GROUP DECISION-MAKING: CONSENSUS RULE VERSUS MAJORITY RULE

Elizabeth Taylor\textsuperscript{a}, Kelsey Hewitt\textsuperscript{a}, Dr. Robert A. Reeves\textsuperscript{a}, Dr. Stephen H. Hobbs\textsuperscript{a},
W.F. Lawless\textsuperscript{b,}\textsuperscript{*}

\textsuperscript{a}Georgia Regents University-Sumerville Campus, 2400 Walton Way, Augusta, GA 30904;
\textsuperscript{b}Paine College, 1235 15\textsuperscript{th} Street, Augusta, GA 30901;

\textbf{Abstract}

Previously, in the field to solve complex problems, we had found that majority rule (MR) decision-making out-performed consensus rule (CR) by making decisions that were quicker, more practical, and of better quality. This is an important finding for businesses. In the laboratory, we had found consistent support for the speed of making decisions under majority rules, but we subsequently failed to replicate the findings about practicality and quality with three-person groups in the laboratory. We attributed the problem to a lack of conflict experienced in the MR groups that we had attempted to generate but which did not materialize. The literature agreed with us that it was difficult to get debate in three-person groups. In an effort to increase debate among group members in the MR condition, in the present research, we used from three to seven-person groups and the Wason Selection Task. We additionally began using improved psycho-physiological instrumentation to measure electrodermal activity, skin temperature and body movement.

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* Corresponding author. Tel.: +1 706-821-8200.
\textit{E-mail address:} wlawless@paine.edu.
1. Main text

Working in the field with citizens advising the Department of Energy on its complex-wide cleanup of the military radioactive wastes at its sites, we had found that large groups under majority rule (MR) versus consensus rule (CR) work more efficiently to produce more effective decisions that are also made more quickly, the result being decisions of more practical value and of better quality [6]. This result has important implications for businesses. Some of the possible factors that may be causing the MR-CR differences:

- Decisions may be reached in less time under MR simply because fewer people participate in reaching an agreement. The reason is debate [9]. Those thick-skinned MR members who participate may have less fear of driving a group to a decision as they contradict the views of others. Thus, debate should increase the costs for non-debaters to join in a discussion.
- In contrast, CR group members may perceive their chances as remote of winning everyone over to a concrete problem solution, thereby contributing less direct discussion to a specific topic. Thus, CR participants should talk longer and produce less concrete results. More ominously, but along the same lines, concrete positions can be more easily vetoed by a minority, making CR “minority” rule.

We have been addressing these possible ideas in an ongoing series of studies aimed at unraveling the factors that help us to replicate the field research in a laboratory setting in order to elucidate key factors involved in making better decisions by groups [7].

1.1. Past Studies: Three-Person Groups

Methods

Initially, three-person groups were formed from student volunteers. Discussion topics included welfare, the morning-after pill (used to induce early-stage abortions), and legalization of marijuana. Continuous psychophysiological measures recorded using BIOPAC MP36 sensors were placed on two fingers of a subject’s dominant hand [2],[3].

Measures of participant engagement included: Self-reports taken after each problem (1-6 Likert Scale, with 1 being very likely and 6 being extremely unlikely). Groups were required to reach a decision under two randomly assigned conditions:

MR: “You must come to a majority rule decision of either for or against the topic, requiring 2 out of 3 of you to be in agreement.”

CR: “You must come to a unanimous decision of either for or against the topic, requiring an agreement among all 3 of you.”

And participant engagement during discussion was assessed by self-reports, counts of individuals’ verbal contributions (utterances), and GSR as recorded with sensors from adjacent digits of the non-dominant hand (with the BIOPAC MP36).

1.2. Results

The welfare topic tended to produce the most discussion. Self-reported engagement correlated well with utterances, but neither correlated significantly with any GSR measures. Maximum change in GSR from baseline appeared to be the most robust psychophysiological measure.

As expected, participants in the CR condition produced significantly more utterances but, unexpectedly, they also had significantly higher average maximum GSR changes during discussion than those working under MR [1].
1.3 Discussion

With the three-person format, the two decision rules appeared to produce different levels of participant engagement, but the overall amount of discussion was not as great as desired. Also, we had no objective means of assessing the quality of the decisions that resulted other than by asking outside experts (and inter-rater assessments), motivating us to shift to larger groups and to use the Wason Selection Task, which has a rational solution [11]. In addition, we replaced the BIOPAC MP36 that we had used previously with the Affectiva Q-Sensors wristband system with the band placed on the underside of the wrist of the dominant hand.

2. Current Study

2.1 Methods

Three-person, five-person and seven-person groups were formed from student volunteers (see Figure 1 for a photograph of a 5-person group).

Fig. 1. A photograph of a typical 5-person group with random assignment to roles.

Four Wason Logic Puzzles (two were practice problems, and two were target problems; see an example of a Wason Task in Figure 2 below). For the target problems, groups were required to reach decisions under two randomly assigned conditions:

MR: “You must come to a majority rule decision that requires at least 3 out of 5 of you to be in agreement (for the 5-person groups).”

CR: “You must come to a consensus rule decision that requires all 5 of you to reach an agreement (for the 5-person groups).”

Continuous psycho-physiological measures recorded using Affectiva Q-Sensors from the underside of the wrist of the dominant hand. Measures of participant engagement included: Self-reports taken after each problem (1-6 Likert Scale, with 1 being very likely and with 6 being extremely unlikely). Vocalizations (counted through taped sessions). Electrodermal activity (Arousal peaks and Max EDA). Skin temperature (difference between the start and the end of each problem). Movement (researcher ratings of Q-Sensor
accelerator patterns using a 0-5 Likert Scale, with 5 being very high movement). Time for groups to reach CR or MR decisions.

Interdependence: Self-reported data were used to measure interdependence (Kenny et al., 1998). Interdependence ranged from a -1.0, implying no social effects and full independence among agents; up to +1.0, implying no individual effects, only group effects.

2.1. Sample group problem

“If a person has an iPhone, then he or she must be listening to music.”

Fig. 2. A Wason Selection Task centered around the use of an iPhone to listen to music. In this example, turning over items 1 and 3 suffices to solve with logic the problem posed. Wason found that the average solution amounted to 10% for individuals; however, Mercier & Sperber (2011) reviewed the research of groups to conclude that significant improvement occurred with a group decision-making condition.

2.2. Results

Analysis of self-rated engagement during sessions using all group sizes currently available (n’s = 3, 5, 7): Amount of interdependence across groups and conditions. Interdependence 3’s CR: 0.26; MR: 0.40. Interdependence 5’s CR: 0.20; MR: 0.15. Interdependence 7’s CR: 0.39; MR: 0.44. Weighted averages, CR: 0.301; MR: 0.335. These results imply that MR leads to more engagement that does CR (likely due to an increase in boredom from the increased length of time necessary to make decisions under CR).

Additional preliminary qualitative analyses of self-rated engagement and other dependent measures were made of two experimenter-selected 5-person groups, one group being particularly active in discussion and the other being markedly less active.

Both groups solved one target problem using CR, followed by a second target problem using MR. Participants rated themselves as more engaged during CR than in MR. More vocalizations were evident in MR than in CR. CR produced more EDA arousal peaks than under MR (see Figures 3 and 4). In contrast, MR had higher max EDA than CR. Temperature change indicated more arousal in MR than in CR. Hand movement was greater in MR than in CR. Decision times, as expected, were longer under CR than MR.
Fig. 3. Results: Consensus Rule.

Fig. 4. Results: Majority Rule.
3. Discussion

Complete laboratory confirmation of the field observation of superior decision-making when using majority rule, as opposed to unanimity, remains incomplete at this time. Our study is ongoing.

Other research suggests that group size may be an important consideration. For example, Kerr and MacCoun [5] found that "As group size increased, the observed probability of a hung jury increased significantly." Although some of our results are consistent with that notion, additional refinement of our experimental paradigm will be required to be certain.

We are encouraged by an analysis of the interdependence of participants’ self-report of engagement; i.e., how groups affected individual self-reports. Comparing all groups versus all subjects, the amount of interdependence across all groups was 0.375, a moderate amount across all group sizes.

Importantly, MR was found to be more engaging than CR, meaning the longer the problem took to solve, the more likely problems would arise from disengagement under CR (e.g., this may mean that daydreaming is more likely under CR due to an increase in the time CR takes to make decisions).

Consider that while consensus seeking reduces the costs of entering a discussion, the inability to openly disagree with peers leads to endless discussion, reducing the likelihood of finding a problem solution; worse, a minority in a dictatorship can exploit the consensus process by always rejecting disagreeable points of view, thereby suppressing the beliefs of a majority [8]. This result suggests how autocratically operated businesses can be led astray. However, under democratic decision making, people are more willing to engage in conflict to debate an issue, thereby raising the costs of entering a debate, but consequently producing more efficient and effective decision-making [9].

3.1. Limitations and considerations for future research

We exposed each group to both MR and CR conditions, making interpretation of results more difficult, especially regarding our psycho-physiological measures which can show drift over time (requiring the data to be de-trended).

Participants were not informed as to the correctness of their decisions prior to reporting their perceived level of engagement. We plan to consider changing this procedure in future studies.

It will be important in subsequent research to more directly confirm each participant’s decision, especially under CR, as might be done in a trial by polling the jurors before and after debate.

We plan to analyze the raw data across time (i.e., as time series) to disaggregate the impact of the procedures.

Finally, we had randomized only some of the Wason Tasks, keeping the first two as practice examples run under CR and randomizing the last one between CR and MR. In the future, we plan to make the decision process the same across all tasks, but randomly assigning the MR or CR rules chosen at the beginning.

4. Summary

Our work originated from the question of what type of decision rule leads to more efficient and superior decisions for groups (and firms, etc.). This question has important implications for small and large businesses. At present we find ourselves still seeking the best measures of engagement (psycho-physiological and otherwise) while at the same time, also seeking a protocol that allows us to examine our hypotheses in a more straightforward manner. Nonetheless, at this time, we have again found MR is quicker than CR; but in addition, we have found that MR generates more engagement (more interdependence) in seeking solutions to problems; and it appears that MR generates more emotional engagement in reaching a solution to a problem, suggesting there is less “free-riding” taking place under MR than under CR.
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References


