This is to certify that the

thesis entitled

EFFECTS OF TIME PRESSURE
AND INFORMATIONAL ACCESS
ON HIDDEN PROFILE SOLUTION
IN DECISION-MAKING GROUPS

presented by

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has been accepted towards fulfillment
of the requirements for

M.A. degree in COMMUNICATION

Major professor

Date Dec. 2, 2002

EFFECTS OF TIME PRESSURE AND INFORMATIONAL ACCESS ON HIDDEN PROFILE SOLUTION IN DECISION-MAKING GROUPS

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Communication

2002

ABSTRACT

EFFECTS OF TIME PRESSURE AND INFORMATIONAL ACCESS ON HIDDEN PROFILE SOLUTION IN DECISION-MAKING GROUPS

By

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Kelly and Karau (1999) found an unexpected tendency for time-urgent, decision-making groups to solve a hidden profile better than groups with ample time. The purpose of the present study was to examine and clarify when time pressure facilitates or impairs the solution of a hidden profile. In the present experiment, members of three-person groups read information about two hypothetical cholesterol-reducing drugs and collectively decided on the best drug under high or low time pressure conditions. Information was distributed to members as a hidden profile such that the information that supported the best drug was unshared before discussion. Correct solution of the hidden profile required members to pool their unshared knowledge. Some groups discussed the drug information from memory (memory condition). Others kept the drug information during discussion, accessing sheets that either indicated which pieces of information were shared and unshared (informed access condition) or did not (access condition). Contrary to predictions, low time pressure groups chose the best drug more often than high time pressure groups. In addition, groups in the informed access condition chose the correct drug more often than groups in the memory and access conditions. Suggestions are offered for why the time pressure results differed from those of Kelly and Karau.

DEDICATION

This work is dedicated to my father and mother, Michael and Sherri Bowman.

Without their love and continued support, I would not have striven
to reach the goals that they helped me believe were within my reach.

I thank them for helping me to grow and mature
in order that I might impact my world
for my Lord and Savior Jesus Christ.

ACKNOWLEDGEMENTS

This work would not have been possible without the
guidance and assistance of the author's advisor,
Dr. Gwen M. Wittenbaum,
to whom a great deal of gratitude is directed.

The author would like to thank Dr. Frank Boster and Dr. Norbert Kerr
for their ideas and comments on all drafts of this work.

The author is deeply indebted to Marge Barkman and Rachel Smith
for their assistance in maintaining the
author's emotional well-being in the office.

The author would also like to acknowledge the work of some
highly motivated undergraduate research assistants:
Mona ElBenni, Kirsten Miller, Leah Quint, Johanna Schulte, and Jenny Strawser

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Groups are formed in organizations, businesses, and educational settings with the hope that they will make better decisions than a single individual. If group members with varied expertise contribute their unique knowledge to discussion, the group may make a more informed decision than any individual. However, research has shown that members of decision-making groups ineffectively pool their unique knowledge. Specifically, groups tend to discuss more shared information that is known by all group members, rather than unshared, unique information that is known to a single member (Gigone & Hastie, 1993; Larson, Foster-Fisherman, & Keys, 1994; Schittekatte & Van Hiel, 1996; Stasser & Stewart, 1992; Stasser, Stewart, & Wittenbaum, 1995; Stasser, Taylor, & Hanna, 1989; Stasser & Titus, 1985, 1987; Stewart & Stasser, 1995). Failure to disseminate unshared information may harm the quality of the group's choice if unshared information is critical for uncovering the best decision alternative (Stasser & Titus, 1985).

Discussing unshared information improves group decisions when information is distributed in the group as a hidden profile (Winquist & Larson, 1998). In a hidden profile, information that supports the optimal decision alternative is largely unshared whereas information that supports the less desirable option is mostly shared. Thus, a hidden profile task requires that group members pool unshared information in order to discover the best option. Research has uncovered factors that reduce groups' bias toward shared

information and improve group decisions on a hidden profile task. For example, when members know one another's expert roles (Stasser et al., 1995), are personally acquainted with each other (Gruenfeld, Mannix, Williams, & Neale, 1996), and think the task is solvable (Stasser & Stewart, 1992), they are more likely to discuss unshared information and thus discover the correct option in a hidden profile. One study showed that when groups have a norm to be critical, they are more likely to value unshared information and thus correctly solve the hidden profile (Postmes, Spears, & Cihangir, 2001). Thus, both discussing and positively evaluating unshared information are critical processes that influence group decision quality.

Most of the factors identified as influential in affecting groups' dissemination of unshared information originate from structural properties of the group, such as member status (Wittenbaum, 1998, 2000), leadership (Larson, Christensen, Abbott, & Franz, 1996; Larson, Christensen, Franz, & Abbott, 1998), and expert roles (e.g., Stasser et al., 1995; Stasser, Vaughan, & Stewart, 2000; Stewart & Stasser, 1995). Few studies have explored how factors originating from outside the group (e.g., time pressure, threat, accountability) affect information sharing and subsequent group decisions in a hidden profile. In one of the few studies to examine the impact of an external input on collective information sharing and decision making, Kelly and Karau (1999) found that the effect of members' initial preferences on their ability to solve a hidden profile depended on the amount of time pressure imposed on the group. When members mildly preferred the sub-optimal decision alternative before discussion,

high time pressure exacerbated these poor choices after discussion relative to low time pressure. Alternatively, when members strongly preferred the less desirable option before discussion, high time pressure tended to help members discover the best option compared to low time pressure. However, these time pressure effects found by Kelly and Karau were weak and unexpected. The purpose of the present study is to clarify when time pressure facilitates or impairs the solution of a hidden profile when members enter discussion strongly preferring the less optimal decision alternative.

Time Pressure in Task-Performing Groups

In theory and research, time pressure is linked to group processes and task performance. In one of the earliest theories of group decision-making, Janis (1972, 1982) proposed that stress (e.g., time pressure, external threats) contributes to groupthink, or poor decision-making in groups. Time pressure is one factor that has been found to cause group member stress (Brown & Miller, 2000; Gladstein & Reilly, 1985). Groupthink occurs when group members focus on maintaining group cohesiveness and solidarity instead of making a good group decision (Janis, 1982). Groupthink is most likely to occur in groups that have high cohesiveness, social isolation, high stress, a directive leader, and poor decision making procedures. These antecedent conditions lead members to engage in such processes as feeling that the group can do no wrong, censoring disagreeing opinions, believing falsely that all members agree, and imposing conformity pressures. These processes result in defective decision-making characterized by an incomplete consideration of alternatives, a failure to fully

examine faults of the favored alternative, a poor search for information, and a failure to develop contingency plans. Decisions resulting from groupthink also display a deterioration of mental efficiency and moral judgment (Janis, 1982). A group that succumbs to groupthink is unable to reasonably consider all possible courses of action and to thoroughly consider the implications of a particular chosen course of action. Recent reformulations of the groupthink model place time pressure as a crucial antecedent of groupthink processes and poor decision quality (Jones & Roelofsma, 2000; Morehead, Ference, & Neck, 1991; Neck & Morehead, 1995).

Empirical investigations of time pressure's effect on group performance and decision quality mirror the groupthink model: time pressure impairs group outcomes. Time pressure reduces group creativity despite members' greater attention to task-related activities and faster work pace (Karau & Kelly, 1992; Kelly & Karau, 1993). Time pressure causes group members to disregard standard decision procedures, which reduces the quality of group decisions (Lehner, Seyed-Solorforough, O'Connor, Sak, & Mullin, 1997). Time scarcity decreases group performance on monitoring tasks (Urban, Weaver, Bowers, & Rhodenizer, 1996) and lowers member perceptions of group efficacy (Durham, Locke, Poon, & McLeod, 2000). Members may assert their agreement more quickly under conditions of such time pressure (Frye & Stritch, 1964), thereby not adequately assessing all possible decision alternatives. When groups work on intellective tasks, time pressure produces a normative influence structure, increasing groupthink tendencies (Kelly, Jackson, & Hutson-Comeaux, 1997). If

decision-making group members enter discussion mildly preferring the less optimal decision alternative, time pressure exacerbates members' inability to discover the best option (Kelly & Karau, 1999). In part, time pressure may harm effective group performance because it makes members defer to the group leader (Brown & Miller, 2000), leads to unequal speaking time among members (Isenberg, 1981), and restricts members' processing of information (Gladstein & Reilly, 1985). High task cohesion may help to prevent the negative impact of time pressure on team performance (Zaccaro, Gualtieri, & Minionis, 1995).

Time pressure may not always have deleterious effects on group processes and performance. Other research has found that product development teams with time pressure do not produce lower quality products than those without time pressure (Sethi, 2000), and mock juries followed similar decision-making processes regardless of different time limits (Kerr, 1981). Some studies call into question the belief that longer discussions result in better group decisions; sit-down meetings (Bluedorn, Turban, & Love, 1999) and instructions to value accuracy (Turner, 1992) resulted in longer discussions but not better group choices. Isenberg (1981) found that time pressure affected equity in speaking turns but did not affect group decision efficiency. Therefore, time pressures often, but not always, reduce group performance outcomes.

The Attentional Focus Model

The Attentional Focus Model (Karau & Kelly, 1992) can explain the varied effects of time pressure on group performance and decision making. Karau and Kelly (1992) argued that time pressure serves to focus group members' attention

to the most salient features of the group interaction and task environment. As group members perceive certain aspects of a task to be more central to completing that task, those features increase in relative salience. Meanwhile, time pressure decreases the relative salience of those features that are less central to the completion of that task. If salient features are not necessary for good performance, then time pressure decreases performance. If salient features are necessary for optimal performance, then time pressure should improve group performance.

When a time constraint is imposed, the Attentional Focus Model (AFM) predicts that the constraint itself and its associated task demands are most likely to be salient features, such that a focus on task completion is probable. Such a focus may encourage a restricted range of environmental features that seem central to the task at hand. Alternatively, when time is abundant, task importance is less salient, resulting in a focus on more social and less task-related activity. Under optimal time conditions, the model shows that a broad range of task-relevant features are most likely to be salient, leading to an increased concern for the quality of the product, a focus on task performance, and a desire for the production of the best group product possible.

With such tenets the AFM serves to explain a mechanism by which time pressure can have both a positive and a negative effect on group outcomes. Moderate levels of time pressure are expected to enhance group performance by causing members to become focused on an appropriate amount of task-relevant cues. High levels of time pressure will have detrimental performance effects due

to a disregard for cues with slight or possible relevance. A lack of time pressure may not be significantly motivating to encourage an attentional focus on task-relevant cues, thus hurting performance quality. Such a model is consistent with early work suggesting an inverted U-shaped function between arousal and performance (Yerkes & Dodson, 1908), such that time pressure may lead to increased performance up to an optimal level, and then become detrimental for subsequent increases in time pressure (Freedman & Edwards, 1988; McGrath, 1976).

Time Pressure in a Hidden Profile Task

The AFM may help to explain the effects of time pressure on group members' ability to solve a hidden profile. Kelly and Karau (1999) found that time pressure either increased or reduced the quality of member choices in a hidden profile depending on the strength of members' initial preferences. In their experiment, members of three-person groups read information about two cholesterol-reducing drugs and collectively determined which one should be marketed by their pharmaceutical company. Group members were told to reach a decision as quickly as possible (*high time pressure*) or were instructed to take as much time as needed (*low time pressure*). The total pool of information supported Drug 2, however members' preference for Drug 1 or Drug 2 was manipulated prior to discussion by varying the information distribution. When group members tended to prefer Drug 2 before discussion (i.e., all information was shared), time pressure enhanced members' ability to choose Drug 2 after discussion. When group members mildly preferred Drug 1 before discussion

(*weak incorrect preference*), time pressure worsened members' ability after discussion to discover that Drug 2 was optimal. Contrary to predictions, when group members strongly leaned toward Drug 1 before discussion (*strong incorrect preference*), time pressure tended to help members discover after discussion that Drug 2 was the best. Consistent with the AFM, time pressure sometimes improved and sometimes hurt the quality of group performance.

Kelly and Karau (1999) attempted to explain their findings using the AFM. According to the AFM, high time pressure should focus members' attention to salient aspects of the task relative to low time pressure, improving performance when those salient features are helpful for effective performance and decreasing performance when those features are deleterious for effective performance. When all information was shared and members leaned toward the correct drug before discussion, the information supporting the preferred drug and against the incorrect drug would have been most salient. Thus, time pressure improved performance. When some information supporting the correct drug was unshared (weak incorrect preference), members' shared information mildly biased them toward the incorrect drug before discussion. Because the shared information that supported the incorrect drug would have been most salient, time pressure made groups less able to determine the correct drug. When all information supporting the correct drug was unshared (strong incorrect preference), Kelly and Karau (1999) expected that group members would find the shared information that supported their incorrect preference to be most salient. Thus, they expected time pressure to worsen members' ability to solve the hidden

profile, when in actuality, time pressure seemed to help these members discover the correct drug. It is possible that time pressure focused members' attention on unshared information, which was particularly diagnostic for solving the hidden profile in the strong incorrect preference condition. However, the findings from the strong incorrect preference condition must be interpreted with caution; the results only approached statistical significance.

At least three limitations associated with Kelly and Karau's (1999) experiment make it difficult to interpret their findings. First, the time pressure manipulation was weak. Group members in the high time pressure condition were told to imagine that they were on a stressful decision-making team where it was essential to come to a decision as quickly as possible. In addition, group members were asked to time themselves and record the discussion length. In the low time pressure condition, members were informed to take as much time as needed. The time pressure in this manipulation was perceived rather than actual time differences. The manipulation check showed that all groups, regardless of condition, perceived little time pressure. It is possible that a stronger time pressure manipulation might have produced a more powerful effect on decision quality when members strongly preferred the incorrect drug.

Second, Kelly and Karau's (1999) time pressure manipulation was confounded with factors such as accountability and task demonstrability. Group members in the high time pressure condition may have felt more accountable for the group decision relative to those in the low time pressure condition because the former were told to imagine that they were going to report the final group

decision to the president of the company. Because accountability can induce more effortful processing of information (e.g. Lerner & Tetlock, 1999), members with high time pressure may have integrated the drug information more carefully and thus solved the hidden profile slightly better than those with low time pressure. In addition, Kelly and Karau's manipulation of time pressure emphasized decision correctness more than the low time pressure induction. As a result, group members with high time pressure, compared to those with low time pressure, may have perceived the task solution as demonstrable- a factor that is known to improve hidden profile solution (Stasser & Stewart, 1992). In sum, high time pressure groups in Kelly and Karau's experiment may have solved the hidden profile slightly better than those with low time pressure because perceptions of accountability and task demonstrability made the former group members more thorough processors of information.

Finally, members relied exclusively on memory to recall information during discussion and determine the correct drug. Thus, the weak time pressure effect in the strong incorrect preference condition may have been due to members' incomplete memories. If high time pressure groups realized the diagnosticity of the unshared information, but were unable to discuss it because of incomplete memory, then the time pressure effect would be weak. If members were given access to information during discussion, then time pressure may help members focus on salient, unshared information, thus improving hidden profile solution. The present experiment attempted to replicate and strengthen the pattern of

findings by Kelly and Karau (1999) in the strong incorrect preference condition by addressing these three limitations.

Overview and Predictions

In the present experiment, members of three-person groups read information about two hypothetical cholesterol-reducing drugs and collectively decided on the best drug under high or low time pressure conditions. A strong incorrect preference was induced before discussion, and access to the drug information during discussion was manipulated. The *memory condition* replicated the Kelly and Karau study; members read the drug profiles and then discussed them from memory. In the *access condition*, members had access to the drug profiles during discussion. In the *informed access condition*, members read drug profiles that had items of unshared information highlighted and had access to these profiles during discussion.

High time pressure was expected to focus members' attention on salient, diagnostic information during discussion. Because the unshared information pointed toward the opposite drug than the one preferred by members, that information should have seemed particularly salient and diagnostic. When members needed to rely on their memories to focus on that unshared information, their inability to recall all unshared information was expected to provide a barrier to high time pressure improving hidden profile solution over low time pressure. Thus, in this condition the findings of Kelly and Karau should have been replicated: high time pressure groups should show a tendency,

though possibly not significant, to solve the hidden profile better than low time pressure groups.

When members have access to information during discussion, then more shared and unshared information will be discussed (Hollingshead, 1996). High time pressure should focus members' attention to salient and diagnostic unshared information, which reveals the correct drug. Because the drug profiles were in front of members during discussion, they could easily identify and discuss the unshared information. Because the low time pressure may not focus group members' attention on salient task cues, these groups may not target unshared information as easily, and therefore were not expected to be as successful in solving the hidden profile. Thus, when members had access to information during discussion, the high time pressure groups were expected to correctly solve the hidden profile more often than low time pressure groups.

When members had informed access, the unshared information was highlighted and available during discussion for all members. This was expected to potentially have the effect of aiding hidden profile solution for both high and low time pressure groups. Essentially, the highlighted unshared information would have made that information the focus of attention for all group members, regardless of their felt time pressure. Alternatively, the time pressure effect on decision quality might be accentuated under informed access. The arousal due to high time pressure might be needed to direct members' attention to that highlighted information. Thus, high time pressure groups may have been the

only ones that benefit from the informed access, causing them to perform better than low time pressure groups.

Method

Participants and Design

The participants in the study were 354 introductory communication students at Michigan State University who participated in exchange for class credit. The study employed a 2 x 3 between-groups design, defined by Time Pressure (high vs. low) and Information Access (memory vs. access vs. informed access). At least fourteen three-person groups were run in each of the six cells of the factorial design. There were 15 groups in the low time pressure-memory cell, 16 groups in the high time pressure-memory cell, 29 groups in the low time pressure-access cell, 30 groups in the high time pressure-access cell, 14 groups in the low time pressure-informed access cell, and 14 groups in the high time pressure-informed access cell.

Drug Profiles

Participants read drug profiles containing information about two hypothetical cholesterol-reducing drugs: Drug A and Drug B. The total pool of information favored Drug B. Overall, Drug A contained 9 positive, 7 neutral, and 12 negative pieces of information, whereas Drug B contained 12 positive, 7 neutral, and 9 negative pieces of information (See Table 1). A sample of student volunteers who read the total pool of information preferred Drug B (82%) to Drug A (18%), χ^2 (df=1, N=49) = 19.61, p<.001. Information was distributed in a hidden profile such that all positive information about Drug B and all negative

information about Drug A was unshared. Thus, in order for groups to discover that Drug B was the best, they needed to disseminate their unshared knowledge. The manifest profile, which contained both shared and unshared information, was the version of the drug profiles that each member read. As shown in Table 1, the manifest profiles should have strongly biased members to prefer Drug A before discussion (i.e., a strong incorrect preference). Indeed, group members who read the manifest profiles before discussion selected Drug A (87%) more often than Drug B (13%), 2 (df=1, N=354) = 190.96, p<.001. Positive and negative information was clearly identified on members' drug profile sheets as benefits and potential problems, respectively (see Appendix A).

Information Access Manipulation

Three levels of information access were created that varied members' access to and informativeness of the manifest drug profiles. The memory condition represented a replication of Kelly and Karau (1999). Members read the drug profiles, returned the information to the experimenter, and discussed the drug information from memory. In the access condition, members read the drug profiles and kept them during discussion. In the informed access condition, members read the same drug profiles as in the other conditions, but immediately prior to discussion, the drug profile sheets were replaced with ones where unshared information was underlined to both identify and increase the salience of that information. Members in this condition were told the following about their drug profiles (see the complete verbal instructions in Appendix B):

The underlined sentences on this sheet are pieces of information that only you know. Other group members do not have access to this information about the two drugs unless you choose to tell them."

Like members in the access condition, members with informed access kept their drug profiles during group discussion. In both access conditions, members were able to share any piece of information from the drug profiles provided that they did not exchange or reveal their information sheets with each other.

Time Pressure Manipulation

The time pressure manipulation deviated from Kelly & Karau's (1999) original manipulation to increase the potency of the induction and unconfound time pressure from other factors. Groups in the high time pressure condition were told the following:

"We would like you to discuss your information and opinions about the two drugs and choose the one drug that is most desirable to market. Group performance will be evaluated based on both accuracy of the decision and the speed with which the decision is made. Groups will be rewarded for quickly coming to a decision that is correct. The fastest groups that correctly choose the best drug will be placed into a lottery. A $60 cash prize, consisting of $20 per member, will be awarded to two different groups that are randomly selected from among the fastest correct groups. So, six $20 prizes will be awarded to individuals at the end of the study based on both speed and accuracy. For this reason, it is very important for

your group to come to the correct decision as quickly as possible. You can use this stop watch to help keep track of how much time has elapsed."

Groups in the low time pressure condition were told the following:

"We would like you to discuss your information and opinions about the two drugs and choose the one drug that is most desirable to market. Group performance will be evaluated based on the accuracy of the group decision. Groups will be rewarded for coming to a decision that is correct. Groups that correctly choose the best drug will be placed into a lottery. A $60 cash prize, consisting of $20 per member, will be awarded to two different groups that are randomly selected from among the correct groups. So, six $20 prizes will be awarded to individuals at the end of the study based on accuracy. For this reason, it is very important for your group to come to the correct decision. But, feel free to take your time on this task. There is no need to rush."

The use of a lottery prize for both high and low time pressure conditions served to equalize across conditions task importance and the member motivation. The emphasis on accuracy for both conditions also helped to ensure that high and low time pressure group members had equivalent perceptions of task demonstrability. This time pressure manipulation was intended to be stronger and less confounded with other factors relative to that used by Kelly & Karau (1999).

Procedure

Pre-discussion Phase. Participants volunteered for a "Drug Marketing Study" in which they played the role of a manager deciding between two drugs to market. Upon arriving at the study, participants were assigned to three-person, mixed-sex groups in a small room. Members were told to place all personal items on a table at the end of the room, including all personal electronic devices (watches, cell phones, pagers, etc.), so that they not serve to distract group members. Each group member sat on one of three sides of a table with a video-camera at the opposite end of the room to record the group discussion. After indicating their consent to participate (see Appendix C), members received a version of the manifest drug profiles (see Appendix A) and general information about cholesterol-reducing drugs (see Appendix D). They were told to read individually the information about the two drugs and subsequently indicate which drug each personally felt was more desirable to market. (see Appendix E) At this point, members in the memory condition returned their drug profiles; All others were allowed to access the drug profiles during discussion.

Discussion Phase. The time pressure manipulation was implemented at this point. Members discussed information about the two hypothetical cholesterol-reducing drugs and chose the better one to market (see Appendix F). Group members were then instructed to inform the experimenter when they completed the task.

Post-discussion Phase. After discussion, group members individually again indicated their preferred drug to market. A final questionnaire measured

members' impressions of the task, other members, and the interaction processes (see Appendix G). Questionnaire items assessed the adequacy of the time pressure and information access manipulations. Participants were also asked about their perceptions of the study (see Appendix H). Finally, participants were debriefed and invited to receive a copy of the results upon completion of the study.

Results

Manipulation Checks

Time Pressure. Ten questionnaire items tested the success of the time pressure manipulation. An exploratory factor analysis using principle components and varimax rotation was conducted. Of these items, three different aspects of time pressure emerged: a quick pace bias, taking one's time, and negative affect. Questionnaire items and factor loadings for all factors are displayed in Table 2. Factor means and standard deviations are displayed in Table 3.

Three items were related to the measure of a quick pace bias: (a) "I tried to help my group finish the task quickly," (b) "My group focused on completing the task to get done faster," and (c) "I felt like my group needed to choose the best drug to market as quickly as possible." Because these three items were highly correlated, a group composite measure was created by equally averaging the three items (Standardized Item $\alpha = 0.86$). Scores on quick pace bias were averaged across members of the group to yield a group-level score. This measure was analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. As expected,

high time pressure groups (M = 7.15, SD = 1.19) reported working at a quick pace more than low time pressure groups (M = 4.63, SD = 1.31), F (1, 112) = 120.04, p < .001, η^2 = 0.47 . The access factor and its interaction with time pressure did not have significant effects on quick pace bias.

Three items were related to taking one's time: (a) "My group took as much time as needed to choose a drug," (b) "My group worked at a relaxed pace," and (c) "My group fully discussed information." Because these three items were highly correlated, a composite measure was created by averaging the three items (Standardized Item α = 0.76). Scores on taking one's time were averaged across members of a group to yield a group-level score. This measure was analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. As expected, low time pressure groups (M = 7.44, SD = 1.07) reported taking their time more than high time pressure groups (M = 6.57, SD = 1.14), F (1, 112) = 18.24, p < .001, η^2 = 0.10 . The access factor and its interaction with time pressure were non-significant.

Four items were related to negative affect: (a) "I felt anxious during group discussion," (b) "I felt stress during group discussion," (c) "I felt time pressure during group discussion," and (d) "I felt that other group members would disapprove if I took too long to come to a decision." Because these four items were highly correlated, a composite measure was created by averaging the four items (Standardized Item α = 0.83). Scores on the negative affect measure were averaged across members of a group to yield a group-level score. This measure

was analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. As expected, high time pressure groups (M = 3.05, SD = 1.14) reported feeling more negative affect during their group discussion than low time pressure groups (M = 2.33, SD = 0.83), F (1, 112) = 15.46, p < .001, η^2 = 0.10.[1] In sum, high time pressure groups felt more rushed, less comfortable working at a relaxed pace, and more time-related stress compared to low time pressure groups.

Access Manipulation. Five items from the post-discussion questionnaire were used to assess the success of the access manipulation. Of those five items, two items tested the success of the memory condition: (a) "I had to rely on my memory to discuss information about the drugs," and (b) "I had to work hard to try to remember the information during discussion." Because these two items were highly correlated (r = 0.60), a composite measure of group scores was created by averaging the two items (Standardized Item α = 0.75). Group scores, computed as the average of member scores on an item, were analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. The memory condition was contrasted against the average of the access and informed access conditions. Memory groups (M = 6.41, SD = 1.25) were significantly more likely to agree with the statements than were access groups and informed access groups (M = 3.54, SD = 1.15), t (115) = 11.15, p < .001, η^2 = 0.54.

One item tested the success of both the access and informed access conditions: "I was allowed to use the drug profile sheet during discussion." Group

scores, computed as the average of member scores, were analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. The average of the access and informed access conditions were contrasted against the memory condition. Access groups and informed access groups ($\underline{M}$ = 8.48, $\underline{SD}$ = 0.89) were significantly more likely to report using the information sheet during discussion than memory groups ($\underline{M}$ = 1.31, $\underline{SD}$ = 0.56), $\underline{t}$ (115) = 40.89, $\underline{p} < .001$, $\eta^2 = 0.94$.

Two items tested the success of the informed access condition: (a) "Some pieces of information were underlined on the drug profile sheet," and (b) "I knew exactly which pieces of drug information I knew that others did not." Because these two items were highly correlated (r = 0.54), a composite measure of scores was created by averaging the two items (Standardized Item α = 0.70). Group scores, computed as the average of member scores, were analyzed in a time pressure (high vs. low) by access (memory vs. access vs. informed access) between-groups factorial ANOVA. The informed access condition was contrasted against the average of the memory and access conditions. Informed access groups ($\underline{M}$ = 7.84, $\underline{SD}$ = 0.85) were significantly more likely to agree with the statements than were memory and access groups ($\underline{M}$ = 3.56, $\underline{SD}$ = 1.05), $\underline{t}$ (115) = 19.36, $\underline{p} < .001$, $\eta^2 = 0.77$. Therefore, each aspect of the access manipulation was successful.

Member Preferences and Group Choices

Pre-discussion Preferences. Directly after reading the drug information but before any manipulation was induced, members were given the opportunity to

privately indicate which drug they most preferred. The percentage of members who chose the correct drug (Drug B) was submitted to a Time Pressure (high vs. low) X Access (memory vs. access vs. informed access) logistic regression. No significant effects were found (see Table 4).

Post-Discussion Preferences. The percentage of members who picked the correct drug after discussion was analyzed in a logistic regression as a function of Time Pressure (high vs. low) and Access (memory vs. access vs. informed access). Members in the low time pressure condition were more likely to choose the correct drug than those in high time pressure groups, χ^2 (df=1, N=340) = 11.197, p<.001 (See Table 3). Also, there was a main effect of access on post discussion preferences, χ^2 (df=2, N=340) = 24.363, p<.001. Members in the access condition were more likely to choose the correct drug than those in the memory condition, χ^2 (df=1, N=257) = 8.67, p<.005. Members in the informed access condition were also more likely to choose the correct drug than those in the memory condition, χ^2 (df=1, N=172) = 24.38, p<.001. Additionally, members in the informed access condition were more likely to choose the correct drug than those in the access condition, χ^2 (df=1, N=251) = 7.76, p<.01. The interaction between time pressure and access was not significant.

Group Choices. The percentage of groups that chose the correct drug was analyzed in a logistic regression as a function of Time Pressure (high vs. low) and Information Access (memory vs. access vs. informed access). It was expected that high time pressure groups would be more likely to solve the hidden profile than low time pressure groups overall, but this effect would emerge largely

in the access condition, possibly in the informed access condition, and marginally so in the memory condition. That is, an interaction between time pressure and access was expected. However, only the two main effects proved significant. A main effect emerged for time pressure. Groups in the low time pressure condition were more likely to choose the correct drug than were high time pressure groups, χ^2 (df=1, N=118) = 4.277, p<.05 (See Table 3). Also, there was a main effect of access, χ^2 (df=2, N=118) = 9.065, p<.003. Groups in the memory and access conditions were equally likely to choose the correct drug, χ^2 (df=1, N=59) = 2.11, n.s. Informed access groups, however, were more likely to choose the correct drug than memory groups, χ^2 (df=1, N=59) = 8.93, p<.01, and access groups, χ^2 (df=1, N=87) = 4.22, p<.05.

Even though the interaction between time pressure and access was non-significant, χ^2 (df=2, N=118) = 1.95, n.s., the hypothesis tests require comparing the percentage of high versus low time pressure groups that chose the correct drug at each level of access. When groups were in either the memory or informed access condition, high and low time pressure groups were equally likely to choose the correct drug, χ^2 (df=1, N=31) = .0078, n.s. and χ^2 (df=1, N=28) = 2.33 , n.s. respectively. However, when groups were in the access condition, they were marginally more likely to choose the correct drug under conditions of low time pressure, χ^2 (df=1, N=59) = 3.06, $p < 0.10$. Thus, the difference, between high and low time pressure groups, in ability to determine the correct drug was most visible in the access condition, as expected. However, the

direction of the difference was opposite from expected, with high time pressure groups underperforming relative to low time pressure groups.

Group Discussion

To determine whether the independent variables affected group discussion, discussion length and self-reported discussion content were analyzed. To assess discussion length, the author and a coder blind to hypotheses independently timed (in seconds) each discussion from the videotaped interactions. Discussion length was analyzed in a Time Pressure (high vs. low) by Access (memory vs. access vs. informed access) between-groups factorial ANOVA. Not surprisingly, low time pressure groups ($M = 714.67$, $SD = 451.97$) took significantly longer to reach a decision that did high time pressure groups ($M = 218.32$, $SD = 204.11$), $F(1, 112) = 59.77$, $p < .001$, $\eta 2 = 0.34$. The main effect of access also was significant, $F(2, 112) = 5.97$, $p < .005$, $\eta 2 = 0.06$. Groups in the memory condition ($M = 303.8$ minutes) took significantly less time to discuss the drug information as compared to the access condition ($M = 476.7$ minutes), $F(1, 112) = 5.28$, $p < .01$, $\eta 2 = 0.05$, and informed access condition ($M = 607.5$ minutes), $F(1, 112) = 11.72$, $p < .005$, $\eta 2 = 0.10$. There was no significant difference between the informed access and access conditions, $F(1,112) = 2.78$, n.s. In addition, the proportion of correct group decisions was positively correlated with discussion length (Pearson's $r = .368$, $p<.01$). These results suggest that groups that were most likely to select the correct drug (i.e., those in the informed access condition and those with low time pressure) spent the most time discussing the drug information.

Discussion of shared and unshared information was inferred from two items on the post-discussion questionnaire: (a) "Our group discussion focused on information all members knew in common," and (b) "Our group tried to discuss each member's unique information." Because these two items were highly negatively correlated ($r = -0.49$), a composite measure of scores was created by reverse scoring the second item and then averaging the resulting two items (Standardized Item $\alpha = 0.66$). Group scores, computed as the average of member scores, were analyzed in a Time Pressure (high vs. low) by Access (memory vs. access vs. informed access) between-groups factorial ANOVA. High time pressure groups ($M = 3.69$, $SD = 1.49$) reported focusing on shared information more than low time pressure groups ($M = 2.79$, $SD = 0.98$), $F(1, 118) = 15.27$, $p < .001$, $\eta 2 = 0.10$. There was also a main effect for access, $F(1, 118) = 10.55$, $p < .001$, $\eta 2 = 0.14$. Groups in the memory condition ($M = 4.03$, $SD = 1.37$) reported focusing on shared information more as compared with groups in the access condition ($M = 3.12$, $SD = 1.29$), $F(1, 112) = 11.78$, $p < .01$, $\eta 2 = 0.10$, and informed access condition ($M = 2.65$, $SD = 1.00$), $F(1, 112) = 19.77$, $p < .005$, $\eta 2 = 0.25$. Indeed, the proportion of correct group decisions was negatively correlated with members' self reports of a focus on shared information (Pearson's $r = -.436$, $p<.01$). These results suggest that groups that were least likely to select the correct drug (i.e., those in the memory condition and those with high time pressure) were most likely to report focusing discussion on shared information.

Discussion

Time pressure affected group decision-making quality, however, the effect was opposite from expected.[2] Instead of time pressure enhancing group members' ability to solve a hidden profile when they strongly preferred the wrong alternative (as found by Kelly and Karau, 1999), the present study showed that time pressure impaired hidden profile solution. Groups that experienced high time pressure engaged in shorter discussions about the decision alternatives and reportedly focused discussion on shared information more than groups with low time pressure. These factors likely were mechanisms producing the poorer performance in high time pressure groups. These results mirror a large body of research and theory suggesting that time pressure hurts effective group decision-making processes and performance.

Access to information during discussion did not moderate time pressure's effect on group decision quality. Instead, informational access affected group decisions independent of time pressure. Group members who could view information about decision alternatives during discussion solved the hidden profile better than those who needed to rely on memory to discuss the information, but only when such access also identified pieces of information as shared and unshared. Simply accessing the drug information during discussion without learning additionally which items were shared and unshared failed to improve group decisions above group members who discussed information solely from memory. This finding is consistent with that of Hollingshead (1996), who showed that access to information during discussion increased the

mentioning of both common and unique information but did not improve group decision quality above groups who relied on memory to discuss information. Hollingshead concluded that access to information during discussion does not improve hidden profile solution. The present research suggests a refinement of her original conclusion. Informational access does help group members discover the optimal alternative in a hidden profile task but only when such information is additionally identified as known by all members or uniquely known by the self. Under such conditions, members reportedly focused less on shared information during discussion relative to group members who discussed information from memory.

There are at least three reasons why the present experiment results diverge from those of Kelly and Karau (1999). First, Kelly and Karau may have confounded time pressure with accountability – a factor that increases cognitive vigilance in processing information (e.g., Lerner & Tetlock, 1999). Because high time pressure groups in their study imagined reporting the group decision to a hypothetical company president, such groups may have felt more accountable for defending the group choice compared to low time pressure groups. In order to test whether the present time pressure manipulation varied accountability, two items were included on the postdiscussion questionnaire: (a) "I felt a need to defend why our group picked the drug that it did," and (b) "I felt personally responsible for the group's decision." Because these two items were correlated ($r = 0.48$), a composite measure of scores was created by averaging the two items (Standardized Item $\alpha = 0.65$). Group scores, computed as the average of

member scores, were analyzed in a Time Pressure (high vs. low) by Access (memory vs. access vs. informed access) between-groups factorial ANOVA. As expected, time pressure did not affect perceptions of accountability, $\underline{F}$ (1, 112) = 2.17, n.s. If Kelly and Karau's high time pressure groups did feel more accountable than those with low time pressure, this may explain why the former groups in their study slightly outperformed the latter. When time pressure and accountability are unconfounded, low time pressure groups may outperform high time pressure groups even when members strongly prefer the wrong decision alternative.

Second, Kelly and Karau may have confounded time pressure with perceptions of task demonstrability – a factor that improves hidden profile solution (e.g., Stasser & Stewart, 1992). Decision correctness was emphasized more in their high time pressure groups relative to low time pressure groups. In order to test whether the present time pressure manipulation varied task demonstrability, two items were included on the postdiscussion questionnaire: (a) "There was a right answer to the drug marketing task," and (b) "The best drug to market was a matter of opinion." Because these two items were highly negatively correlated ($r = -0.63$), a composite measure of scores was created by reverse scoring one item and averaging the two items (Standardized Item $\alpha = 0.78$). Group scores, computed as the average of member scores, were analyzed in a Time Pressure (high vs. low) by Access (memory vs. access vs. informed access) between-groups factorial ANOVA. As expected, time pressure did not affect perceptions of task demonstrability, $\underline{F}$ (1, 112) = 2.01, n.s. If Kelly and

Karau's high time pressure groups did perceive the task solution to be more demonstrable than those with low time pressure, this may explain why the former groups in their study slightly outperformed the latter. When time pressure and task demonstrability are unconfounded, low time pressure may help members with a strong incorrect preference to discover the solution to a hidden profile better than high time pressure.

Third, the current experiment may have found different results from that of Kelly and Karau (1999) because the present time pressure manipulation was stronger than theirs. Kelly and Karau's time pressure manipulation check showed only small differences between the perceptions of those with high and low time pressure. In their experiment, all groups felt relatively little time pressure, and high and low time pressure groups did not differ in felt stress. Alternatively, in the present experiment, nearly half of variation in desire to work quickly was explained by the time pressure induction, and high time pressure groups felt more stress and anxiety compared to low time pressure groups. In Kelly and Karau's experiment, low time pressure groups marginally discussed information longer than high time pressure groups, whereas 34% of variation in discussion length in the present experiment was explained by low time pressure groups discussing information longer than high time pressure groups. This evidence suggests that the time pressure manipulation in the present experiment was a more potent induction than that used by Kelly and Karau. The stronger manipulation paired with unconfounding time pressure from felt accountability and task demonstrability may have produced the opposite results from theirs:

low time pressure groups outperform high time pressure groups when members strongly prefer the incorrect preference in a hidden profile task.

Limitations

The present study suffers from at least two limitations. First, discussion content was inferred from group members' self-reports of amount of shared and unshared information discussed. Members of groups with high time pressure and those that relied on memory to discuss the drug information reported the most discussion focus on shared information. The self-report findings are consistent with the group decision results – groups that were most likely to focus on shared information were least likely to solve correctly the hidden profile. It is best, however, to validate the accuracy of these self-reports by content coding the information discussed from recorded interactions. Coding the content of discussions may also reveal group members' reliance on relational versus task behaviors. Past research suggests that high time pressure encourages group members to focus on task-related activity (Karau & Kelly, 1992; Kelly & Karau, 1993). A content analysis may unveil whether the performance of high time pressure groups suffered in spite of increased task behaviors or because of decreased task activity.

Second, the time pressure and informational access manipulations in the present experiment may have unintentionally induced perceived task difficulty. Members of low time pressure groups and group members with informed access reported stronger agreement with the statement, "I found it difficult to come to an agreement with group members" relative to members in other conditions (Time

pressure main effect: F (1, 112) = 7.02, $p < 0.01$, $\eta^2 = 0.05$; Access main effect: F (1, 112) = 3.56, $p < 0.05$, $\eta^2 = 0.05$). It is possible that because these members felt that the task was more difficult, they increased their effort on the task, which influenced them to effectively share information and discover the correct decision alternative. However, responses to the question, "I tried to perform well on the task" yielded no effects of time pressure, informational access, or their interaction. Therefore, correct solution of the hidden profile may have been aided by higher perceptions of task difficulty, but not because such perceptions affected task motivation.

Future Directions

One of the difficulties in comparing the effects of time pressure in groups across different experiments is the variation in time pressure inductions. Time pressure has been induced by encouraging group members to simulate having to rush or take time completing the group task (e.g., Kelly & Karau, 1999). Other studies have created a real time limit by varying the amount of time group members have to complete the task (e.g., Karau & Kelly, 1992). Variation in the effects of time pressure on group decision-making may be due, in part, to the disparate methods of inducing time pressure. It may be helpful to identify the key elements of time pressure (e.g., pace, stress) and ensure appropriate inductions of this construct. Also, caution may be advised in comparing the results of experiments using different time pressure inductions. Understanding which types of time pressure inductions produce particular effects will assist in unifying the literature on time pressure in task groups.

Additionally, theoretical integration will help to unify disparate research findings related to time pressure in groups. Karau and Kelly (1992) offered the AFM as a theory to explain the effects of time pressure on group processes and performance. According to the AFM, high time pressure should focus group members' attention on salient features of the task. In a hidden profile task where members strongly prefer the wrong decision alternative, Kelly and Karau (1999) predicted that shared information (which supports the wrong alternative) should be particularly salient. However, the fact that their high time pressure groups slightly outperformed the low time pressure groups suggests that unshared information was more salient. In the present experiment, high time pressure groups reported focusing more on shared information than low time pressure groups, and consequently were less likely to determine the correct solution to a hidden profile task. The AFM can explain both the results of Kelly and Karau and those of the present experiment: group members in the former experiment found unshared information salient, whereas group members in the present experiment found shared information salient. The model is limited when faced with predicting with precision which features of the task group members will find salient. With some refinement, the AFM may offer more precise predictions about which task features group members will find salient as a function of felt time pressure.

Footnotes

[1] The effect of access on negative affect also was significant F (2, 112) = 3.37, $p < .05$, $\eta^2 = 0.05$. Groups in the informed access condition (M = 3.10, SD = 1.04) were significantly more likely to agree with the statements for negative affect than were groups in the access condition (M = 2.60, SD = 1.02) , F (1, 112) = 5.59, $p < .05$, $\eta^2 = 0.05$, and memory condition (M = 2.51, SD = 1.08), F (1, 112) = 5.66, $p < .05$, $\eta^2 = 0.08$. The informed access groups were the only ones that received new information immediately preceding discussion. In retrospect, it seems that the demands to process the new, underlined information added some stress and anxiety to members in this condition, relative to those in the memory and access conditions. The access induction, however, did not affect measures directly related to members' desire to work quickly or take time. Thus, it does not seem that the access manipulation inadvertently induced felt time pressure.

[2] The discussion section focuses on group decisions rather than post-discussion preferences because the former were of interest in the present study. Because the pattern of post-discussion preferences was similar to that of group decisions, the conclusions would not change with a focus on post-discussion preferences.

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Appendix A: Manifest Drug Profiles

Manifest Profile 1: Drug A Information

Background Information

1. Your marketing team has suggested selling Drug A under the name Abaline.
2. Drug A would probably be delivered to distribution sites from the main factories by truck or train.
3. Drug A will be manufactured in an area convenient to a major airport.
4. One of the ways sales representatives will attempt to market Drug A is through direct contact with drug store managers.
5. Drug A should be taken with food or milk to reduce the chance of stomach upset.
6. Drug A would most likely be produced in 300 or 600 mg tablets.
7. Drug A appears to be more effective when combined with sensible dietary practices.

Benefits

1. Drug A appears to be especially effective in quickly reducing cholesterol levels that are particularly high (above 330 mg).
2. Drug A was shown to be effective in as few as 2-3 weeks.
3. The New Pharmaceutical Research Association (NPRA) has recognized Drug A as having great potential.
4. In one two-month study, it was discovered that Drug A appears to reduce the severity of pain for chronic headache sufferers.
5. Drug A has been shown to increase alertness and energy level for patients aged 50 and older.
6. Drug A appears to be especially effective for elderly patients.
7. Foreign pharmaceutical companies have expressed a great deal of interest in purchasing a marketing share in Drug A.

Potential Problems

1. Drug A interacts with a wide variety of other prescription drugs, often in undesirable and unpredictable ways.
2. Your legal department advises you that if toxic effects are found for long-term human usage of Drug A, the company that produces the drug could be legally liable.
3. Drug A has been found to raise blood pressure in some patients.
4. Drug A is expensive to produce.

Manifest Profile 1: Drug B Information

Background Information

1. Your marketing team has suggested selling Drug B under the name Xinine.
2. Drug B will be marketed mainly to American Citizens.
3. Drug B would most likely be produced in the form of gel caplets.
4. Drug B will be marketed through samples given to family care and cardiology practices.
5. Drug B must be produced in a humidity-free environment.
6. A health magazine of limited circulation plans to run a story on Drug B.
7. Drug B will likely be packaged with a label warning the product should not be taken in conjunction with alcohol.

Benefits

1. Drug B may reduce the chance of breast cancer in women.
2. Insurance company representatives have said they would consider covering Drug B.
3. The board of trustees of your company would like to donate a certain, small percentage of the proceeds of Drug B to national charities.
4. Drug B has been approved and circulated in England.

Potential Problems

1. Patients below the age of 55 should not use Drug B because some of its ingredients could lead to serious liver problems.
2. People who live in warmer climates had more severe side effects from Drug B than in colder climates.
3. Drug B must be shipped very carefully, because heat can cause it to break down; therefore, shipping costs are high for Drug B.
4. People who have weak immune systems should not take Drug B for fear of severe susceptibility to infections such as Pneumonia and Meningitis.
5. 20% of patients who take Drug B experience moderate temporary hair loss.
6. Drug B will likely be marketed without child resistant caps because adults and the elderly will primarily use it.
7. Some human subjects have shown a mild dependency on Drug B.

Manifest Profile 2: Drug A Information

Background Information

8. Your marketing team has suggested selling Drug A under the name Abaline.
9. Drug A would probably be delivered to distribution sites from the main factories by truck or train.
10. Drug A will be manufactured in an area convenient to a major airport.
11. One of the ways sales representatives will attempt to market Drug A is through direct contact with drug store managers.
12. Drug A should be taken with food or milk to reduce the chance of stomach upset.
13. Drug A would most likely be produced in 300 or 600 mg tablets.
14. Drug A appears to be more effective when combined with sensible dietary practices.

Benefits

8. Drug A appears to be especially effective in quickly reducing cholesterol levels that are particularly high (above 330 mg).
9. Drug A was shown to be effective in as few as 2-3 weeks.
10. The New Pharmaceutical Research Association (NPRA) has recognized Drug A as having great potential.
11. In one two-month study, it was discovered that Drug A appears to reduce the severity of pain for chronic headache sufferers.
12. Drug A has been shown to increase alertness and energy level for patients aged 50 and older.
13. Drug A appears to be especially effective for elderly patients.
14. Experts believe that the risk of potential liability suits is low for Drug A.

Potential Problems

5. Out of 11 beagles that were given daily doses of Drug A for a six-month period, 2 developed degenerative liver disease.
6. Drug A has a limited number of people who are potential consumers.
7. Side effects such as insomnia and rapid heartbeat have been associated with Drug A.
8. Patients who have had a recent heart attack cannot use Drug A.

Manifest Profile 2: Drug B Information

Background Information

8. Your marketing team has suggested selling Drug B under the name Xinine.
9. Drug B will be marketed mainly to American Citizens.
10. Drug B would most likely be produced in the form of gel caplets.
11. Drug B will be marketed through samples given to family care and cardiology practices.
12. Drug B must be produced in a humidity-free environment.
13. A health magazine of limited circulation plans to run a story on Drug B.
14. Drug B will likely be packaged with a label warning the product should not be taken in conjunction with alcohol.

Benefits

5. In a three-month test of Drug B using 23 humans, cholesterol levels dropped 33% and there were no reports of toxic side effects.
6. Government contacts have indicated that Medicaid may cover Drug B.
7. Drug B is inexpensive to produce.
8. The potential for immediate and early profit from Drug B is very strong.

Potential Problems

8. Patients below the age of 55 should not use Drug B because some of its ingredients could lead to serious liver problems.
9. Animal rights activists have already been picketing Drug B's research center.
10. Drug B must be shipped very carefully, because heat can cause it to break down; therefore, shipping costs are high for Drug B.
11. People who have weak immune systems should not take Drug B for fear of severe susceptibility to infections such as Pneumonia and Meningitis.
12. 20% of patients who take Drug B experience moderate temporary hair loss.
13. Some human subjects have shown a mild dependency on Drug B.
14. Drug B will likely be marketed without child resistant caps because adults and the elderly will primarily use it.

Manifest Profile 3: Drug A Information

Background Information

15. Your marketing team has suggested selling Drug A under the name Abaline.
16. Drug A would probably be delivered to distribution sites from the main factories by truck or train.
17. Drug A will be manufactured in an area convenient to a major airport.
18. One of the ways sales representatives will attempt to market Drug A is through direct contact with drug store managers.
19. Drug A should be taken with food or milk to reduce the chance of stomach upset.
20. Drug A would most likely be produced in 300 or 600 mg tablets.
21. Drug A appears to be more effective when combined with sensible dietary practices.

Benefits

15. Drug A appears to be especially effective in quickly reducing cholesterol levels that are particularly high (above 330 mg).
16. Drug A was shown to be effective in as few as 2-3 weeks.
17. The New Pharmaceutical Research Association (NPRA) has recognized Drug A as having great potential.
18. In one two-month study, it was discovered that Drug A appears to reduce the severity of pain for chronic headache sufferers.
19. Drug A has been shown to increase alertness and energy level for patients aged 50 and older.
20. Drug A would likely be advertised nationally.
21. Drug A appears to be especially effective for elderly patients.

Potential Problems

9. The president of the American Medical Association has suggested that your company not market Drug A without further testing.
10. Drug A causes heightened sun-sensitivity in 43% of the patients.
11. A consumer advocate publicly criticized Drug A on a nationally televised talk show.
12. Two out of 100 human patients who took Drug A for a fourteen-month period developed cataracts.

Manifest Profile 3: Drug B Information

Background Information

15. Your marketing team has suggested selling Drug B under the name Xinine.
16. Drug B will be marketed mainly to American Citizens.
17. Drug B would most likely be produced in the form of gel caplets.
18. Drug B will be marketed through samples given to family care and cardiology practices.
19. Drug B must be produced in a humidity-free environment.
20. A health magazine of limited circulation plans to run a story on Drug B.
21. Drug B will likely be packaged with a label warning the product should not be taken in conjunction with alcohol.

Benefits

9. Drug B has been shown to improve the facial complexion of patients.
10. A daily capsule of Drug B has been shown to lessen the frequency and severity of angina (chest pains) and reduces a patient's dependency on nitroglycerin.
11. Drug B provides 100% US Recommended Daily Allowances of 5 essential vitamins.
12. If Drug B is marketed as preventative, at least 100 million people could be targeted as potential customers, a greater market than any other drug currently being produced.

Potential Problems

15. Patients below the age of 55 should not use Drug B because some of its ingredients could lead to serious liver problems.
16. Drug B must be shipped very carefully, because heat can cause it to break down; therefore, shipping costs are high for Drug B.
17. A well-respected research scientist published an article in the New England Journal of Medicine criticizing research conducted on the effectiveness of Drug B.
18. People who have weak immune systems should not take Drug B for fear of severe susceptibility to infections such as Pneumonia and Meningitis.
19. 20% of patients who take Drug B experience moderate temporary hair loss.
20. Some human subjects have shown a mild dependency on Drug B.
21. Drug B will likely be marketed without child resistant caps because adults and the elderly will primarily use it.

Appendix B: Procedure and Verbal Instructions

Drug Marketing Study
Brief Procedure

Step 1: Introduction

-Three-Person Groups
-Informed Consent

Step 2: Silent Reading

-Background Sheet
-Drug Profile
-Pre-discussion Questionnaire

Step 3: Group Discussion

-Time Pressure Induction
-Begin Videotape Recording
-Group Ballot

Step 4: Post-Discussion

-Post-Discussion Questionnaire

Step 5: Member Perceptions

-Perceptions Questionnaire

Step 6: Debriefing

-Information Sheet
-Credit Sheet

Drug Marketing Study

Verbal Instructions

Step 1: Introduction

Step 2: Silent Reading

"Today you'll play the role of marketing managers of a large pharmaceutical company. In groups, you will discuss information about two hypothetical cholesterol-reducing drugs and decide which one your company should market."

Please read the background information about cholesterol and heart disease and then read the descriptions of the two drugs. Some of the information you will read about the drugs will only be known by you. After you read the information about those drugs, please fill out the Pre-discussion Questionnaire.

Access and Informed Access: "Please read carefully the information about the drugs. You will be able to keep these sheets when you are working in your groups."
Memory: "Please read carefully the information about the drugs. You won't have these sheets during the group discussion, so you will need to remember the information."

Please do not talk during this part of the experiment. When you are done, please sit quietly until everyone has finished and I come back to the room. Do you have any questions?"

- Collect Informed Consent Form.
- Hand out Drug Background Sheet.
- Hand out Drug Profiles by condition.
- Hand out Pre-Discussion Questionnaire.

"Please discuss the information about the two hypothetical drugs. Your group task is to choose which of the two drugs is best to market. When you have made your decision, please indicate it on your group ballot by writing directly on that ballot."

Access: "You may tell others anything on your information sheet, but you may not show your sheet to others."

Informed Access: "The underlined sentences on this sheet are pieces of information that only you know. Other group members do not have access to this information about the two drugs unless you choose to tell them. You may tell others anything on your information sheet, but you may not show your sheet to others.

High Time Pressure: "During your discussion, we would like to simulate the pressures and stress often experienced by everyday business decision-making teams. Therefore, we would like you to imagine that the president of your company has called a surprise meeting and has demanded that your group report its final decision about what drug to market at this meeting. For this reason, it is very important for your group to come to a decision as quickly as possible. Also, I need one volunteer to time the group discussion using this stopwatch."

Low Time Pressure: "You will have as much time as you need to complete this group discussion task."

When you have finished the group discussion and have chosen what you think is the best drug, please come out of the room and let me know. Do you have any questions?"

- Collect Background Information
- Collect Pre-discussion Questionnaire
- Collect Drug Profiles for the Memory condition and Informed Access condition
- Hand out underlined Drug Profiles for the Informed Access condition
- Hand out Group Ballot
- Pass out Stopwatch by condition
- Start Videocamera
- Record Group #

Step 4: Post-Discussion

"This questionnaire has questions about your impressions of the drugs, the task, and the group members. Please place all of your answers on the scantron sheet. Please don't write on the questionnaire. All the ratings that you will make are on a scale from 1-9, so please ignore the #10 option on your scantron. Please let me know if you have any questions. When you have finished, please sit quietly until I return."

- Collect all materials
- Pass out Post-discussion questionnaire
- Pass out scantron CODED FOR MEMBER AND GROUP NUMBER.

Step 5: Member Perceptions

"Sometimes people think they know what the study is about and it affects their responses. Please write directly on this sheet and tell us your perceptions of the purpose of the study. When you have finished, please sit quietly until I return."

- Collect all materials.
- Hand out Perceptions Questionnaire

Step 6: Debriefing

"Thank you very much for participating in this study. This sheet should answer questions that you have about the study. It is yours to keep, and it gives a little bit of information about the background of this experiment. Also, this credit sheet is the only proof that you have that you participated in the study; please give it to your COM 100 TA for credit. If you would like to receive the results of the study once data collection is completed, please place your email address on this sheet."

- Collect Perceptions Questionnaire
- Hand out Information Sheet
- Hand out green Credit Sheet
- Hand out email list.

Appendix C: Informed Consent Form

Drug Marketing Study

Informed Consent

Welcome to the DRUG MARKETING study. In this study, we would like you to determine what particular drug a pharmaceutical (drug) company should market. You will read pieces of information about two hypothetical cholesterol-reducing drugs and discuss the drugs in groups. During this discussion, you will be asked to determine which of two possible drugs you would prefer to market if you were the marketing manager of a large pharmaceutical company.

Group discussions will be videotaped so that we know what you talked about. Because your identity will be apparent from the recordings, the tapes will be kept under lock and key, only to be viewed by the principle investigator and research assistants. You may opt to work on the group task individually, with no discussion, for the same amount of class credit. If you participate in the study, your privacy will be protected to the maximum extent allowable by law.

Full participation in this study will take 1 hour or less, and you will be given 1 hour of credit in your communication course. Although participation in this study is not expected to produce discomfort or stress, please note that you may refuse to answer certain questions or withdraw from the experiment at any time without penalty. If you do choose to withdraw before the end of the experiment, you will receive credit for the amount of time that you participate (e.g. 1/2 hour credit for 30 minutes of participation). The experimenter can answer any questions you have about the study to help you choose whether to participate. Contact Jonathan Bowman (phone: 353-7252; office: 455 CAS) if you have any further questions or concerns regarding this study. Additionally, concerns about the rights of human participants in this study may be addressed to Ashir Kumar, Chair of the University Committee on Research Involving Human Subjects, at (517) 355-2180.

Thank you,

Jonathan Bowman

If you have read the description of the research procedures involved in the DRUG MARKETING study and feel that the procedures have been explained to your satisfaction, please indicate your voluntary participation in the DRUG MARKETING study to receive course credit by completing the information below.

_____ _____

Your Signature Today's Date

_____

Your Printed Name

Appendix D: Background Information

Drug Marketing Study

Introduction and Fact Sheet

Introduction

In this study, we would like you and your group to determine what particular drug a pharmaceutical (drug) company should market. In the following questionnaire, you will read information about two hypothetical drugs and determine which to market if you were the marketing manager of a large pharmaceutical company. The drug facts on this questionnaire pertain to a drug that is meant to reduce cholesterol.

In most "real-world" drug marketing teams, some members know information that other members do not know. Some members may work in different departments within an organization and have access to different information, while another member may know more about a certain drug or different aspects of all the drugs depending on what they do within that organization. Additionally, there is typically a great deal of information about each drug within a pharmaceutical organization. As such, different people may tend to focus on different types of information about the drugs depending on their interest, expertise, or job description. To simulate such a situation, some of the information you will read about the drugs will only be known by you. Likewise, other group members will also know some drug information that you do not know. However, the total amount of information will be the same for each member of your group. Later in this study, you will discuss this information about the two different cholesterol drugs with other group members.

As you probably know, Americans today are very concerned with managing their health in general and with maintaining low cholesterol levels in particular. The following information is provided to you to help you in understanding the implications of the more "technical" drug facts.

General Information

Over one-half million people in the U.S. are killed by heart disease each year. Many factors contribute to raising an individual's risk of heart disease. Elimination of any single risk factor will not, in and of itself, prevent heart disease. Fortunately, individuals can reduce the chances of becoming heart disease victims by reducing the number of risk factors in their lives. For example, they can quit smoking, eat a low cholesterol diet, maintain a proper weight, and exercise regularly. Nevertheless, although these behaviors will all reduce the level of risk, there is no guarantee that such behaviors will necessarily prevent heart disease.

Arteries carry blood from the heart to the rest of the body. If the walls of the arteries become thickened, then the passageway is narrowed and it is harder for blood to pass through. When the arteries are abnormally narrowed in this way, the heart must work much harder to continue circulating blood through the body. Atherosclerosis is a disease in which an artery becomes dangerously narrowed by fatty (lipid) deposits in its inner walls. Sometimes, a lump of this fatty deposit, or a blood clot which has formed around it, will break away and travel through the arterial system until the artery becomes too narrow to let it pass any further. Because cells need a continuous supply of oxygen

from fresh blood in order to survive, any blockage in an artery will cause a number of cells to die. If the blocked artery was feeding the brain, a stroke will occur. If the blocked artery was feeding the heart muscle, a heart attack will occur. Atherosclerosis is a major cause of heart disease. Furthermore, a high level of cholesterol is a major cause of atherosclerosis.

For many years, scientists have known that there is a very high correlation (strong relationship) between heart disease and high blood cholesterol (serum cholesterol) levels. A recent long term study by the National Heart, Lung, and Blood Institute (NHLBI) studied the beneficial health effects of reducing cholesterol levels in 3,806 men between the ages of 35 and 59. All of these men had abnormally high cholesterol levels of 265 mg per deciliter of blood or above. When these men were able to reduce their cholesterol levels by 25% their risk of heart disease was cut by 50%. The greater the drop in cholesterol the lower the incidence of both fatal and nonfatal heart attacks over a seven to ten year period.

Research shows that 25% of U.S. men and women need to lower their blood cholesterol. Dr. Rifkind, director of NHLBI, suggests that if one's cholesterol level is above 240 to 250, they should attempt to reduce it. Both Dr. Rifkind and Dr. Kliman, a cardiologist in East Lansing, suggest that people should attempt to reduce their cholesterol levels by changing their diet first, and should resort to drug therapy only if repeated attempts at a dietary change are not successful in reducing cholesterol levels. Dr. Kliman, for example, will try to reduce cholesterol levels by means of drugs (provided dietary changes are not successful) if the patient's cholesterol level is consistently above 300 mg.

Cholesterol is a fat-soluble alcohol $C_{27}H_{45}0H$, present in body cells and animal fats and tissues. As noted above, controlling one's dietary intake can contribute to reducing one's cholesterol level. However, 70 to 80% of one's cholesterol is manufactured by the body itself, mainly in the liver. This is the major reason that researchers have tried to develop a drug that can assist a dietary program in lowering cholesterol levels. Of course, the liver is a very important organ in the body and should not be tampered with haphazardly. Therefore, before any cholesterol-lowering drug can be placed on the market, great care must be taken to insure that the drug does not have any negative effects on the liver, or any other part of the body. Researchers, by means of rigorous scientific tests, must conclude that the drug is safe before it can be released to the public. Potentially harmful effects are especially important to consider if the drug actually blocks production of cholesterol in the body.

Another approach to lowering cholesterol levels might be to develop a drug that would help the body excrete body cholesterol. Perhaps this could be accomplished by developing a drug that would help to prevent cholesterol from building up on the linings of the arteries. Although research is continuing on this issue, it appears that a high-density lipoprotein (HDL) that exists naturally in the body may serve such a function. Therefore, if a drug could be developed that would increase HDL levels, this same drug might serve to reduce body cholesterol levels.

Cholesterol is carried throughout the bloodstream in complexes composed of cholesterol, other lipids, and proteins. There are four major classifications of these lipoprotein complexes: chylomicrons, the very low-density lipoproteins (VLDL), the low-density lipoproteins (LDL), and the high density lipoproteins (HDL). The majority of

total blood cholesterol is carried by LDL - about 80%. HDL carries most of the remaining blood cholesterol. VLDLs contain mainly triglyceride lipids and carry very little cholesterol. Researchers have found that as the amount of HDL increases, the risk of heart attack decreases. Scientists still don't know how HDL lowers cholesterol levels. William Castelli, director of the Farmingham study (Massachusetts), believes that when the ratio of total cholesterol to HDL exceeds 4.5 to 1, attempts should be made to reduce the percentage of LDL in the bloodstream.

Deciding whether or not to make a drug available to the public is a complicated issue. Both the FDA and the drug manufacturer must consider a number of questions when making this decision: How dangerous is the condition that the drug is supposed to cure or hold in check? What are the chances that this condition might disappear naturally? What side effects are produced by the drug and how dangerous are they? Are the potential benefits of the drug greater than the potential risks? Does the drug really work, and if so, how reliably? Was enough research conducted on the drug, and was this research well controlled and unbiased? The drug manufacturer must also ask a number of questions about the financial viability of the drug: is the drug too expensive to manufacture? Is there a chance for substantial profit? Is there a potential for costly legal battles from other companies or from dissatisfied customers? There are costs and benefits associated with marketing any drug. The appropriate balance must be found between the effectiveness of a drug and its side effects, and between moral and business demands in order for a responsible decision to be made.

PLEASE GO ON TO THE NEXT PAGE

Appendix E: Pre-discussion Questionnaire

Participant #_____ **Group #**_____

Drug Marketing Study
Pre-Discussion Questionnaire

In this study, we will be asking your group to determine what particular drug is most likely to be marketed by a pharmaceutical (drug) company. In the following questionnaire, you will be asked to determine which of two possible drugs you would personally prefer to market if you were the marketing manager of a large pharmaceutical company.

Please answer the following questions based on the readings and your interpretation of the information presented.

(1) As the marketing manager, which drug do you find most desirable to market? (Circle one)

Drug A Drug B

(2) How certain are you that your chosen drug is most desirable? (Circle a number)

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Not at all Certain				Neither Certain Nor Uncertain				Very Certain

YOU HAVE NOW COMPLETED THIS PORTION OF THE STUDY. PLEASE SIT QUIETLY UNTIL THE REST OF THE GROUP HAS COMPLETED THIS PORTION. THE EXPERIMENTER WILL RETURN TO THE ROOM WHEN ALL MEMBERS ARE FINISHED.

Appendix F: Group Ballot

Group #_____

Drug Marketing Study
Group Ballot

As a group, please decide which of the four hypothetical drugs is the best to market. Mark the group's response below by circling the chosen drug. Also, please indicate the group's certainty by circling a number on the scale.

(1) Which drug does your group find most desirable to market? (Circle one)

Drug A Drug B

(2) How certain is your group that your chosen drug is most desirable? (Circle a number)

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Not at all Certain				Neither Certain Nor Uncertain				Very Certain

YOU HAVE NOW COMPLETED THIS PORTION OF THE STUDY.
PLEASE LET THE EXPERIMENTER KNOW THAT YOU HAVE FINISHED.

Appendix G: Post-Discussion Questionnaire

Drug Marketing Study
Post-Discussion Questionnaire

PART I

You now have an opportunity to again indicate which drug you personally think is the best one to market. You are free to choose a different drug from the one you chose before discussion, if indeed your preference has changed.

Please answer the following questions by choosing a scale value or letter choice that best represents your judgment. Mark your response on the scanner sheet by filling in the circle containing the letter/number on which you decided next to the appropriate item number. Please ignore the #10 option on your scantron sheet. **Be sure to mark you judgment ratings on your scanner sheet and NOT on this questionnaire**. When you have finished these questions, please continue to the next page.

Mark your responses on the scanner sheet and not on this questionnaire.
Please ignore the # 10 option on the scanner sheet.

(1) As the marketing manager, which drug do you find most desirable to market? (Circle one)

Drug A Drug B

(2) How certain are you that your chosen drug is most desirable? (Circle a number)

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Not at all Certain				Neither Certain Nor Uncertain				Very Certain

PLEASE GO ON TO THE NEXT PAGE.

Post-Discussion Questionnaire - PART II

This part of the questionnaire allows you to indicate your perceptions of the task, yourself, and the other group members. For the following questionnaire items, choose a number from the scale below that indicates the extent to which you agree with that statement.

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Strongly Disagree				Neither Agree Nor Disagree				Strongly Agree

Please answer the following questions by choosing a scale value that best represents your judgment. Mark your response on the scanner sheet by filling in the circle containing the number on which you decided next to the appropriate item number. Please ignore the #10 option on your scantron sheet. Be sure to mark you judgment ratings on your scanner sheet and NOT on this questionnaire. When you have finished these questions, please continue to the next page.

Again, mark your response on the scanner sheet and not on this questionnaire. Please ignore the # 10 option on the scanner sheet.

(3) I enjoyed the drug marketing task.

(4) I found it difficult to come to an agreement with group members.

(5) I found that some of the pieces of drug information were personally relevant.

(6) I was satisfied with our group decision.

(7) I tried to share information with others in an unbiased way.

(8) I think that other members shared information with me in an unbiased way.

(9) I like the members of my group.

(10) My group members seemed interested to hear what I had to say.

(11) The members of my group were similar to me.

(12) I got along well with the members of my group.

PLEASE GO ON TO THE NEXT PAGE.

(13) I tried to get to know other members on a personal level.

(14) Our group tried to stick exclusively to working on the task.

(15) I wanted to discuss information that other members already knew.

(16) Our group discussion focused on information all members knew in common.

(17) Our group tried to discuss each member's unique information.

(18) It was difficult for my group to determine the best drug within the allotted time.

(19) I tried to perform well on the task.

(20) I found the drug marketing task to be interesting.

(21) I did not care about which drug the group chose.

(22) Information brought up during discussion changed my mind from my initial drug preference.

(23) I felt like the information I received was not as important as the information of the other group members.

(24) During discussion, I changed my mind about my drug preference in order to go along with the group.

(25) During discussion, I felt motivated to choose the drug I initially preferred.

(26) I felt time pressure during group discussion.

(27) I felt that other group members would disapprove if I took too long to come to a decision.

(28) I felt like my group needed to choose the best drug to market as quickly as possible.

(29) My group took as much time as needed to choose a drug.

(30) My group worked at a relaxed pace.

(31) My group fully discussed information.

(32) My group thought it was important to choose the best drug.

PLEASE GO ON TO THE NEXT PAGE.

(33) I felt that my group was responsible for making the correct decision.

(34) I felt that I was personally responsible for making the correct decision.

(35) During discussion, I felt like my group's purpose was to gather information about the best drug.

(36) During discussion, I felt like my group's purpose was to reach agreement on the best drug.

(37) If we had not rushed, my group would have made a better decision.

(38) I felt that there was enough time to complete the group discussion.

(39) I had to rely on my memory to discuss information about the drugs.

(40) Some pieces of information were underlined on the drug profile sheet.

(41) I had to work hard to try to remember the information during discussion.

(42) Some information about the drugs was known by only one member.

(43) Some information about the drugs was known by all members.

(44) Before discussion, I believed that some information about the drugs was known by only one member.

(45) Before discussion, I believed that some information about the drugs was known by all members.

(46) I was allowed to use the drug profile sheet during discussion.

(47) I knew exactly which pieces of drug information I knew that others did not.

YOU HAVE NOW COMPLETED THIS PORTION OF THE STUDY. PLEASE SIT QUIETLY UNTIL THE REST OF THE GROUP HAS COMPLETED THIS PORTION. THE EXPERIMENTER WILL RETURN TO THE ROOM WHEN ALL MEMBERS ARE FINISHED.

Appendix H: Perceptions Questionnaire

Drug Marketing Study
Perceptions Questionnaire

Please answer the following question by writing your response directly on this questionnaire. If you have any questions, please ask the experimenter.

Occasionally someone's perceptions of an experience affect the way that they respond in that situation. To the best of your knowledge, what was the purpose of this experiment?

YOU HAVE NOW COMPLETED THIS PORTION OF THE STUDY. PLEASE SIT QUIETLY UNTIL THE REST OF THE GROUP HAS COMPLETED THIS PORTION. THE EXPERIMENTER WILL RETURN TO THE ROOM WHEN ALL MEMBERS ARE FINISHED.

Table 1

Distribution of Drug Facts for the Overall Distribution and Manifest Profiles.

Overall Distribution

Item Valence	Drug A	Drug B
Positive	9	12
Neutral	7	7
Negative	12	9

Manifest Profile

Item Type and Valence	Drug A	Drug B
Shared Items		
Positive	6	0
Neutral	7	7
Negative	0	6
Unshared Items (for each member)		
Positive	1	4
Neutral	0	0
Negative	4	1
Manifest Profile		
Positive	7	4
Neutral	7	7
Negative	4	7

Table 2

Time Pressure Manipulation Check Questions, and Factor Loadings from a Varimax-Rotated Principle Components Factor Analysis

Questionnaire Item	Quick Pace Bias	Taking One's Time	Negative Affect
I tried to help my group finish the task quickly.	0.88	0.02	-0.16
My group focused on completing the task to get done faster	0.89	0.13	-0.08
I felt like my group needed to choose the best drug to market as quickly as possible.	0.80	0.31	-0.31
My group took as much time as needed to choose a drug.	0.02	0.82	-0.14
My group worked at a relaxed pace.	-0.20	0.79	-0.23
My group fully discussed information.	-0.22	0.77	-0.08
I felt anxious during group discussion.	0.16	-0.02	0.79
I felt stress during group discussion.	-0.12	-0.18	0.85
I felt time pressure during group discussion.	0.35	-0.33	0.73
I felt that other group members would disapprove if I took too long to come to a decision.	0.18	-0.15	0.76

Table 3

Cell Means (and Standard Deviations) for Each Factor of the Time Pressure Manipulation Check as a Function of Time Pressure and Information Access

	Quick Pace Bias	Taking One's Time	Negative Affect
High Time Pressure			
Memory	6.92 (1.47)	6.45 (1.10)	2.77 (1.21)
Access	7.12 (1.13)	6.49 (1.26)	3.01 (1.10)
Informed Access	7.49 (0.92)	6.87 (0.94)	3.47 (1.11)
Low Time Pressure			
Memory	4.25 (1.26)	7.15 (1.19)	2.23 (0.88)
Access	4.71 (1.24)	7.61 (0.98)	2.18 (0.74)
Informed Access	4.87 (1.50)	7.41 (1.12)	2.74 (0.87)

Table 4

Percentage of Correct Pre-discussion and Post-discussion Preferences and Group Choices as a Function of Time Pressure and Access

High Time Pressure	Memory	Access	Informed Access
Pre-Discussion Preference	13.6%	14.9%	9.8%
Post-Discussion Preference	20.5%	32.2%	43.9%
Group Choice	18.8%	23.3%	42.9%
Low Time Pressure			
	Memory	Access	Informed Access
Pre-Discussion Preference	15.6%	13.4%	14.3%
Post-Discussion Preference	17.8%	50.0%	66.7%
Group Choice	20.0%	44.8%	71.4%