Shared Cognitions and Shared Theories: Telling More Than We Can Know by Ourselves?

Brandon Randolph-Seng
Texas Tech University

Mario P. Casa de Calvo
Texas A&M University-Kingsville

Tammy Lowery Zacchilli
Saint Leo University

Jacquline L. Cottle
Roger Williams University

Abstract

Despite recent advances in group cognition research, a clear conceptualization of collective cognition is lacking. In order to assist researchers in their conceptualization of group cognition, a separation between shared cognitions and shared theories is proposed. Shared cognitions can be operationally defined as cognitive functioning shared by a set of group members (e.g., shared rationale for decision making process), while shared theories can be understood as perceptual beliefs shared by a set of group members (e.g., shared norms, values, identities). Using this dual process model, evidence for a conceptualization of group cognition as shared social theories will be delineated, and implications for understanding past research in group cognition and decision making will be discussed.

Just as individual decisions are different from group decisions, the cognitions that underlie those decisions can also vary. Researchers have provided support for such a conclusion by showing that a group's collective cognition can be separated from each individual's cognition in the group (e.g., Larson & Christensen, 1993). Despite recent advances in group cognition research (for a recent review see Mathieu, Maynard, Rapp, & Gilson, 2008), a clear conceptualization of collective cognition is lacking. In order to assist researchers in their conceptualization of group cognition, a separation between shared cognitions and shared theories is proposed.

Before delineating the potential interrelatedness and differentiation of shared cognitions and shared theories, it is essential that a definition be provided of each construct. Shared cognition refers to consciously shared cognitive functions that occur within group contexts (Tindale, Smith, Thomas, Filkins, & Sheffey, 1996). For example, group members that clearly communicate the rationale for their beliefs/decisions attempt to literally share their thought processes with the rest of the group (i.e., shared cognition). In the context of the current review, shared social theories are a type of social cognition that refers to shared beliefs among group members (Nisbett & Wilson, 1977). More specifically, shared social theories are conceptualized as shared assumptions and beliefs that influence the decisions/behaviors of group members. For example, group members may share generalized beliefs, values, identities, or assumptions that affect their decision making process, even though these shared theories are not explicitly communicated *per se*.

The current review will begin by providing a selective overview of shared cognition research. Next, non-group research on shared social theories will be examined in order to better delineate the concept of "group cognition", and whether such a process represents actual cognitive functioning, or merely perceived cognitive functioning via shared social theories. Finally, a re-examination of group cognition research will be discussed according to the proposed group cognitive functioning model. However, before formally comparing and contrasting shared cognition and shared social theories, we must first come to understand the notion of shared cognition, and the manner in which shared cognition manifests itself in research on group processes.

Shared Cognition

Within the area of research on collective cognition, the term "group cognition" is akin to the concept of "shared representations." A shared representation is defined as "any task/situation-relevant concept, norm, perspective or cognitive processes that are shared by most or all of the group members," (Tindale et al., 1996, p. 84). Although conceiving group cognition as a shared representation may provide a more accurate conceptualization of research conducted in this area, researchers tend to define shared representations according to the cognitive processing component of Tindale et al.'s definition. In essence, the idea is that if enough group members think alike,

then the group intellective product becomes a function of group-level rather than individual-level cognitive functioning (Thompson & Fine, 1999). In order to provide some clarity to the different terms used in the area, the term *shared cognition* will be used to refer to conscious cognitive functioning shared by a set of group members, as opposed to the broader conceptualization of representation that subsumes a shared cognition.

Shared vs. Unshared Information

Support for the idea of shared cognition comes from research done on the effects of shared vs. unshared information in group decision making. Stasser and Titus (1985) used a simulated political caucus scenario to determine how effectively groups share information during deliberation processes, and the manner in which the distribution of "shared" versus "unshared" information affects groups' decisions. More specifically, these researchers prepared descriptions of three hypothetical student body presidential candidates for participants to read (i.e., candidates A, B, & C). Objectively, "Candidate A" was the best candidate, and possessed the most universally admired traits for a student body president. Additionally, the researchers manipulated the manner in which information about the candidates was distributed across various four-person groups before the groups received the opportunity to collectively discuss the candidates. In the shared condition, participants read descriptions of the candidates that contained all positive and negative information about each candidate. In the unshared/consensus condition, positive information about "Candidate A" and negative information about "B" were given to only one person in each group (to bias the groups toward "A"). In the unshared/conflict condition, positive information about "Candidate A" was given to only one person in each group, and negative information about "B" and "C" went unshared (to shift group preference away from "A"). Results showed that unshared conditions preferred the candidate about whom the group members had shared positive information, rather than the candidate that objectively possessed more positive characteristics but whose positive characteristics were not shared by the group. In other words, group discussion did not overcome the pre-discussion biases that existed among individual group members, as groups did not efficiently make "unshared" information about each candidate known. Stasser and Titus (1985) labelled the above results the "hidden profile" effect. More recently, Stasser (1992) has been able to demonstrate the robustness of the hidden profile effect through computer simulations.

Gigone and Hastie (1996) conceptually replicated Stasser and Titus' (1985) results, and found that the influence of shared information on decision outcome did not depend on whether it was actually considered in the group discussion or not. In other words, shared cognition in this context may not simply be a function of the group discussion, but may in fact be strongly dependent on individual cognition. For example, Greitemeyer and Schulz-Hardt (2003) found that even when group processes are optimal (e.g., sufficient discussion and time), hidden profiles are still rarely solved. Greitemeyer and Schulz-Hardt's (2003) finding suggests that individual level processing may be involved more than previously thought; however, consistent with a shared cognition explanation, the above effect can be lessened through group training (Larson, Foster-Fishman, & Keys, 1994), and participation in and positive feelings of the group discussion (Sargis & Larson, 2002; Wittenbaum, Hubbell, & Zuckerman, 1999). Further, the influence of shared vs. unshared information on participation and affect could explain Greitemeyer and Schulz-Hardt's (2003) findings. Therefore, it may not matter how much time and discussion a group has if certain members are not actually part of the group cognition process. Additional support for a shared cognition explanation can also be found in other work examining the manner in which shared information influences group decisions (e.g., Isenberg, 1986; McCauley, 1989); nevertheless, such an explanation does not support more recent evidence that illustrates the limitations of shared cognition (e.g., Gigone & Hastie, 1996; Winquist & Larson, 1998).

Demonstrability and the Majority

The concept of shared cognitions may have implications for decision making and the majority. When a demonstrability correct solution, or an objectively accurate solution, is not clear, the majority perspective will usually prevail. A majority rule is consistent with the idea that group decision processes are specifically guided by shared cognitions. The idea of demonstrability, therefore, is important for understanding the influence of shared cognition in group decisions. Further, shared cognitions can actually be superior to individual cognitions through the process of correcting individual cognition errors and biases. Evidence of these issues will be discussed below.

First, unlike the hidden profile effect discussed previously, when participants believe that a task has a demonstrably correct answer (e.g., an objectively correct answer to a mathematics problem), unshared information is shared and listened to much more often (Stasser & Stewart, 1992). Further, Laughlin and Ellis (1986) found that an individual person with a demonstrably correct answer was all that was necessary in order for the whole group to arrive at the correct solution to difficult math problems. According to a shared cognition perspective, when no demonstrably correct answer exists, a group would be expected to simply use the view of the majority to come to a decision (Tindale & Kameda, 2000). Recent research supports such a stance (e.g., Hastie & Kameda, 2005; cf. Mohammed & Ringseis, 2001).

Specifically, Hastie and Kameda (2005) found that in most cases following the majority perspective is the most correct, least biased way a group can make a decision. In other words, group processes (e.g., shared cognition) generally may correct possible individual-level errors. Other research supports such a contention. For example, Hinsz (1990) found that groups perform better than individuals on memory tasks, and Wright and Wells (1985) found that group discussion decreased levels of dispositional bias in comparison to the amount of dispositional bias that occurs when group discussion is lacking. Furthermore, Kerwin and Shaffer (1994) found that group deliberation attenuated juror biases. Finally, Tetlock, Skitka, and Boettger (1989) found that under certain situations increased accountability (caused by needing to explain one's self to others) may also decrease errors normally found in individual decision making processes. Consistent with the notion of group accountability, Siegel-Jacobs and Yates (1996) found that accountability for the process of the decision more than accountability for the decision outcome led to the greatest reduction in errors.

In sum, it appears that the majority rule is guided by shared cognitions. Additionally, shared cognitions may be more effective than individual cognitions in decision making. Shared cognitions, however, may not always lead to less errors and biases. Further, when a demonstrably correct solution exists in the group decision process, shared cognitions may actually not be involved. The next section will address these possibilities.

An interesting implication of the concept of demonstrability, as discussed above, is that its existence may not always depend on the task itself. Demonstrability alone may in fact be driven in large part by the shared cognitions and broader mental representations (e.g., schemas) of the group members. In other words, what may seem like a demonstrably correct solution to one group may not to another, due to subjective and unique schemas or perspectives (Tindale & Kameda, 2000). For example, Kerr and MacCoun (1985) found, via a mock jury verdict paradigm, that decisional minorities can use the majority's values (e.g., being unbiased) in order to defeat majority decisions. Similarly, Smith, Dykema-Engblade, Walker, Niven, and McGough (2000) found that minorities arguing against the death penalty are much more influential when appealing to the shared representations held by the majority.

The implication above suggests that those solutions which a group collectively views as the demonstrably correct may in reality be inaccurate. In other words, collective cognition can, in some cases, be more biased than individual cognition. For instance, groups sometimes make more extreme decisions than individuals make alone (i.e., group polarization effect; Moscovici & Zavalloni, 1969). In another example, Argote, Seabright, and Dyer (1986) compared individuals and groups on their utilization of base-rate biases (i.e., the tendency individuals have to overlook relevant statistical data when estimating likelihoods), and found that groups tended to display this representative bias much more than individuals. Furthermore, Betz, Skowronski, and Ostrom (1996) had participants read a story and complete a recognition test of the story, after which the participants were shown bogus responses from other participants. Later, the participants completed another recognition test of the story. Results showed that participants' second recall of the story generally matched the consensus of the group of bogus responses more than the participant's original (and more accurate) recall of the story. Finally, Miller and Prentice (1994) demonstrated the powerful influence that errors in shared representations can have, specifically through pluralistic ignorance. In the case of pluralistic ignorance, false norms are erroneously thought to represent the views of the majority when in reality they do not (e.g., perceiving erroneously high drinking norms on campus; Prentice & Miller, 1993). Therefore, the properties of group representations (whether true or false) can actually influence individual's inferences and cognitions about others. Often in the case of errors produced from group cognition, group members are not consciously aware of the influence such collective representations have on the decision outcome process (e.g., Gigone & Hastie, 1996).

Group Decision Errors and Social Identity

As previously discussed, shared cognitions may not always lead to the best or most accurate decisions. Rather shared cognitions could lead to errors in the decision making process. For example, Tindale and colleagues have explicitly researched the influence of shared cognition in group decision making processes. Specifically, Tindale, Sheffey, and Scott (1993) found that the majority of individuals working in research groups avoided conjunctive-type errors, but that the group often demonstrated the error in their final decision following group discussion. Conjunctive-type errors refer to erroneous beliefs that the likelihood of two or more events occurring simultaneously (i.e., "in conjunction") is higher than the likelihood of either event occurring alone (Tversky & Kahneman, 1983). For instance, a conjunctive-type error may involve the misperception that events A & B are more likely to occur in combination than either event A or B alone. In as much as cognitive processes explain these conjunctive-type errors (i.e., Tversky & Kahneman, 1974; Stasser and Stewart, 1992), group discussion exacerbated those shared cognitions thereby increasing the frequency of the error. The aforementioned results are also consistent with Whyte (1993), who found that group decision making tended to amplify similar errors (see also Bazerman, Giuliano, & Appelman, 1984). Interestingly, individuals who avoided conjunctive-type errors before group

discussion were not very confident in their decision. Sniezek, Paese and Switzer (1989) found that expressing uncertainty about a judgment can influence subsequent judgments to be more accurate. However, in Tindale et al. (1993) the influence of shared cognitions actually decreased subsequent group judgment quality.

Tindale (1989) instructed five-person groups to evaluate employee profiles for promotion. The study tested whether the amount of feedback given by ostensibly promoted employees would influence conservatively biased decision rules (i.e., no promotion). The results showed that in the partial and no feedback conditions, minority-perspective individuals favoring the conservative decision were sometimes even more influential than the majority. Similarly, Smith, Tindale, and Steiner (1998) found (via a sunk cost problem - incurred costs of the past that cannot be recovered, and may potentially lead to faulty decision making) that minority perspective members were able to successfully influence the group's decision only when sunk cost arguments were used. Once again, in as much as cognitive processes explain these representative-type errors (i.e., Tversky & Kahneman, 1974), minority perspective arguments that are consistent with these shared cognitions are particularly influential on the final group decision.

Social identity theory (Tajfel & Turner, 1986) also provides support to the process of the perspective minority being able to influence the majority. Social identity theory itself refers to the process by which a self-inclusive social category (e.g., nationality, political/religious affiliation) provides a self-definition that serves as a key component of one's self concept (Tajfel & Turner, 1986). According to Hogg (1996), these subjectively crafted social identities both describe and prescribe one's attributes as a member of a specific group. For example, social identity theory holds that one's subjective identification with a particular political party would affect the composition of one's self-concept, and would inform an individual of the unique, normative attributes that members of the group should possess. Furthermore, the subjectively-established, defining attributes of a social category are called *prototypes*, and those individual group members that most closely personify those attributes are perceived by other group members as highly prototypical (Hogg, 1996).

In terms of minority perspective influence on the majority, social identity research has found that minority-perspective individuals are persuasive to the extent that they are perceived to share a social identity with the majority (Hogg & Terry, 2000). Further, Hogg, Turner, and Davidson (1990) found that salient group identity can increase polarization of group decisions through conformity to group norms (see also Mackie, 1986). More recently, Hoggs and Hains (1996) found that identity with a salient group influences shared cognitions in the form of higher regard for prototypical members of the group. In other words, shared identities produce shared cognitions regarding attributes that are most prototypical, which may lead to positive evaluations of those group members that most closely match those prototypical characteristics. In summation, increases in group polarization (Hogg et al., 1990) and cohesion (Hogg & Hains, 1996) may ultimately stem from underlying shared cognitions.

Work Groups

Shared cognitions also have implications for work groups. According to Hackman (1987), work groups' shared responsibilities and membership is clearly defined. Thus, individuals working toward the same goal likely share common ideas about how that goal should be reached. For example, Rentsch (1990) found that individuals possess similar representations of work events to others on their work teams, while representations were different for participants in different interaction groups. Liang, Moreland, and Argote (1995) and Moreland Levine and Wingert (1996) have provided additional evidence that work teams' shared cognitions are important to the task at hand. These researchers showed that groups who train together performed better than those trained apart and then put together later on. Further, work groups even share cognitions about which response is appropriate when the group makes errors (Cannon & Edmondson, 2001), and work groups reach a higher level of effectiveness through shared mental models (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000).

Mooreland and colleagues interpreted their findings in a manner consistent with transactive memory systems (Wegner, 1995). Transactive memory refers to groups' knowledge of those skills that are shared or not shared; in other words, the group's metacognition. For example, each group member becomes aware of his or her own relative strengths and weaknesses, as well as the strengths and weaknesses of others in the group. When a group first forms, transactive memory must first be assigned among the members. Over time, the transactive memory system can become automatic, allowing for the group to remember much more information than any given member (Wegner, 1995; see also Walsh & Ungson, 1991). Nevertheless, Brandon (2004) provided evidence that transactive memory can vary in accuracy depending on the accuracy of group members' perceptions of each group member's expertise. Pavitt (2003) also found that ineffective sharing of individual abilities might cause errors, and Hutchins' (1991) use of computer models found that groups' distribution of cognition among its members depends on the organization of communication over time, with more organized communication associated with more efficient/effective cognition distribution.

Klimoski and Mohammed (1994) stated that the definition of team mental models can only include what members know about other members and what they share in common. In other words, it is not that nonconscious

processes are unimportant in shared cognitions; rather, it is that task team cognitions, by definition, can only include those cognitions that are conscious. For example, Mathieu, Heffner, Goodwin, Salas and Cannon-Bowers (2000) found that groups function better when they consciously share some of the same ideas (see also Langan-Fox, Code & Langfield-Smith, 2000). Despite such findings, additional evidence is needed to rule out nonconscious cognitive processes.

Cultural Groups

The final research domain involving shared cognitions that will be reviewed is the area of cultural groups. Specifically, shared cognitions may be an important component in the development of cultural norms. For example, Triandis (1996) found that the shorter time it took for a group to reach agreement on some issue, the more likely that issue reflected an element of the group members' shared culture. Higgins (1992) found that the simple exchange of information among people is sufficient to increase the perceived truth of that information. In other words, shared cognitions appear to be a natural consequence of social interaction. Applying the previous implication to the cultural level, Latane and Bourgeois (1996) have shown (through simulation research) that preference sharing can lead to the creation of large groups of individuals who all share similar norms and values (i.e., sub-cultures). Lau, Chiu, and Lee (2001) demonstrated similar relationships between individual interactions, shared cognition, and cultural development. For example, research on families has been able to identify the same characteristics of culture that can be found at the community and country level (Wolin & Bennett, 1984). Further, once these shared cognitive structures are developed, they tend to be maintained over time even by new members of the group (Weick & Gilfillan, 1971). Finally, support for the importance of shared cognitions in cultural development and maintenance comes from cross-cultural research revealing strong cultural differences in thinking style (Nisbett, Peng, Choi, & Norenzayan, 2001).

Conclusions

The research reviewed thus far on shared cognition prompts four general conclusions. First, shared information in groups may reflect shared cognition, but the specific or actual amount of individual-level cognition that takes place in a shared cognition context is unclear (e.g., Winquist & Larson, 1998). Second, the perceived demonstrability of the decision is largely based on the group representation of the choice (e.g., Smith et al., 1998). That is, when no demonstrable evidence is available, shared cognitions will once again guide outcome through majority rules (Hastie & Kameda, 2005). Third, errors produced from shared cognition appear to be exaggerated when group members are unaware of the influence such cognitions have on the process on the group decision (e.g., Gigone & Hatie, 1996). When awareness of the influence that shared cognitions have on the process of the group decision is known, then errors tend to decrease (e.g., Klimoski & Mohammed, 1994; Siegel-Jacobs & Yates, 1996). Fourth, shared cognition processes found in groups may be similar to those processes occurring in larger cultural groups (e.g., Higgins, 1992).

Shared Social Theories

A possible unifying theme from the four points presented above may involve identifying a more specific distinction between perceived shared cognition and actual shared cognition. For example, when a group decision outcome is based on conscious, well reasoned cognitive processes, then errors may be less likely; however, when group decision outcomes are based on shared, heuristic type reasoning processes (e.g., implicit group norms, false consensus, shared expectations), errors may be more common. In other words, when groups are actually aware of the higher order cognitive processes underlying their decision outcomes, those outcomes are likely to be correct. Non-group research may help in delineating instances in which "shared cognition" may be actual or perceived.

Shared social theories are presented here as a subcomponent of shared cognitive functioning that may capably classify conscious heuristic-based processing at the group level. Shared social theories are based on the notion of implicit shared beliefs among group members (Nisbett & Wilson, 1977). More specifically, shared social theories are conceptualized here as shared assumptions and beliefs that influence the decisions/behaviors of group members (e.g., shared beliefs, values, norms, identities, or assumptions).

Non-Group Research

As previously discussed, group research provides insight into shared cognitions, but may not answer the question of when shared cognitions are actually perceived. Non-group research on shared social theories might be beneficial in examining actual cognitive functioning and perceived cognitive functioning that is merely based on shared social theories.

Nisbett and Wilson (1977) proposed that higher order cognitive processes are nonconscious. Through their review, these researchers demonstrated that implicit experimental manipulations of social judgments had a significant effect on participants' judgments, yet participant awareness of the reasons behind judgmental changes was usually not observed. Nisbett and Wilson explained that the reason for this effect was that participants were

accessing shared social theories, or implicit perceptions of ideas, norms, or beliefs held by the society to which they belong. Therefore, when a plausible cause and the shared normative theory correctly accounts for the behavior, self-reports will be accurate. They hypothesized that when people are asked to report on why they behaved in a particular fashion, people are likely to construct their reasons after the fact. The source of these reasons originated from cultural rules which may state specific stimulus-response outcomes, and from cultural implicit theories about causal relationships (Nisbett & Wilson, 1977).

A series of studies was spawned to test Nisbett and Wilson's theory (e.g., Sabini & Silver, 1981; Sprangers, Brink, Heerden, & Hoogstraten, 1986; White, 1988; Turner, 1988). However, much of this research neither supports nor contradicts Nisbett and Wilson's (1977) claims of shared theories as the explanation for the attempts people make at deciding why they behave as they do (e.g., Spranger et al., 1987). Hamill, Wilson and Nisbett (1980) and Wilson, Laser, and Stone (1982) on the other hand, found additional evidence that shared social theories explained participants' errors in decision outcomes in a manner similar to the errors made by groups described in the previous section (e.g., Tindale et al., 1993). However, Gavanski and Hoffman (1987) and Wegener and Petty (1995) found that in some situations, participants can rely on access to their own conscious cognitive processes to correct for perceived biases. These results are similar to Wright and Wells' (1985) findings regarding group correction of errors. What is causing these seemingly contradictory findings?

Wilson's more recent work sheds some light on this question. Wilson, Hodges, and LaFleur (1995) had participants make an initial impression of a person, immediately after which positive or negative thoughts about the person were made salient. Those participants who analyzed the reason for their impression of the person were much more likely to base their reasons on those thoughts that were made salient rather than their initial impressions, compared to those who were asked to recall the behaviors of the person. Similar results have been found in groups; for example (as described previously), Betz et al. (1996) found that participants' second recall of the story generally matched the consensus of the bogus group responses more than the participants' original (and more accurate) recollection of the story.

In a related set of non-group studies, Wilson and Schooler (1991) found that when participants analyze preferences for jams and college courses their decision outcomes can actually be of a lower quality than participants who do not analyze such reasons. Therefore, analyzing reasons for choices can lead to decreased satisfaction with those choices (Wilson, Lisle, Schooler, & Hodges, 1993), and can even lower peoples' ability to predict their own future behavior if those reasons are not based on the true underlying cognitive processes (Wilson & Dunn, 1986; Wilson, Dunn, Bybee, Hyman, & Rotondo, 1984; Wilson & LaFleur, 1995).

Conclusions

Overall, the evidence suggests that people generally do not have access to the "… reasons behind their feelings, attitudes, and judgments and thus generate reasons that are consistent with cultural and personal theories that are accessible in memory" (Wilson & Dunn, 2004, p. 505). Further, recent psychophysiological evidence suggests that the same region of the brain is activated when one considers their own perspective versus the perspective of others (Ruby & Decety, 2003), thus indicating that similar processes may be involved in the execution of each strategy.

What implications do Wilson and colleagues' results have for the idea of shared cognition? At times, group cognition may be better conceived as shared social theories (see Figure 1). The final section will use the proposed model in Figure 1 to reexamine the aforementioned research on shared cognition.

Shared Cognitions and Shared Social Theories

At this juncture, a dual process model of group cognitive functioning in the context of group decision outcomes is proposed (see Figure 1). Argote et al. (1986), Miller and Prentice (1994), Tindale et al. (1990), and Tindale et al. (1993) found that group processes such as shared cognition actually increase individual-level errors rather than decrease them. Such findings are exactly what would be expected if shared cognitions are based on social theories, rather than actual cognitive processing (as indicated in the direct path from shared social theories to decision outcome). In a group setting, to the extent that all group members share similar social theories, the likelihood of processing information according to the shared social theory route should increase. Group decisions made based primarily on shared social theories will be influenced by implicit shared beliefs, values, norms, identities, or assumptions. Furthermore, groups may automatically make decisions based on these shared social theories, unless individuals within groups explicitly express the rationale or thought process for their individual-level decisions. Such an interpretation is supported by research showing that an increase in certainty for a decision choice in groups can lead to fewer correct solutions (Sniezek, Paese & Switzer, 1989), and research showing the influences of shared representations on decision outcome processes (e.g., Gigone & Hastie, 1996).
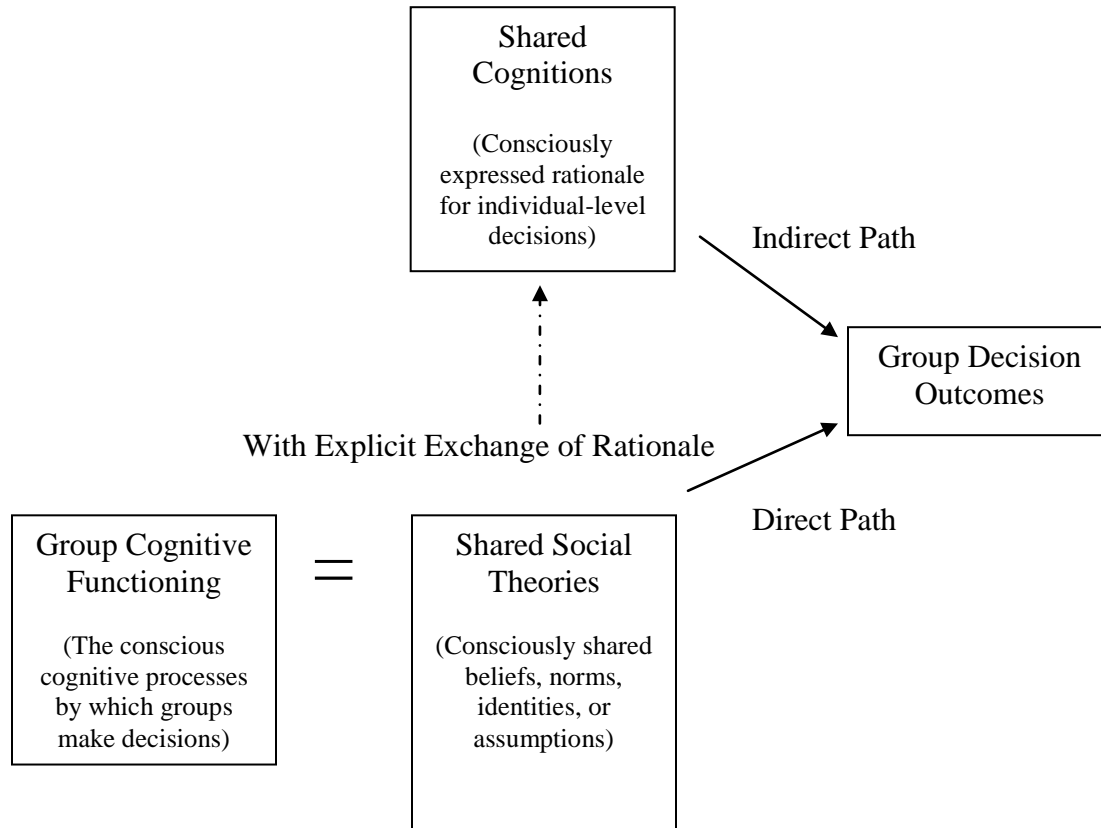
Figure 1. Dual process model of conscious group cognitive functioning in the context of group decision outcomes.

The model's direct path from socially shared theories to decision outcome is supported by previous research suggesting that minority-perspective individuals not only have knowledge of such shared representation, but are able to use those representations to influence the majority (e.g., Tindale, 1989). Finally, support for the importance of shared social theories in group cognition comes from cross-cultural research revealing strong cultural differences in thinking styles (Nisbett et al., 2001). Therefore, shared social theories rather than actual cognitive processes may be reflected in many differences across and within cultural development (Higgins, 1992; Triandis, 1996).

Nevertheless, Hastie and Kameda (2005), Hinsz (1990), Wright and Wells (1985), and Kerwin and Shaffer (1994) found that group processes (such as shared cognition) generally may fix individual-level errors. If shared cognitions only represent shared social realities, why would shared cognitions be any more correct than individual cognitions? The answer to this problem may be that under group conditions described in Tetlock et al. (1989), increased accountability caused by needing to explain one's self to others may also decrease errors normally found in individual decision making processes. In other words, shared cognitions may be simply shared social theories unless the process of the group decision itself is analyzed by the group members, allowing the more nonconscious cognitive reasons for the decision to be manifest. Such a possibility is indicated by the indirect path of the model, in which shared social theories (e.g., implicit norms, identities, etc.) can lead to shared cognitions and ultimately the group decision outcome. Group decisions made based primarily on shared cognition will be influenced by explicitly shared and authentic rationale, and will thus represent a more conscious or controlled process. Consistent with this possibility, Siegel-Jacobs and Yates (1996) found that accountability for the process of the group decision, rather than accountability for the decision outcome, led to the greatest reduction in errors. Further, it seems possible for a group to consciously create a transactive memory system that will allow for group cognitions to reflect the underlying cognitive processes rather than shared social theories (Walsh & Ungson, 1991). However, over time the conscious transactive memory system itself can become automatic (Wegner, 1995), as the conscious system becomes a well-learned, higher-order cognitive process. Thus, benefits of improved memory provided by the group

transactive memory system may provide a way for shared cognitions among group members to reflect the underlying cognitive processes, be they conscious or not.

Future Directions and Conclusions

The proposed model explains conscious thinking processes in groups. Other less conscious influences on group decision making are not addressed in the current model. Conformity in group decision making, for example, could lead to group consensus without a need to share the same theory or cognitive processing. In this case, following the majority may be reflective of a nonconsciously prescribed decision rule (e.g., majority wins).

Further, process gain may only be possible when the group does not share cognition, even in the event that they share a theory. An example of this can be found in the event of a biased representation by the group members. If everyone in the group shares the same false representation of the task, then the group is more likely to come to the same flawed conclusion (and in some cases, possibly a more flawed conclusion vis a vis polarization). Instead, if one member has a correct representation and can then direct the group toward another way of representing the task, then it is possible that process gain can occur (as mentioned earlier in the case of minority influence). In this way, the minority can only "win" when they invoke or create a new socially shared theory. One could argue, however, that this would also be an example of a shared cognition. It is important to remember that groups are dynamic entities, shifting and changing in response to the task, from which different group outcomes may "emerge". What must not be lost is the idea that whether a group is better than an individual always depends on the type of task and the processes that occur at the group level.

Therefore, research needs to be done to identify that which makes a shared theory a shared cognition. These may be two sides of the same coin, and as such could benefit from research that elucidates when each process is occurring in a group, and under what conditions each is likely to lead to an optimal group response.

In conclusion, many of the studies reviewed above are consistent with Nisbett and Wilson's (1977) original claim that individuals' knowledge about why they choose their decisions may occasionally be based on socially shared theories rather than an authentic cognitive rationale. Therefore, what some researchers consider to be shared cognitive processes may simply be the product of intuitively shared social theories. Further, it may even be possible for small groups to create their own shared theories that are separate from larger cultural theories. Such a possibility would be readily explained by previously discussed social identity effects (e.g., Hogg & Hains, 1996). However, such an interpretation does not mean that groups cannot be trained to recognize when their decisions are based on socially shared theories, as well as the errors this may create. In addition, it should be recognized that in many cases shared social theories may actually be correct. Future research is needed to directly test when socially shared theories can better explain group cognition, and the circumstances or situations under which groups may have direct access to the authentic rationale behind those cognitions.

References

Argote, L., Seabright, M. A., & Dyer, L. (1986). Individual versus group use of base-rate and individuating information. *Organizational Behavior and Human Decision Processes, 38*, 65-75.

Bazerman, M. H., Giuliano, T., & Appelman, A. (1984). Escalation of commitment in individual and group decision making. *Organizational Behavior & Human Performance, 33*, 141-152.

Betz, A. L., Skowronski, J. J., & Ostrom, T. M. (1996). Shared realities: Social influence and stimulus memory. *Social Cognition, 14*, 113-140.

Brandon, D. P., & Hollingshead, A. B. (2004). Transactive memory systems in organizations: Matching tasks, expertise, and people. *Organization Science, 15,* 633-644.

Cannon, M. D., & Edmondson, A. C. (2001). Confronting failure: Antecedents and consequences of shared beliefs about failure in organizational work groups. *Journal of Organizational Behavior, 22*, 161-177.

Gavanski, I. & Hoffman, C. (1987). Awareness of influences on one's own judgments: The roles of covariation detection and attention to the judgment process. *Journal of Personality and Social Psychology, 52*, 453-463.

Gigone, D., & Hastie, R. (1996). The impact of information on group judgment: A model and computer simulation. In E. H. Witte & J. H. Davis (Eds.), *Understanding group behavior, Vol. 1: Consensual action by small groups.* (pp. 221-251): Lawrence Erlbaum Associates, Inc.

Greitmeyer, T. & Schulz-Hardt, S. (2003). Preference-consistent evaluation of information in the hidden profile paradigm: Beyond group level explanations for the dominance of shared information in group discussions. *Journal of Personality and Social Psychology, 84*, 322-339.

Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior* (pp.315-342). Prentice Hall: Englewood Cliffs, NJ.

Hamill, R., Wilson, T. D., & Nisbett, R. E. (1980). Insensitivity to sample bias: Generalizing from atypical cases. *Journal of Personality and Social Psychology, 39*, 578-589.

Hastie, R., & Kameda, T. (2005). The robust beauty of majority rules in group decisions. *Psychological Review, 112*, 494-508.

Higgins, E. T. (1992). Achieving "shared reality" in the communication game: A social action that creates meaning. *Journal of Language and Social Psychology, 47*, 141-154.

Hinsz, V. B. (1990). Cognitive and consensus processes in group recognition memory performance. *Journal of Personality and Social Psychology, 59*, 705-718.

Hogg, M. A. (1996). Social identity, self-categorization, and the small group. In E. Witte & J. Davis (Eds.), *Understanding group behavior: Small group processes and interpersonal relations* (Vol. 2, pp. 227-253). Lawrence Erlbaum Associates, Inc.

Hogg, M. A., & Hains, S. C. (1996). Intergroup relations and group solidarity: Effects of group identification and social beliefs on depersonalized attraction. *Journal of Personality and Social Psychology, 70*, 295-309.

Hogg, M. A., & Terry, D. J. (2000). Social identity and self-categorization processes in organizational contexts. *Academy of Management Review, 25,* 121-140.

Hogg, M. A., Turner, J. C., & Davidson, B. (1990). Polarized norms and social frames of reference: A test of the self-categorization theory of group polarization. *Basic and Applied Social Psychology, 11*, 77-100.

Hutchins, E. (1991). The social organization of distributed cognition. In L. Resnick, J. Levine, & S. Teasdale (Eds.), *Perspectives on socially shared cognition* (pp. 283-307). Washington, D.C. American Psychological Association.

Isenberg, D. J. (1986). Group polarization: A critical review and meta-analysis. *Journal of Personality and Social Psychology, 50*, 1141-1151.

Kerr, N. L., & MacCoun, R. J. (1985). The effects of jury size and polling method on the process and product of jury deliberation. *Journal of Personality and Social Psychology, 48*, 349-363.

Kerwin, J., & Shaffer, D. R. (1994). Mock jurors versus mock juries: The role of deliberations in reactions to inadmissible testimony. *Personality and Social Psychology Bulletin, 20*, 153-162.

Klimoski, R., & Mohammed, S. (1994). Team mental model: Construct or metaphor? *Journal of Management, 20*, 403-437.

Langan-Fox, J., Code, S., & Langfield-Smith, K. (2000). Team mental models: Techniques, methods, and analytic approaches. *Human Factors, 42*, 242-271.

Larson, J. R., & Christensen, C. (1993). Groups as problem-solving units: Toward a new meaning of social cognition. *British Journal of Social Psychology, 32*, 5-30.

Larson, J.R., Foster-Fishman, P.G., & Keys, C.B. (1994). Discussion of shared and unshared information in decision-making groups. *Journal of Personality and Social Psychology, 67*, 446-461.

Latané, B., & Bourgeois, M. J. (1996). Experimental evidence for dynamic social impact: The emergence of subcultures in electronic groups. *Journal of Communication, 46*, 35-47.

Lau, I. Y.-M., Chiu, C.-y., & Lee, S.-l. (2001). Communication and shared reality: Implications for the psychological foundations of culture. *Social Cognition, 19*, 350-371.

Laughlin, P. R., & Ellis, A. L. (1986). Demonstrability and social combination processes on mathematical intellective tasks. *Journal of Experimental Social Psychology, 22*, 177-189.

Liang, D. W., Moreland, R., & Argote, L. (1995). Group versus individual training and group performance: The mediating factor of transactive memory. *Personality and Social Psychology Bulletin, 21*, 384-393.

Mackie, D. M. (1986). Social identification effects in group polarization. *Journal of Personality and Social Psychology, 50*, 720-728.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85*, 273-283.

Mathieu J. E., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management, 34,* 410-476.

McCauley, C. (1989). The nature of social influence in groupthink: Compliance and internalization. *Journal of Personality and Social Psychology, 57*, 250-260.

Miller, D. T., & Prentice, D. A. (1994). Collective errors and errors about the collective. *Personality and Social Psychology Bulletin, 20*, 541-550.

Mohammed, S., & Ringseis, E. (2001). Cognitive diversity and consensus in group decision making: The role of inputs, processes, and outcomes. *Organizational Behavior and Human Decision Processes, 85*, 310-335.

Moreland, R. L., Levine, J. M., & Wingert, M. L. (1996). Creating the ideal group: Composition effects at work. In E. H. Witte & J. H. Davis (Eds.), *Understanding group behavior, Vol. 2: Small group processes and interpersonal relations.* (pp. 11-35): L awrence Erlbaum Associates, Inc.

Moscovici, S. & Zavalloni, M. (1969). The group as a polarizer of attitudes. *Journal of Personality and Social Psychology, 12*, 125-135.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108*, 291-310.

Nisbett, R. E. & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84*, 231-259.

Pavitt, C. (2003). Colloquy: Do interacting groups perform better than aggregates of individuals? Why we have to be reductionists about group memory. *Human Communication Research, 29*, 592-599.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology, 64*, 243-256.

Rentsch, J. R. (1990). Climate and culture: Interaction and qualitative differences in organizational meanings. *Journal of Applied Psychology, 75*, 668-681.

Ruby, P., & Decety, J. (2003). What you believe versus what you think they believe: A neuroimaging study of conceptual perspective-taking. *European Journal of Neuroscience, 17*, 2475-2480.

Sabini, J. & Silver, M. (1981). Introspection and causal accounts. *Journal of Personality and Social Psychology, 40*, 171-179

Sargis, E. G., & Larson, J. R. J. (2002). Informational centrality and member participation during group decision making. *Group Processes & Intergroup Relations, 5*, 333-347.

Siegel-Jacobs, K., & Yates, J. F. (1996). Effects of procedural and outcome accountability on judgment quality. *Organizational Behavior and Human Decision Processes, 65*, 1- 17.

Smith, C. M., Dykema-Engblade, A., Walker, A., Niven, T. S., & McGough, T. (2000). Asymmetrical social influence in freely interacting groups discussing the death penalty: A shared representations interpretation. *Group Processes & Intergroup Relations, 3*, 387-401.

Smith, C. M., Tindale, R. S., & Steiner, L. (1998). Investment decisions by individuals and groups in 'sunk cost' situations: The potential impact of shared representations. *Group Processes & Intergroup Relations, 1,* 175-189.

Sniezek, J. A., Paese, P. W., & Switzer, F. S. C. (1990). The effect of choosing on confidence in choice. *Organizational Behavior and Human Decision Processes, 46*, 264-282.

Spranger, M., van den Brink, W., van Heerden, J., and Hoogstraten, J. (1986). A constructive replication of White's alleged refutation of Nisbett and Wilson and of Bern: Limitations on verbal reports of internal events. *Journal of Experimental Social Psychology, 23*, 302-310

Stasser, G. (1992). Pooling of unshared information during group discussion. In S. Worchel, W. Wood, & J. A. Simpson (Eds.), *Group processes and productivity* (pp. 48-67). Newbury Park, CA: Sage.

Stasser, G. & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology, 63*, 426-434.

Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality & Social Psychology, 48*, 1467-1478.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7-24).Chicago: Nelsen-Hall.

Tetlock, P. E., Skitka, L., & Boettger, R. (1989). Social and cognitive strategies for coping with accountability: Conformity, complexity, and bolstering. *Journal of Personality and Social Psychology, 57*, 632-640.

Thompson, L., & Fine, G. A. (1999). Socially shared cognition, affect, and behavior: A review and integration. *Personality and Social Psychology Review, 3*, 278-302.

Tindale, R. S. (1989). Group vs individual information processing: The effects of outcome feedback on decision making. *Organizational Behavior and Human Decision Processes, 44*, 454-473.

Tindale, R.S., Davis, J.H., Vollrath, D.A., Nagao, D.H., & Hinsz, V.B. (1990). Asymmetrical social influence in freely interacting groups: A test of three models. *Journal of Personality and Social Psychology, 58*, 438-449.

Tindale, R. S., & Kameda, T. (2000). 'Social sharedness' as a unifying theme for information processing in groups. *Group Processes & Intergroup Relations, 3*, 123-140.

Tindale, R. S., Sheffey, S., & Scott, L. A. (1993). Framing and group decision-making: Do cognitive changes parallel preference changes? *Organizational Behavior and Human Decision Processes, 55*, 470-485.

Tindale, R. S., Smith, C. M., Thomas, L. S., Filkins, J., & Sheffey, S. (1996). Shared representations and asymmetric social influence processes in small groups. In E. Witte & J. H. Davis (Eds.), *Understanding group behavior: Consensual action by small groups* (Vol. 1, pp. 81-103). Mahwah, NJ: Erlbaum.

Triandis, H. C. (1996). The psychological measurement of cultural syndromes. *American Psychologist, 51*, 407-415.

Turner, C. K. (1988). Don't blame memory for people's faulty reports on what influences their judgments. *Personality and Social Psychology Bulletin, 14*, 622-629.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*, 1124-1131.

Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review, 90*, 293-315.

Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review, 16*, 57-91.

Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgment: The role of naive theories in corrections for perceived bias. *Journal of Personality and Social Psychology, 68*, 36-51.

Wegner, D. M. (1995). A computer network model of human transactive memory. *Social Cognition, 13*, 319-339.

Weick, K. E., & Gilfillan, D. P. (1971). Fate of arbitrary traditions in a laboratory micro-culture. *Journal of Personality and Social Psychology, 17*, 179-191.

White, P. A. (1988). Knowing more about what we can tell: "Introspective access" and causal report accuracy 10 years later. *British Journal of Psychology, 79*, 13-45.

Whyte, G. (1993). Escalating commitment in individual and group decision making: A prospect theory approach. *Organizational Behavior and Human Decision Processes, 54*, 430-455.

Wilson, T. D., & Dunn, D. S. (1986). Effects of introspection on attitude-behavior consistency: Analyzing reasons versus focusing on feelings. *Journal of Experimental Social Psychology, 22*, 249-263.

Wilson, T. D., & Dunn, E. W. (2004). Self-knowledge: Its limits, value and potential for improvement. *Annual Review of Psychology, 55*, 493-518.

Wilson, T. D., Dunn, D. S., Bybee, J. A., Hyman, D. B. & Rotondo, J. A. (1984). Effects of analyzing reasons on attitude-behaviour consistency. *Journal of Personality and Social Psychology, 47*, 5-16.

Wilson, T. D., Hodges, S. D. & LaFleur, S. J. (1995). Effects of introspecting about reasons: Inferring attitudes from accessible thoughts. *Journal of Personality and Social Psychology, 69*, 16-28.

Wilson, T. D., & LaFleur, S. J. (1995). Knowing what you'll do: Effects of analyzing reasons on self-prediction. *Journal of Personality and Social Psychology, 68*, 21-35.

Wilson, T. D., Laser, P. S., & Stone, J. I. (1982). Judging the predictors of one's own mood: Accuracy and the use of shared theories. *Journal of Experimental Social Psychology, 18*, 537-556.

Wilson, T. D., Lisle, D. J., Schooler, J. W., & Hodges, S. D. (1993). Introspecting about reasons can reduce post-choice satisfaction. *Personality and Social Psychology Bulletin, 19*, 331-339.

Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology, 60*, 181-192.

Winquist, J. R., & Larson, J. R. J. (1998). Information pooling: When it impacts group decision making. *Journal of Personality and Social Psychology, 74*, 371-377.

Wittenbaum, G. M., Hubbell, A. P., & Zuckerman, C. (1999). Mutual enhancement: Toward an understanding of the collective preference for shared information. *Journal of Personality & Social Psychology, 77*, 967-978.

Wolin, S. J., & Bennett, L. A. (1984). Family rituals. *Family Process, 23*, 401-420.

Wright, E. F., & Wells, G. L. (1985). Does group discussion attenuate the dispositional bias? *Journal of Applied Social Psychology, 15*, 531-546.