

Group Processes in Conflict: The Impact of Communication Channels on Consensus Building

Morgan M. Shepherd

University of Colorado, Colorado Springs
mshepher@mail.uccs.edu
(719) 262-3641

William B. Martz, Jr.

University of Colorado, Colorado Springs
wmartz@mail.uccs.edu
(719) 262-3414

Abstract

Most researchers, practitioners and theorists describe group problem solving as having a divergent phase - production - and a convergent phase - selection. Recent research has shown that groups using multiple communication channels produce more ideas, and more unique ideas than groups using a single communication channel. The research study described here attempts to extend this theme and more closely examine the impact of the production phase on the selection phase of group problem solving. The results show that groups using a single communication channel generate more actual consensus than groups using multiple communication channels. In addition, the single channel discussions provide more integrative comments and these integrative comments may help explain the difference in consensus.

Keywords: group support systems, decisions, consensus, integrative

1. Introduction

1.1 Background

Most group problem-solving processes or methodologies that attempt to resolve an issue do so in an effort to gain a consensus about a choice. These problem-solving methodologies have the fundamental activity of consolidating individual perspectives into a group perspective in order to choose or create an optimal solution. Churchman's alternative assessment [4], Mason and Mitroff's stakeholder assessment [21], Saaty's priority scaling models [26], and Fox's voting methods [12] are all examples of this. In addition, a review of early problem solving literature [25], [35], [23] identifies four generalized problem solving processes or activities: 1.)

discovery, the uncovering of information; 2.) analysis, the decomposing of information into data and perspective; 3.) synthesis, the recombining of data into information; and 4.) choosing, the act of selecting a solution to the problem.

As presented in Table 1, many authors have just divided problem solving into two sub-processes; divergent and convergent activities. Interestingly, these sub-processes so necessary in problem solving seem to antagonize each other when a group is trying to reach common ground or consensus. The meta-analyses of Benbasat and Lim [1] and more recently, of Fjermested and Hiltz [13] provide credence to this position as they both report low levels of consensus in group support system (GSS) research studies. This clearly presents a dilemma for problem solving groups. Retarding the divergent process should make it easier to achieve consensus, but doing so reduces the odds of identifying an optimal, or even a good solution.

The divergent processes historically have been easier for groups to accomplish. Research shows that electronic GSSs have been able to outperform traditional methods for producing numbers of comments and numbers of unique comments [28], [14], [17], [31], [18]. However, along with this increased production comes the associated dysfunction of groups inefficiently combining and filtering the large lists of comments, ideas or items. There are so many items that individuals have difficulty assimilating all the information.

In traditional manual groups, facilitator and meeting techniques have been used to successfully combat this problem of information overload [11], [2]. Some techniques such as the Advantages/Disadvantages Table [15], the 4-M [16] and the Plus-Minus-Interesting [6] use pre-defined categories to focus the participants. GSSs can automate these manual methodologies and can even add the capability to automatically organize information around keywords and synonyms.

1.2 This study

The purpose of this study was to see if different types of information could be used to help the individuals in a group assimilate the information generated in a GSS meeting. Specifically, we examined the use of integrative comments in meetings. We define an integrative comment as a comment that makes a comparative statement between the themes or monologues under discussion. A comment that simply mentions two themes would not qualify under our definition. The key ingredient whereby a comment is considered to be an integrative comment is that the text of the comment makes a comparative reference across pre-defined categories or themes.

Researcher	Divergent Process	Convergent Process
Osborn [23]	Ideation	Synthesis
Cowan [5]	Clarification	Categorization
Polya [25]	Decomposing	Recomposing
DeBono [6]	Splitters	Lumpers
Warfield [34]	Analysis	Synthesis
Benbasat & Lim [1]	Generating	Choosing

Table 1: Problem Solving Sub-Processes

1.3 Multiple dialogues

As discussed, the main effort in the divergent process of problem solving has been to create ways to get more and better ideas. Manual techniques evolved over time to help groups be productive in their divergent process [15]. For example, research experiments using the Nominal Group Technique (NGT) [32] demonstrate ways to enhance group productivity - when measured by the number of ideas and the number of unique ideas. With the introduction of electronic based GSSs, these and other techniques have been automated with varying degrees of success. As an example, the Electronic Brainstorming tool from Ventana Corporation automates and extends the basic premise of the Brainwriting-type techniques [19].

One of the strategies used to improve comment production (a divergent process) is to provide a means to have multiple-channel discussions. In this context, group problem solving discussions may be forced to branch out and naturally develop different perspectives of the problem domain or what can be referred to as "multiple monologues." Stated another way, there are multiple threads available during the discussion. As Dennis and Valacich [8], [9] point out, each of these monologues has a tendency to be somewhat "thematic." A multi-channel discussion will allow transmission of information on each channel thereby allowing significant amounts of information and data to flow.

One of the key research issues in this area is the impact that multi-channel and single-channel discussions have on

group performance. The research and interpretation of results is mixed. Dennis et. al. [9], [10] report that groups using multi channel discussions create better discussions - when defined by number of ideas and by number of unique ideas. Pinsonneault et. al. [24] offer differing interpretations on the success of multiple channel discussions in large groups. They feel that larger pools of ideas cause additional process losses. The impacts of these losses are not yet fully understood and require further study.

Overriding both of these interpretations are the results that show these multi-channel GSS groups have a lower level of consensus. Some researchers have highlighted this fact as a concern for using GSS [1], [4], [13]. The discussions above have concentrated on the divergent process of brainstorming and defined performance based upon the number of ideas and the number of unique ideas produced. Consensus building requires both the divergent and the convergent process. In this way, a consensus building task is what Benbasat and Lim[1] have defined as a complex task. It follows then that the efficiency of the entire complex task - one that combines divergent and convergent subprocesses - may well be hindered because of the optimization in the divergent process. In this research, we have extended the task domain to include the consensus phase of group problem solving.

Dennis et. al. [9], [10] conjecture, and we concur, that multi-channel discussions may make it more difficult for a group to ultimately converge on a decision. Furthermore, we propose that multi channel discussions inherently create environments that are less friendly to the convergent or categorization phase of problem solving. One reason we propose is that the threads, themes or discussions in a multi channel environment produce less integrative comments. As such, they do not lend themselves to transferring comparative information between threads. And it is that comparative information that better allows, enables and precipitates categorization and ultimately consensus. We call comments that provide this type of comparative information - "integrative comments".

2. Hypotheses

When a group is chartered to work toward consensus through a vote or polling of positions, a multi channel discussion (while producing more overall comments) may reduce the number of integrative comments and thereby the prerequisite information necessary for consensus. The use of multi channel discussions, (i.e. categories) encourages dialog within the individual categories, reducing the need for integrative comments. Taken to an extreme, there is no need for integrative comments as each category may deal with a single entity or idea. This leads to the first hypothesis.

H1. Multiple channel discussions will produce less integrative comments than single channel discussions.

Each individual comes into a meeting with his/her own consensus level. We call this their acceptable level (ACC) and define it as the level of consensus they need the group to achieve in order to feel satisfied with the groups' outcome. In addition, each participant is constantly adjusting their estimate of the groups' current level of consensus throughout the meeting process. We call this their estimated level of consensus (EST). We call the difference between an individual's ACC and their EST the consensus gap. Participants should feel more satisfied when their EST approaches, or exceeds their ACC. This is similar to Vroom's expectancy theory [22]. Vroom posits that people favor certain outcomes more than others, and have higher levels of satisfaction when those preferred outcomes occur. In addition, in the multi-channel, complex-task environment, a lack of integrative comments should make it more difficult for participants to determine the groups' EST. This complexity will manifest itself as differences in the consensus gap and satisfaction measures. This leads to the next four hypotheses.

H2a. Multiple channel discussion groups will have a larger consensus gap than single channel discussion groups

H2b. Multiple channel discussion groups will have less actual consensus than single channel discussion groups

H3a. Participants in multi channel discussions will report less satisfaction with the meeting outcome.

H3b. Participants in multi channel discussions will report less satisfaction with the meeting process.

Hypothesis	Single Channel	Multi Channel
H1: Integrative Comments	More	Less
H2a: Consensus Gap (ACC-EST)	More	Less
H2b: Measured Consensus (ACT)	More	Less
H3a: Satisfaction with Outcome	More	Less
H3b: Satisfaction with Process	More	Less

Table 2: Hypotheses Developed

3. Methodology

3.1 Subjects & task

Twenty-four groups of 8-10 participants in each group were asked to participate in a group decision making exercise. A total of 238 students participated. The exercise included both a divergent process and a convergent process. The exercise asked participants to generate a list of comments and ideas concerning five course evaluation criteria and ultimately to vote on these criteria based upon the information generated. The course evaluation criteria were; tests, quizzes, group projects, homework, and term papers. Each evaluation criteria was discussed aloud to help remove any ambiguity about the terms.

All groups used the same software module with one configuration change to replicate a multi channel or a single channel discussion mode. Fifteen groups generated their ideas - ran their divergent process - in a multi-channel mode while ten groups generated their ideas in a single channel mode. Ultimately, all groups voted by having each participant rank the five evaluation criteria in their preference order and by having the software tabulate the results. All groups finished the task within approximately 10 minutes, although there was no set time length.

3.2 Independent variables

The two channel treatments, single and multiple channel, were implemented using Ventana Corporation's GroupSystems Voting module. To create a multiple channel discussion, each of the five different evaluation methods was placed in the "list" mode of the software tool. Each of the five evaluation methods headed its own list. Participants were then asked to add their comments regarding each of the methods by opening the individual "list item" and submitting their comments. For example, a student wanting to comment on the pros/cons of quizzes would click on the 'quiz' list item. This would open a dialog box where the student could type in his/her comment(s) and submit them to list of other comments in the 'quiz' list item. Once the divergent process of idea generation was completed, the software switched the participants to the convergent process of voting on list. While in the process of voting, participants could open and look at the comments if they desired, but no new comments could be added.

To create a single channel discussion, all five evaluation methods were placed on the same list. Therefore, only one "list item" was available. Participants in the single channel discussion had to place all comments in the same list during their idea generation phase. Again,

voting was implemented after the brainstorming ended. In both instances, the results were collected and displayed.

3.3 Dependent variables

There were five dependent variables tracked for this study: number of comments, integrative comments, measured actual consensus, consensus gap and three satisfaction variables: satisfaction with the meeting outcome, the discussion process and the voting process.

We define an integrative comment as a comment that makes a comparative statement between the themes or monologues under discussion. The comparison may be explicit as with the comparative phrase "...tests are better than quizzes..." or may be implicit as when a superlative is used - "...tests are the best...". The key ingredient whereby a comment is considered to be an integrative comment is that the text of the comment makes reference across the categories or themes.

A standardized definition of consensus remains elusive with some researchers prescribing consensus while others are willing to simply describe consensus. On the one side, Sniezek and Henry [30] calculate consensus using "judgment accuracy" in their studies on consensus and corresponding social interaction. Bradford [2] simply describes consensus-seeking as "the maintenance function" of a meeting that resolves the polarization which occurs around issues in meetings. From here, he permits the facilitator and the group to define consensus for the specific task. So, consensus is based upon the perception of the group members and facilitator.

We have instances of both measures. First, the measured actual (ACT) level of consensus reached by the groups may be calculated using Kendall Coefficient of Concordance where we had ten judges and five items for judging. This coefficient ranges from 0.0 (no consensus) to 1.0 (perfect consensus). Second, the "consensus gap" (ACC-EST) will be measured by comparing a group member's acceptable consensus with their estimate of consensus generated in the actual meeting. This measure has proven to be an acceptable way to measure perceived consensus without having to rely on the actual value of consensus [20].

The satisfaction variables (satisfaction with the outcome, satisfaction with the discussion process and satisfaction with the voting process) are measured using a questionnaire. Group participants filled out a survey of five, six-point, Likert-type questions. Subjects filled out these questionnaires at the end of the meeting, after the finalized list had been determined, but before any additional discussion was allowed and before the debriefing.

4. Results & discussion

As suggested by Siegel [29], the individual results (n=238) were analyzed using the non-parametric, Mann-Whitney test and the group results (m=10, n=15) were analyzed using the non-parametric, Kolmogorov-Smirnov Z-test and are noted below with a (1). Results are provided in Table 3.

	Mean Rank		Average(1)		Significance
	Single	Multi	Single	Multi	
Consensus Gap (ACC-EST)	94.51	133.46	----	----	.000
Satisfaction with Outcome	108.08	126.20	----	----	.043
Satisfaction with Process (discussion)	114.31	128.34	----	----	.093
Satisfaction with Process (voting)	110.20	135.35	----	----	.004
Measured Consensus (ACT)	----	----	.73	.29	.001(1)
Integrative Comments	----	----	17.62	5.44	.005 (1)
Number of Comments	----	----	111.88	58.69	.002 (1)

Table 3: Results of Mann-Whitney and Kolmogorov-Smirnov Tests(1)

The single-channel and the multi-channel groups show no predisposition to different levels of acceptable consensus. This is an indication that our sample was homogeneous. In addition, single-channel groups outperformed multi-channel groups in their actual consensus. This outcome for consensus is consistent with the literature and with our H2b in that multi-channel groups produced less actual consensus (p<.001) than single-channel groups.

Somewhat inconsistent with the literature is the difference (p<.002) in number of comments where our

single-channel groups produced more than the multi-channel groups. We attribute this to the fact that we did not cull the comments into unique and non-unique items. Therefore some single-channel transcripts have a more conversational quality with multiple comments used to confirm or solicit discussion topics. By way of comparison, the multi channel discussions seem to be more definitional which again reinforces the lack of integrative comments.

With regard to the number of integrative comments, H1 was supported: single-channel discussions created

more integrative comments ($p < .005$) than multi-channel discussions. Group members in multi-channel discussions produced larger consensus gaps ($p < .000$) than group members in the single-channel discussions. This outcome directly supports H2a. Due to the nature of the Mann-Whitney test, a larger Mean Rank for the multi-channel groups means larger values of the gap for multi-channel groups. Finally, H3a and H3b are supported as the multi-channel groups showed less satisfaction with the outcome ($p < .043$) and with the voting process ($p < .004$) than single-channel groups. Less significant, was the difference in the satisfaction with the discussion process.

The results show that one fundamental difference between multi channel and single channel discussions is with the amount of integrative comments produced. Further, the number of integrative comments within a set of comments may provide an indicator of information available to group members as they attempt to identify their level of consensus. In fact, a relatively low number of integrative comments during the divergent phase may deter a group's future ability to synthesize that set of comments. Since multi channel groups produce less integrative comments, thereby frustrating the categorization process, lower levels of satisfaction with multi channel processes should be anticipated. Finally, the reports of lower levels of consensus for multi-channel groups can be explained as a lack of integrative information.

From a practical perspective, this study suggests that systems designed to handle complex tasks [1] may want to develop environments and tools that help create integrative sets of information. Clearly, if the intent is to garner consensus, the practitioner will find it beneficial to create situations for integrative comments. For example, a facilitator may wish to instruct participants to produce integrative comments in the divergent (i.e. brainstorming) phase so that the comments are more productive in the convergent (i.e. selection) phase. From a research perspective, we can learn from the system characteristic of holism whereby optimization at a local level, in this case, the idea production (i.e. brainstorming), may prove inefficient at the global level, in this case, the level of consensus (i.e. selection).

5. Conclusion

In summary, while previous literature concentrated on the divergent phase of problem solving - the generation of ideas - this research also studied the impact on the convergent phase - selection - also. We constructed a study to compare the differences in impact of multiple channel and single channel discussions on consensus. We proposed the idea that a single channel discussion produces more integrative comments - those comments that provide comparative information - and as such, these

integrative comments may prove a source of helping with consensus. The results showed that single channel discussions, in addition to having higher consensus than multi channel discussions, created more integrative comments than multi channel discussions. As a result, we conclude that the practitioner and researcher both may want to consider the overall purpose of a discussion - how it will need to integrate with the next phase of problem solving - before optimizing on a particular discussion process.

6. References

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