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ABSTRACT

Research that identifies factors that facilitate information processing and enhance performance without reducing group confidence and decision satisfaction may influence future development of groupwork systems. This paper contains a review of the literature on cognitive and motivational issues in both group decision-making and learning contexts due to their dual focus on task and process satisfaction and examines the concept of closure as a possible contributor to group member satisfaction. Next, The Cognitive Closure Model of Decision Satisfaction is presented and described. This model provides a framework for research that explores the relationships among need for closure, extent of information processing, and subjective certainty (cognitive closure), as contributing factors to decision satisfaction in group contexts. Improvement of current systems that facilitate group work used in business settings offers potential for the future development of such systems for educational applications. (Contains 37 references.) (JLB)

Title:

An Exploration of Closure as a Factor Influencing Group Member Satisfaction: Implications for Applications of Group Support Technology in Education

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Abstract

Research that identifies factors that facilitate information processing and enhance performance without reducing group confidence and decision satisfaction may influence future development of groupwork systems. The Cognitive Closure Model of Decision Satisfaction provides a framework for research that explores the relationships among need for closure, extent of information processing, and subjective certainty (cognitive closure), as contributing factors to decision satisfaction in group contexts. Improvement of current systems that facilitate group work used in business settings offers potential for the future development of such systems for educational applications.

Introduction

The importance placed on the construct "satisfaction" in groups is evidenced by the amount and variety of contexts in which it has been studied and measured. For example, Maier (1970) cited the importance of member satisfaction for decision adoption and implementation. Van de Ven and Delbecq (1974) operationalized group effectiveness to include performance and satisfaction. Keller (e.g. 1983) specifies satisfaction as one of four critical factors in his model for designing motivating instruction. Yet, despite its acknowledged importance the construct is not well understood.

Although their goals and contexts may be quite different, a close look at satisfaction in the group decision-making literature may provide useful insight into the design of computer-based systems that support group learning and problem-solving tasks. The research on and development of computer-based group decision support systems for use in business settings may have promising applications in educational settings.

This paper reviews the literature on cognitive and motivational issues in both group decision-making and learning contexts, due to their dual focus on task and process satisfaction, and examines the concept of closure as a possible contributor to group member satisfaction. This is followed by a presentation and description of The Cognitive Closure Model of Decision Satisfaction (Venkatesh, Small & Verville, 1993) and concludes with a brief discussion of potential applications to education.

Group Member Satisfaction

In learning situations, satisfaction is often described as the sense of accomplishment that learners feel at the conclusion of a learning event when outcomes of their efforts are consistent with their expectations (e.g. Keller, 1983). Keller maintains that instruction may be designed to help people feel good about their learning accomplishments, thereby resulting in learning satisfaction. This suggests that learning satisfaction occurs at or near the end of either each learning chunk or the total learning event.

Assessment of learning satisfaction often focuses on the individual's satisfaction with his or her learning accomplishments. McCombs (1982) and Keller (1983) mention intrinsic factors such as personal control and responsibility as contributors to learner satisfaction. Small and Gluck (in press) found that adults perceive external reinforcements such as feedback, encouragement, expectations, praise, and reward as factors closely related to satisfaction. Manteuffel (1982) cited both control and reward as major characteristics for a satisfied adult learner.

Frequently, satisfaction is tied to the completion of a learning task by an *individual* in a learning situation. However, often learners are required to work in *groups*, use *group* processes, accomplish *group* tasks, and be assessed according to *group* outcomes. In these situations, group member satisfaction may not reflect individual satisfaction; i.e. an individual could be satisfied that the group reached a group-level goal but lack personal closure on the efficacy of the result or the process.

Hecht (1978) has stated the need for theoretic work in the measurement of satisfaction. Exploration of the factors that influence satisfaction in group decision-making situations has led researchers to distinguish between *task-related* and *process-related* components of satisfaction. In relation to task-related factors, several researchers have reported a link between group task accomplishment and group member satisfaction. Heslin and Dunphy (1960) reported that groups scoring low on perceived task accomplishment tended to report low group member satisfaction, while Marquis, Guetzkow and Heyns (1951) found satisfaction to be higher in groups that reported a high degree of accomplishment. They determined that groups that completed a larger

percentage of their agenda were more satisfied than groups that did not.

Other studies have identified process-related factors of task accomplishment as predictors of group member satisfaction. Hrycenko and Minton (1974) suggest that member satisfaction with the task-performance procedure chosen may contribute to overall satisfaction. The process dimension is implicit in Collins and Guetzkow's (1964) observation that perception of movement toward the task goal may be positively related to satisfaction. Preparing and adhering to the meeting agenda and keeping the problem in focus during the meeting have also been cited as factors promoting satisfaction (e.g. Kriesberg, 1950).

Closure

In the education literature, closure is often presented as a norm; i.e. that a learning task *must* be brought to closure (e.g. Phillips, 1987; Dubelle, 1986). McMillin and Newman(1991) cited closure as one of six important elements for effective instruction.

Closure is often associated with the idea of "completeness," as, for example, in Gestalt theory which proposes that one responds to a situation as a complete and unanalyzable whole rather than a sum or specific elements. Dubelle (1986) describes closure as the outcomes of an activity that brings the major points of a lesson into focus so they may be perceived as an organized whole and as the individual's need to smooth or complete what is unfinished. Stacey and DeMartino (1963) emphasize the importance of closure as striving for some form of completion of an activity.

Reigeluth (1984) prescribes a "zooming in and out" approach to instruction that allows students to study specific content or skills but always in the context of the larger body of knowledge in which they fit. Similarly, Keller (1984) emphasizes the need for learners to perceive various pieces of content as fitting into a whole, thereby experiencing closure and a sense of accomplishment. Brophy (1987) contends that students experience a sense of accomplishment when they complete meaningful tasks. Wlodkowski (1991) advocates attaining closure when insructing adult learners, stating that it "enhances learner motivation because it affirms the entire process, reinforces the value of the experience, directly or indirectly acknowledges competence, increases cohesiveness within the group, and encourages the surfacing of inspiration and other beneficial emotions within the learners themselves (pp 247-248). Therefore, closure may relate to subjective certainty or confidence related to the result (cognitive closure) or related to the completion of the process (process closure).

Cognitive closure. The motivation to attain cognitive closure has been examined in regard to subjective certainty; that is the need to closure may motivate people to prefer certainty and coherence over indeterminacy. Kruglanski (e.g. 1989) has examined the need for closure within a motivational theory of cognition. Cognitive closure occurs when a definite answer to a question is obtained, leaving no ambiguity or confusion (Kruglanski and Freund, 1983). Need for closure represents a need to attain assured knowledge that "affords predictability and a base for action" (Kruglanski, 1989, p. 14).

In a group context, the need for closure may be reflected in the group's motivation to collectively develop a genuine "social reality" (Festinger, 1950) or consistent problem representation. Such a motive may prompt the group to resolve differences so that authentic agreement may result. This drive for group consensus may be similar to an "individual's need for personal closure in his or her own cognitive system, that is, for intrapersonal consistency among the individual's cognitions giving rise to a sense of coherent knowledge or subjective reality" (Kruglanski and Webster, 1991, p. 223).

Process closure. Both activity predictability and completion of activity sequences may facilitate closure (Maier, 1970). Group task strategies facilitate both coordination of group

effort and the determination of task progress and may help members generate expectations about when and how these activity sequences will conclude (Losada et al., 1990). In educational situations, learners engaged in a learning task strive for closure to an activity under way (Stacey and DeMartino, 1963). When closure is not achieved, learners may feel "left up in the air" and psychologically unsettled (Cutietta, 1984).

Satisfaction and Closure

The literature reviewed to date does not adequately address the possible relationship between satisfaction and closure. In the education literature, closure is commonly presented as a desired end state; i.e. that the learning task should be brought to closure for learning satisfaction to occur and that it may require more than one learning session to accomplish closure.

In the group literature, Hagen and Burch (1985) found that both perception of closure on a group task and attainment of closure for task direction promoted satisfaction. However, the factors behind closure were not adequately explored, nor was the concept of closure clearly defined. Furthermore, the psychometric properties of the instrument used to measure satisfaction were not adequately described.

Van de Ven and Delbecq (1974) compared groups using interacting, delphi, and nominal group technique (NGT). They found the NGT groups attained high closure while delphi and interacting groups members attained either low closure or "closure with detachment" (p. 619) but closure was implicitly (not explicitly) defined as task accomplishment. Furthermore, NGT groups also reported being significantly more satisfied than the other groups. Here, satisfaction was operationalized to include perceptions of both process and quality of the group's performance. They enumerate "facilitative characteristics" of the NGT: structured meeting process,, balance bewteen task and maintenance focus, problem-centeredness, opportunity for members to "think through and write down ideas" and so on (Van de Ven & Delbecq, 1974, pp 617-619). Although this result hints at a linkage between satisfaction and closure, Van de Ven & Delbecq do not explicitly make this connection. They also do not specify whether these facilitative characteristics are examples of more general underlying mechanisms that promote cognitive closure and, if so, what those mechanisms are. Therefore, while prior group research has addressed closure as an outcome measure, the construct is seldom explicitly defined and the components of closure remain unidentified.

Closure and Confidence

In group decision-making situations, satisfaction may be considered an *affective* response of group members toward the decision made, while confidence is a *cognitive* response. Wlodkowski (1991) asserts that confidence occurs once a person knows with some degree of certainty that he or she is capable or adept at what was learned.

While satisfaction and confidence are not the same (Sniezek, 1980), there is evidence that they are highly related constructs. Keller (1983) identifies four critical factors for motivation and describes them in relationship to expectancy-value theory, with both confidence and satisfaction linked to expectancy for success or failure. According to Keller, confidence is built on such factors as awareness of expectations, personal control, and a history of success while satisfaction depends on meaningful applications, positive outcomes, and consistency. In a study that explored the relationships of Keller's four factors and to identify the effective instructional strategies that are most closely related to each of them, Small and Gluck (in press) found a significant relationship between confidence and satisfaction.

Kruglanski (1989) notes that the need for closure represents a quest for assured knowledge. In this paper, closure is defined as a state characterized by confidence or subjective certainty (cognitive closure), terms often used synonymously (Sniezek, 1980). This relates to the characterization of closure as task accomplishment (Hagen & Burch, 1985; Van de Ven & Delbecq, 1974) because, in decision-making situations, a task is perceived as "done" when subjective certainty about the decision is deemed acceptable by the decision-maker (e.g. Corbin, 1980).

In their research, Kruglanski and his associates manipulated the need for closure as an independent variable. We examine closure (subjective certainty) as a dependent variable. Our work focuses on the effects of information processing on closure and whether attaining cognitive closure promotes decision satisfaction. The Cognitive Closure Model of Decision Satisfaction (see Figure 1) is based on the literature and our previous work in this area.

Place Figure 1 about here

The Cognitive Closure Model of Decision Satisfaction

The Cognitive Closure Model of Decision Satisfaction begins with the proposition that need for closure affects the extent of information processing (Kruglanski, 1989) and explores the implications of this proposition for closure (as a dependent variable) and decision satisfaction. The following sections of this paper describe this model through a discussion of each pair of posited relationships leading to final satisfaction; i.e. need for closure and extent of information processing; extent of information processing and cognitive closure (defined as confidence or subjective certainty), and cognitive closure and decision satisfaction.

Need for Closure and Extent of Information Processing

Knowledge is assumed to consist of propositions in which a person has a given degree of confidence (Kruglanski, 1989). As such, knowledge has two components--- *hypothesis generation* during which propositions are generated and *hypothesis validation* in which a given degree of confidence is attached to the hypotheses. Knowledge acquisition, involving epistemic activity, thus entails information processing.

The hypothesis generation-validation model might be considered a general characterization of the process by which knowledge is acquired. In a study that examined the impact of telecommunication system design and instructor style factors on student perceptions of learning and satisfaction, Walker and Hackman (1991) found that the *amount* of information received was the single greatest contributor. However, Hooper (1992) suggests that cognitive benefits associated with cooperative learning situations are more closely related to *giving* than to *receiving* information. He further states that "(t)he processes associated with generating explanations appear to force students to process information deeper than the processes association with listening to explanations of lesson content" (p.27).

Kruglanski (1989) differentiates between two "epistemically-relevant motivations" that affect the extent of information processing (both breadth and depth) in knowledge acquisition; i.e. high and low need for closure. Information processing may be less extensive (breadth) under high need for closure conditions than low need for closure conditions (Mayseless & Kruglanski, 1987) while it may be more intensive (in-depth)

under certain conditions. That is, low need for closure subjects were more sensitive to alternative hypotheses, considered information that was inconsistent with prior opinions, and were more open to both global and specific information about the task than were high need for closure subjects (Kruglanski, 1989).

The cognitive motivation to attain firm knowledge may therefore be said to influence the extent of information processing. This model, however, does not address two important issues---how the process is regulated and how the knowledge that is acquired through the process is judged to be more or less firm. These issues are considered critical because the motivation to attain or delay cognitive closure entails, by definition, a characterization of the decision-maker as an active evaluator of the adequacy of the information processing. It also assumes the existence of a standard of appraisal against which knowledge is judged to be more or less firm.

Extent of Information Processing and Cognitive Closure

The model further posits that the decision-maker actively assesses the adequacy of information processing with reference to the need for closure (high vs. low) salient in the situation. That is, the need for closure may regulate the extent of information processing (including both hypothesis generation and validation) before a firm judgment is reached (Mayseless & Kruglanski, 1987; Kruglanski & Freund, 1983).

In general, it appears that high need for closure (induced by either reducing the cost to the subject of judgmental invalidity or by increasing the benefit of rendering an expeditious judgment) retards information processing. Conversely, low need for closure (induced by increasing the cost to the subject of judgmental invalidity) fosters more extensive information processing. Under either of these conditions, the decision-maker actively assesses the costs versus the benefits of increased information processing in conditions characterized by differing motivations to reach a firm decision. As a consequence, processing is judged adequate when such a motivation is high (high need for closure) and inadequate when the motivation is low (low need for closure). However, Kruglanski's work does not clarify how the decision-maker determines that the knowledge he or she possesses is more or less firm before deciding to decide; i.e. by what criterion or standard of appraisal the decision-maker makes this determination.

It is likely that cognitive closure (defined here as the minimum level of subjective certainty or confidence acceptable to the decision-maker) will function as such a criterion. Information gathering and deliberation are geared in part to reducing the subjective uncertainty inherent in a decision to a "comfortable" level (Cox & Rich, 1964). This implies that the decision-maker may not feel the need to decide until this level is reached.

Consistent with this line of reasoning, Corbin (1980) uses the "uncertainty cutoff" idea to discuss the timing of choice. This cutoff point is subjectively determined according to an acceptable level of certainty. When subjective certainty fails to reach that level, the decision-maker may choose to delay making a decision or avoid making a decision entirely. Intensive processing of available information or gathering more information may provide an alternative means "for decreasing uncertainty and for inducing the readiness to decide" (Corbin, 1980, p. 54).

In an attempt to define what constitutes an "acceptable level" of subjective certainty and how to determine the "uncertainty cutoff,"
we propose that the cutoff level may be a function of the need for closure. In high need for closure situations, the acceptable confidence level may be set relatively low if the cost of judgmental error is not perceived to be great and the reward is perceived to be high. However, in low need for closure situations, the decision-maker may feel a need to attain a relatively high level of confidence before making a decision if the cost of judgmental

invalidity is perceived as higher than the reward for possessing firm knowledge.

The model asserts that the decision-maker assesses both the adequacy of the extent of information processing and the subjective confidence level during the decision-making process. The previous discussion indicates that a determination of what is an adequate level of information processing may be influenced by cognitive and motivational factors. Decision makers may simply process more information in order to increase the subjective confidence level, terminating such processing when the confidence level exceeds the uncertainty cutoff. Decision makers may decide to halt processing and make a decision if they believe that they had put forth "enough" effort on the task and therefore believe the probability of being correct is high, resulting in high final confidence. Thus the model explicity indicates a reciprocal relationship between subjective confidence and information processing (see Figure 1); i.e. information processing helps increase confidence in general, although under certain circumstances increased processing may reduce confidence (Sniezek, 1991). Information processing would continue until subjective certainty is above the acceptable level of confidence (or reaches the uncertainty cutoff) which defines the moment of choice.

Information overload may negatively affect decision-makers' ability to "integrate and cope with all that information...lead(ing) to dissatisfaction" (Cummings, O'Connell and Huber, 1976, p. 234). In a study exploring the ways people approach the task of gathering information on a specific topic from a multimedia information source, Small and Ferreira (1994) found that some subjects expressed frustration and uncertainty about the amount of information available for access when using a multimedia information system. This phenomenon may have contributed to a lack of subjective certainty about the adequacy of the information search process or the information accessed, resulting in a perceived lack of closure.

Cognitive Closure and Decision Satisfaction

Although cognitive closure may lead to decision satisfaction, there is a need for research that investigates the effects of different levels of need for closure and extent of information processing on both factors. For example, when the need for closure is valued and attained (high), is decision satisfaction assured? If the need for closure is low (not immediately desired) but external constraints (e.g. time) force a decision, does this lead to lowered or lack of confidence and decision satisfaction? When each group member possesses different information, does the perceived necessity to share information influence interaction and the extent of information processing? When all group members possess the same information, does interaction decrease and is the extent of information processing affected? Our current research is exploring some of these issues.

Conclusions

Group decision support systems (GDSS) (e.g. GroupSystems, VisionQuest) are a set of networked electronic tools that facilitate group work, most often in business settings.. They typically include software that allows participants to conduct group activities, such as anonymous electronic brainstorming and organization and ranking of alternatives.

Research that identifies factors that facilitate information processing and enhance performance without reducing group confidence and decision satisfaction may influence future development of groupwork systems. The Cognitive Closure Model of Decision Satisfaction provides a framework for research that explores the relationships among need for closure, extent of information processing, subjective certainty, and decision satisfaction.

Although, the current model does not incorporate a feedback component, Small and

Gluck (in press) identified feedback as a unique term related to satisfaction. Hooper (1992) stated the need "to investigate the effects of feedback timing and the nature of feedback in group environments" (p. 36). Adding appropriate feedback loops to the model may increase the likelihood of confidence and satisfaction in group work. This is an area for future research.

Steeb and Johnston (1981) suggest that visual aid organizers may help decision-makers deal with information overload more effectively.
This type of intervention tool during the hypothesis generation *and* validation stage might promote confidence and satisfaction. However, application to one or the other (generation *or* validation) might decrease confidence and/or satisfaction.

Research on and development of effective support systems for groupwork in business settings holds promise for applications to education. Aiken (1992) recommends the use of GDSS technology in a wide variety of educational situations (e.g. foreign language instruction, classes for the deaf, group meetings) as an effective tool in group instruction. Adaptation of these tools to educational contexts could enhance problem-solving learning activities. For example, such systems would allow discussions of sensitive or controversial topics (e.g. as drug abuse, national health care, the environment, conflict resolution), allowing all students to participate actively while allowing their thoughts and ideas to remain anonymous. Exploration of applications of GDSS technology in education, as well as ways to improve current group work systems, are needed.

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