group seemed to dominate here. The group had the second highest number of synthetic answers (5) as well as the second highest percentage of synthetic to total answers (16%). It also had the second highest creativity indicator (S/L = 9%).

The results for Group 4 are shown in Table 8. Group 4 was relatively diverse in both personality and worldview. It achieved the lowest score of the four groups of synthetic answers to total group responses (4%). It had the third lowest number of synthetic responses (3) and the third lowest creativity indicator (S/L = 6%). Individual 3 of this group tied for the lowest loss rate of any individual across all groups (Loss/Total = 30%). Individual 1 of this group had the third lowest loss rate (40%) of all individuals. This may be indicative of the formation of a coalition of those two individuals and the acknowledgement of their validity claims by the other two members.

5. Conclusions and Future Directions

One of the most difficult areas in the preceding type of research is developing means to get at the theoretical categories used by Habermas. There were several experimental rounds which took place before the one reported in this paper. During those rounds, and after looking at some of the preliminary results, questions concerning the viability of associating the construct of personality with that of communicative validity arose. It is not altogether clear whether personality types would *ex ante* question the validity claims of others who were close to themselves in personality type or who were far from themselves in type. Of course this might vary from type to type. It is also unclear as to how much personality type would intervene with this specific task. Those were some of the reasons for adding the pre-questionnaire to the reported round. The pre-questionnaire attempts to get a firmer measure of what understanding (worldview) the students were bringing into the group process.

The results of this study seem to indicate that group creativity and the eliciting of a communicative action response rather than a strategic response is more influenced by the relative homogeneity of the group's worldviews concerning the task, rather than the group members' personality types. This has some intuitive appeal since it indicates that the group members were more concerned with task completion than with personality conflicts. The completion of the task at hand is also an action in Habermas' sense, so manipulations of worldview in group composition would seem to come closer to investigating the difference between strategic and communicative forms of action in group decision making.

Considering further directions for this type of research might seem to be looking for the next turtle. Actually, there is more coherence here than might at first be supposed. The SSM was originally developed to deal with those systems problems which are not technology driven but people driven. Checkland was confronted by situations where the individuals in a company, including the top management team, lacked a common sense of direction or worldview. One of the intended outcomes of the SSM is to consciously create a common organizational worldview. The research presented here helps achieve this goal by investigating how group composition afters the possibility of communicative action which in turn affects the evolution of common worldviews through common understandings. One of the next stages involves fine-tuning the group composition instrument. Another area that needs development is the coding of student responses. There is another set of SSM data in which the students' individual responses are in the form of formal case write-ups. Development of techniques to codify this text is a third project.

References

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Exhibit 1
Checkland's SSM

Group:

1. The problem situation - unstructured:

2. The problem situation - expressed:

****
(C)ustomer:
(A)ctor:
(T)ransformation:
(W)orldview:
(O)wner:
(E)nvironmental constraints:

3. a. Primary task root definitions:

    b. Issue-based root definitions:

4. Conceptual model: (remember to use verbs - an account of the activities which the system must do in order to be the system named in part 3 a & b.)

5. Compare 2 and 4

Activity in the conceptual model	Present in the real world?	Comments	Include on agenda?

6. Feasible and desirable changes:

7. Actions to improve the problem situation:

    I. I agree with the group's resolution of the messy problems:

Strongly agree		Strongly disagree		
1	2	3	4	5

    II. My group reached consensus:

1	2	3	4	5

Exhibit 2
SSM Pre-questionnaire

Name:

Please answer the following questions:

    1 - Strongly agree   5 - Strongly disagree

1.   I believe that a hard systems solution is the best solution for Dezha Views.
        1   2   3   4   5

2.   Oscar Dezha is a charismatic leader.
        1   2   3   4   5

3.   Daphne Cornpone (VP - Production) is a competent middle manager.
        1   2   3   4   5

4.   Dave Binder has the appropriate vision for a CIO.
        1   2   3   4   5

5.   Vern Mably is a loyal employee.
        1   2   3   4   5

6.   There are wildly different worldviews at Dezha Views.
        1   2   3   4   5

Exhibit 3

1.   Students took a Meyers-Briggs type personality indicator.
2.   They read the case.
3.   They filled out an individual response to stages 1 - 7 of Checkland's Soft Systems Methodology.
4.   They answered the questions on a case-related pre-questionnaire.
5.   The students were assigned to groups based on personality type and their answers on the pre-questionnaire.
6.   They met in groups and filled out a group response.
7.   They filled out individual responses to items I and II.
8.   The data was analyzed.

Table 1 – Group Personality Results

	Name	I/E	I/S	T/F	P/J		
Group 1	1	10	-4	4	-14		
	2	2	-8	2	0		
	3	14	-2	-6	4		
	Sum	26.00	-14.00	0.00	-10.00		
	Average	8.67	-4.67	0.00	-3.33		
	STD	4.99	2.49	4.32	7.72	4.88	STD Avg.
						19.52	STD Sum
Group 2	1	12	2	12	-10		
	2	-6	-6	10	-8		
	3	0	-4	12	-14		
	4	16	0	14	-10		
	Sum	22.00	-8.00	48.00	-42.00		
	Average	5.50	-2.00	12.00	-10.50		
	STD	8.87	3.16	1.41	2.18	3.91	STD Avg.
						15.63	STD Sum
Group 3	1	0	-16	4	-22		
	2	-14	-10	2	-12		
	3	10	-10	16	-24		
	4	-14	-2	8	-8		
	Sum	-18.00	-38.00	30.00	-66.00		
	Average	-4.50	-9.50	7.50	-16.50		
	STD	10.14	4.97	5.36	6.69	6.79	STD Avg.
						27.16	STD Sum
Group 4	1	12	-8	6	-22		
	2	2	-14	10	-22		
	3	-4	-2	12	-2		
	4	14	-12	6	0		
	Sum	24.00	-36.00	34.00	-46.00		
	Average	6.00	-9.00	8.50	-11.50		
	STD	7.35	4.58	2.60	10.52	6.26	STD Avg.
						25.05	STD Sum

Table 2 – SSM Pre-questionnaire

		1	2	3	4	5	6		
		-	-	-	-	-	-		
Group 1	1	5	4	3	4	2	1		
	2	4	4	3	4	2	1		
	3	5	4	5	4	2	1		
	Sum	14.00	12.00	11.00	12.00	6.00	3.00		
	Average	4.67	4.00	3.67	4.00	2.00	1.00		
	STD	0.47	0.00	0.94	0.00	0.00	0.00	0.24	STD Avg.
								1.41	STD Sum
Group 2	1	4	1	3	2	1	1		
	2	5	3	3	2	5	4		
	3	4	5	4	5	2	1		
	4	2	3	4	5	4	2		
	Sum	15.00	12.00	14.00	14.00	12.00	8.00		
	Average	3.75	3.00	3.50	3.50	3.00	2.00		
	STD	1.09	1.41	0.50	1.50	1.58	1.22	1.22	STD Avg.
								7.31	STD Sum
Group 3	1	4	5	4	4	2	1		
	2	4	5	4	4	1	1		
	3	5	5	3	5	3	1		
	4	4	4	4	2	2	2		
	Sum	17.00	19.00	15.00	15.00	8.00	5.00		
	Average	4.25	4.75	3.75	3.75	2.00	1.25		
	STD	0.43	0.43	0.43	1.09	0.71	0.43	0.59	STD Avg.
								3.53	STD Sum
Group 4	1	4	2	3	3	4	3		
	2	5	5	3	5	2	1		
	3	4	5	3	4	2	2		
	4	4	2	1	4	1	2		
	Sum	17.00	14.00	10.00	16.00	9.00	8.00		
	Average	4.25	3.50	2.50	4.00	2.25	2.00		
	STD	0.43	1.50	0.87	0.71	1.09	0.71	0.88	STD Avg.
								5.30	STD Sum

Table 3
Group Cohesion: Personality and Worldview

Group	Personality Rank	Worldview Rank	Comment
1	2	1	Homogenous
2	1	4	Antithetical
3	4	2	Mixed
4	3	3	Diverse

1 = most homogenous
4 = most diverse

Table 4
Soft System Methodology
Number of Unique Responses by Group

Question	Groups 1	2	3	4
1.	0	1	2	4
2.	3	5	2	3
C	7	3	2	4
A	2	1	2	2
T	2	1	3	4
W	2	2	1	2
O	2	1	1	4
E	4	1	2	3
3a.	1	1	2	2
3b.	2	2	3	3
4.	6	5	6	6
5.	OK	*	OK	*-OK
6.	3	3	4	4
7.	5	3	2	5
	39	29	32	46

Table 5
Soft System Methodology - Individuals and Groups

Group 1 Personality Types

Name	I/E	I/S	T/F	P/J		
1	10	-4	4	-14		
2	2	-8	2	0		
3	14	-2	-6	4		
Sum	26.00	-14.00	0.00	-10.00		
Average	8.67	-4.67	0.00	-3.33		
STD	4.99	2.49	4.32	7.72	4.88	STD Avg.
					19.52	STD Sum

Individuals - Group 1

Question	1	2	3	Group	Loss	Synthesis
1.	a, b	c	d, e		5	0
2.	a, b	c	a	**d, e, f**	4	3
C	a, b	c, d	e, f, g	abdefg**h**	1	1
A	a, b	cdefghi	j	a, b	8	0
T	a	b	a	a, b	0	0
W	a	b	a	a, b	0	0
O	a	a, b	c	a, b	1	0
E	a, b	c	d, e, f	a, d, **g, h**	4	2
3a.	a, b	c	c, d	c	3	0
3b.	a	b	c, d	a, d	2	0
4.	a, b, c	adefgh	b, i, j	adefgh	4	0
5.		OK	Some	I-2		
6.	a, b, c	d	e, f	b, **g, h**	5	2
7.	a, b	c, d, e	c, d	ab**fgh**	5	3
L (S)/					-	-
Total	46%	73%	63%	26%	42	11
					S/L =	26%
I.	2					
II.	2					

_____

a - an individual's response not found in the group response
k - a group response synthesized by the group

Table 6

Group 2 Personality Types

1	12	2	12	-10		
2	-6	-6	10	-8		
3	0	-4	12	-14		
4	16	0	14	-10		
Sum	22.00	-8.00	48.00	-42.00		
Average	5.50	-2.00	12.00	-10.50		
STD	8.87	3.16	1.41	2.18	3.91	STD Avg.
					15.63	STD Sum

Individuals - Group 2

Question	1	2	3	4	Group	Loss	Synthesis
1.	a	b	a, c	d	e	5	1
2.	a, b, c	d, e	a, b, c, e	c	abce**f**	1	1
C	a, b, c	b, c	a, b, d	b	a, b, d	2	0
A	a	a, b	a, b, c	b	b	4	0
T	a	b	c	d	c	3	0
W	a	b	c	a	a, c	1	0
O	a	a	a	a, b	a	1	0
E	a, b	c	d	e, f, g	d	6	0
3a.	a	b, c	d, e	f	d	5	0
3b.	a	b		c	a, b	1	0
4.	a, b, c, d	be fgh	bijkl	fmnop	bhikl	12	0
5.	OK	*	*	*	*		
6.	a	b	a, c, d	c, e, f	a, e, f	4	0
7.	a	b, c	d	b, e	b, c, d	2	0
L (S)/	52%	55%	30%	65%	7%	-	-
Total						47	2
						S/L =	4.3%

I.	1.75
II.	2

_____

a - an individual's response not found in the group response
k - a group response synthesized by the group

Table 7

Group 3 Personality Types

1	0	-16	4	-22		
2	-14	-10	2	-12		
3	10	-10	16	-24		
4	-14	-2	8	-8		
Sum	-18.00	-38.00	30.00	-66.00		
Average	-4.50	-9.50	7.50	-16.50		
STD	10.14	4.97	5.36	6.69	6.79	STD Avg.
					27.16	STD Sum

Individuals - Group 3

Question	1	2	3	4	Group	Loss	Synthesis
1.	a, b, c	b, c, d	d, e	b, e, f	b, c	6	0
2.	a		b, c, d	e	**f, g**	5	2
C	a, b	a, b, c	a	a	a, **d**	3	1
A	a, b	a, b	a	a	a, b	0	0
T	a	a	b	c	a, b, c	0	0
W	a, b		c	c	c	0	0
O	a	a	b, c, d	a, e	a	4	0
E	a, b	c	d		c, d	2	0
3a.	a	b, c, d	a, d, e		**f, g**	7	2
3b.	a, b	cdefghi	j, k, l		c, d, e	9	0
4.	a, b	c, d, e, f	aghijk	d, l, m, n	aghijk	9	0
5.	*	*-OK	OK	*-OK	OK		
6.	a, b, c	b, c, d	e, f	d, g, h, i	b, c, d, f	5	0
7.	a	b	c, d, e	f, g, h, i	c, e	7	0
L (S)/						-	-
Total	57%	52%	53%	68%	16%	57	5
						S/L =	9%

I.	1.25
II.	1.25

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a - an individual's response not found in the group response
k - a group response synthesized by the group

Table 8

Group 4 Personality Types

1	12	-8	6	-22
2	2	-14	10	-22
3	-4	-2	12	-2
4	14	-12	6	0
Sum	24.00	-36.00	34.00	-46.00
Average	6.00	-9.00	8.50	-11.50
STD	7.35	4.58	2.60	10.52	6.26 STD Avg.
					25.05 STD Sum

Individuals - Group 4

Question	1	2	3	4	Group	Loss	Synthesis
1.	abcde	c, f, g	d	h	a, d, e, g	5	0
2.	a	b, c, d, e	c, d, f, g	b, c, h	d, g, h	8	0
C	a	b, c, d	a, b, c, e	a	a, b, c, d	0	0
A	a, b	a, b, c	a, c	c	a, c	2	0
T	a, b	c	a, d, e	a, d	a, b, d, e	1	0
W	a, b	a, c, d, e	f	f	b, f	5	0
O	a, b, c	d	e, f	a, f	a, d, e, f	2	0
E	a, b, c	c, d, e, f	g	g	a, b, e	6	0
3a.	a, b	c, d	c	d	c, d	2	0
3b.	a, b	c, d	e, f	g	e, **h, i**	6	2
4.	a, b, c, d	a, c, e	c, f, g, h	a, i, j	acdgh**k**	5	1
5.	OK	*	*-OK	OK	*-OK		
6.	a, b, c, d	c, e	f, g	g, h	a, b, c, d	5	0
7.	a, b, c, d	d, e, f	g, h	d, f	abdgh	4	0
L (S)/						-	-
Total	40%	57%	30%	52%	4%	51	3
						S/L =	6%

I.	1.5
II.	1.5

a - an individual's response not found in the group response
k - a group response synthesized by the group

Notes