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Do salient cues and self-relevant task aid prospective memory performance?

La Quisha D Beckum
San Jose State University

NOTE TO USERS

DO SALIENT CUES AND SELF-RELEVANT TASKS AID PROSPECTIVE MEMORY PERFORMANCE?

A Thesis

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The Faculty of the Department of Psychology

San Jose State University

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Master of Arts

By

La Quisha D. Beckum

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INFORMATION TO USERS

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APPROVED FOR THE DEPARTMENT OF PSYCHOLOGY

Dr. Kevin Jordan
Professor of Psychology, San Jose State University
SJSU Project Director

Dr. Ronald Rogers
Associate Professor
Psychology Department, San Jose State University

Dr. Jessica Lang-Nowinski
Research Psychologist, NASA Ames Research Center

APPROVED FOR THE UNIVERSITY

ABSTRACT

DO SALIENT CUES AND SELF-RELEVANT TASKS AID PROSPECTIVE MEMORY PERFORMANCE?

By La Quisha D. Beckum

Two experiments examined whether salient cues and self-relevant tasks could enhance prospective memory performance. Both experiments contained four conditions: 1) survey-hidden, 2) survey-present, 3) credit sheet hidden, and 4) credit sheet present. Each participant performed in only one condition and the data was analyzed using a 2 x 2 Chi-Square between-subjects design. The results of Experiment 1 indicated that the use of salient cues could enhance prospective memory performance, especially when the cue was present. These results did not transfer to Experiment 2. No significant effects were found for the self-relevant factor (i.e., credit sheet) in either experiment, although there were numerical trends in the data. The lack of significant findings is discussed.

ACKNOWLEDGEMENTS

I would like to thank Dr. Kevin Jordan for giving me the opportunity to work with a knowledgeable team at NASA Ames Research Center, Moffet Field, California. Through the support of the graduate internship at NASA, I was able to gain research experience that will be useful as I embark upon my career as a researcher and scientist. Thank you to the team at NASA Ames Research Center (Dr. Key Dismukes, Dr. Jessica Lang Nowinski, Dr. Jon Holbrook, Dr. Rahul Dodhia, Sean Belcher, and Loukia Loukopoulos) for working so hard to refine the experiment and for allowing me to ask questions without making me feel as though I did not understand the concepts. Thank you Dr. Rogers for helping me during the time when my proposal was due and for always getting answers to the many questions I posed. And thank you Dr. Lang Nowinski for working endlessly with me to get the thesis completed in a timely manner. Without all of the support I received from all of you, this would not have been possible.

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Prospective Memory Performance?

Despite the rich, 100-year history of memory research, little attention was devoted to memory for intentions until relatively recent. Prospective memory, or remembering to remember, involves establishing a goal to perform a delayed task and then remembering to perform the intended task at an appropriate time. In order to successfully perform a delayed task, one must form and encode an intention and execute the intention at the appropriate moment (Ellis, 2000). The retrieval aspect of prospective memory distinguishes it from other forms of memory; an intention must occur without an explicit reminder. For example, I might form a goal to buy milk when I go to the store. I must then retrieve this intention when I am at the store, rather that at another time of the day. The most fundamental question addressed in prospective memory research has been, what causes us to retrieve the intention from memory without explicit cues in the environment? The conditions for performing a delayed intention can either be event-based or time-based (Einstein & McDaniel, 1990). Event-based tasks occur when an intention is supposed to be executed upon encountering an event. An example of an event-based task is forming an intention to give a message to a friend when that friend is next encountered. The intended task is giving the message, and the target event is seeing the friend. In contrast, time-based tasks occur when an intention is supposed to be completed at a stipulated time. For example, if I need to attend a meeting at 2:00pm the intended task would be to go to the meeting and 2:00pm is the target time, when the intention is to be executed. Most of the prospective memory work has been on event-

intention is to be executed. Most of the prospective memory work has been on event-based tasks due to the nature of the task. Researchers have been able to collect more data using this particular type of task because it requires the participant to respond upon encountering the intended task instead of remembering to do something at a specified "time."

Prospective memory research began with the use of naturalistic experimentation. For example, some researchers stopped people walking on a college campus to participate in a survey about prospective memory, or asked participants to mail letters at a particular time on a designated day, or they have required participants to fulfill their intended plans for the week by having them write their plans in a day planner. Naturalistic experiments have the advantage of allowing the researcher to understand the ways in which people might behave in their everyday lives. Outside of the laboratory, people do not have to adhere to strict guidelines (e.g., being told to respond when they see the name of a fruit, respond when you see plane or train, make sure your hand stays on the table while you do the experiment, etc.). Much of what they do is self-initiated in that they are not told what they are supposed to do next; they merely act in a way that will increase their chances of fulfilling their goals. In addition, outside of the laboratory, people tend to get distracted and/or interrupted by a wide variety of daily activities. These sources of variance (i.e., unwanted interruptions and lost data due to participant drop-out) may be eliminated under the strict controls of the laboratory environment.

Laboratory experiments have advantages in that the environment is controlled or fixed so that there tends to be a decrease in "noise" that may interfere with the

experiment. Laboratory experiments also have disadvantages such as understanding the inherent motivation of the participant in performing such tasks (i.e., why did the participant perform well-or less than satisfactory? did the participant try very hard in the experiment-or not? was it an easy task for this participant? etc.). While the range of possible cues can be somewhat limited, there is no way to control or document the number of possible cues encountered as a person goes about her daily activities.

Cue Importance

A recurring theme in the area of prospective memory research is that of the *cue*. What triggers the retrieval of an intention? There are no direct commands to retrieve intentions, so we believe (as do others), that cues are important. There is an ongoing debate surrounding whether it is the perception of a cue that triggers retrieval or not. Explicit cues are linked to the conditions for executing the intention. Explicit cues are especially important for prospective memory. In laboratory experiments these cues are simple (i.e., a word or a word belonging to a category of words) and they are also quite salient; the participant is told in the beginning of the experiment exactly what cues are associated with the window for executing the intention. Explicit cues can also come from previously existing associations in memory that are stored as representations of the goal (or intention). In naturalistic experiments this type of cue is often used because no explicit cues have been identified. Loftus (1971) conducted an experiment that manipulated two factors, a) the retention interval and b) the salience of the cue (i.e., the participants were explicitly told to give their state of origin after the question pertaining to the Black Panther Party, or they were told to give their state of origin at the end of the

survey). Before administering the survey, the experimenter asked the participants to give their state of origin at the end of the survey (i.e., the prospective task). The experimenter gave half of the participants an explicit cue, namely the last question, and half of the participants had no cue. Loftus found that providing an explicit cue facilitated recall more often when the experimenters gave the participants an explicit cue that signaled the end of the survey.

It has been demonstrated that when an explicit cue is identified with an associated prospective memory task, the likelihood of recalling the intention has increased. In fact, Gyunn, McDaniel, and Einstein (1998) posited that the most effective type of planning might be that which strengthens the association between the target event and the intended action. Jon Holbrook, a NASA Ames researcher in the area of prospective memory and flight cognition, has come up with naturalistic anecdotes collected from colleagues. These anecdotes have been documented in order to understand the way that prospective memory failures occur in the "real world". Within this collection of anecdotes, most of the documented prospective memory failures occurred because there was no cue to trigger the intention, or because the cues that were present were not strong enough to trigger the intention. For example, a colleague who usually uses one parking lot when he goes hiking, ultimately forgot he had parked in a different parking lot because he had become accustomed to parking in the lot where he hikes. If the cues are encountered and are not strong then it may be the lack of association of those cues. The associations may not be explicit or distinct, and as such, they are overlooked or not paid much attention to.

Meacham and Colombo (1980) conducted a study to determine the effectiveness of external retrieval cues in young children. The experimenter asked the children to remind him/ her to open a surprise box, which was placed out of sight. The experimenter gave some of the children a cue (clown placed on the table) that the researchers called the elaboration condition (the child was coached in understanding how the cue could facilitate remembering) and the other children did not receive a cue. The clown was a toy like the prize box, which made it an easy association to remember and thus, an effective cue. Because this particular study recruited children as participants, the prize box might have been personally relevant to them as well. Meacham and Colombo found that the children remembered more often in the elaboration/cueing condition than the control condition (75% correct vs. 52% correct, respectively). They interpreted the results as evidence that the external cue improved performance by increasing the activation of associations for the retrieval of the intention to remind the experimenter to open the prize box.

Both the Loftus study and the Meacham and Colombo study demonstrate the importance of adequate cues. The Loftus study demonstrated that explicitly defining the cue improves performance. The Meacham and Colombo study demonstrated how performance could improve when there was an external cue. Although personal relevance of the clown and its association with the prize box was not discussed in the conclusion of the study, this may be another reason prospective memory performance was enhanced when the children were given the external cue of the clown as opposed to

intending to remember on their own. The next section will draw on this conclusion in order to explain how personal relevance may enhance prospective remembering.

Personal Importance/ Relevance

Self-relevant goals may increase the strength of encoding of the task or information leading to improved memory for those goals. When tasks are more relevant to a person, she may afford more time and systematic processing in order to attain increased performance. Self-relevance may also increase the level of monitoring for opportunities to perform the intended goal. In addition, it may increase the associations that are available in memory for the intended goal. For example, Greenwald (1980) pondered the belief that cognitive conservatism could serve as a disposition to preserve existing structures in memory. To that end, cognitive conservatism may be enhanced when the task is personally relevant to a person because of the need to preserve existing structures in memory. So, can goals that are self-relevant (i.e., a factor that helps with the motivation to complete goals is high in self-relevance, or delay of completion when the goals are low in self-relevance) increase prospective memory performance?

Several studies have examined whether perceived or self-relevant goals affect prospective memory performance. Andrzejewski, Moore, Corvette, and Herrmann (1991) examined participants' prospective memory performance for 24 different appointments varying in importance, retention interval, amount of recurrence, and the specificity of the appointment time. Participants kept a diary for 3 weeks of all appointments made (completed or uncompleted). Analysis of the diaries revealed that

important appointments were more common than unimportant appointments and that participants remembered to keep a larger proportion of the important appointments.

Bakker, Schretlen, and Brandt (2002) examined whether the value of items borrowed from clinical patients would influence the probability that the patients would remember to ask that the items be returned at the end of the experiment. The experimenter borrowed an item from each participant, hid the item as the participant watched, and told the participant to ask for the item at a specified time. If the participant forgot to ask for the item at the specified time, the experimenter gave a series of cues until the participant remembered. The value of the item did not correlate with the number of cues required before the participant remembered. However this null result must be interpreted with caution because of the way the value of the item was estimated. Fifteen members of the clinical staff estimated the amount of distress the owners would feel if the items were lost, but it is not clear how accurately this estimation reflected the true importance of the items to their owners.

Finally, Kvavilashvili (1987) manipulated both the importance of an intention and how interesting the retention interval task was. Participants were asked to hang up a telephone after five minutes while performing an ongoing task. Remembering to perform the task was substantially and significantly higher among participants in the important condition. This effect did not interact with the level of interest of the ongoing task. It has been observed that one way in which the importance of an intention might influence prospective memory performance is by increasing the number of spontaneous recollections of the intention during the retention interval. However, Kvavilashvili found

that the number of spontaneous recollections (which she termed perseverations) reported by participants did not correlate with prospective memory performance.

Current Study

Could the importance of an intention influence the probability of remembering to perform that intention? For example, if a student thinks that completing a survey is critical to her receiving a personally relevant reward, course credit, she might be more likely to remember the survey than performing a task with less meaning to the participant. This question has not been addressed directly, though there is evidence to suggest that the importance or relevance of information influences processing. For example, Greenwald (1980) posits that *ego-involvement* might improve recall. Ego-involvement is elicited when a procedure includes placing some sort of personal importance on the task such that ego processes are activated. If a participant is told that she must mail a letter at a specified time, she might be more likely to remember the task when it is associated with a monetary reward. Furthermore, literature in the area of social cognition, namely the elaboration likelihood model, posits that there are certain motivational factors (i.e., personal relevance) that foster objective message processing instead of biased processing. Although this model created by Petty and Cacioppo (1981, 1986) was generated in order to further understand the ways in which people could be persuaded (or not persuaded) by certain arguments, it may serve as an important factor in that personal relevance is thought of as being a motivational factor. In fact, Petty, Cacioppo, and Goldman (1982) found low personal involvement with a persuasive argument to elicit the importance of the expertise of the speaker, whereas, high personal

involvement with the argument elicited the importance of the argument quality (e.g., weak arguments-personal opinion, versus strong arguments-supported with statistics and data). As the personal importance of the message increased, the person engaged in reasoning through the message in order to form a sound opinion. Therefore, when a participant is highly motivated (i.e., the task is personally relevant) they may engage in elaborative cognitive processing, which might allow the person to encode information at a deeper level. Evidence from the study of retrospective memory has demonstrated the role of personal importance by showing improved memory for self-relevant materials (e.g., Nuttin & Greenwald, 1968; cited in Greenwald, 1980). Since prospective memory has retrospective components, we might expect the likelihood of performing a delayed task to also improve with the perceived importance of that task (McDaniel & Einstein, 2000). We manipulated importance in two ways: a) in the high relevance condition the participants were told that they would receive credit for participation if they remembered to complete the credit sheet at the end of the computerized experiment and b) in the low relevance condition the participants were simply told to remember to complete the survey at the end of the computerized experiment. We surmised that the credit sheet would be more important to the participants than the survey because it satisfied a personally relevant goal, getting course credit. In contrast, the survey was an experimenter provided goal alone. It was not associated with an external "reward".

Environmental cues have been found to be an important aspect of prospective memory success (e.g., Loftus, 1971; Meacham, & Colombo, 1980). A manipulation of this variable was implemented by placing a form (credit sheet or survey) in the

participant's sight during the debriefing session (on the table to the left of the computer), or it was hidden (on the shelf outside of the lab space). The dependent variable was based on whether the participant remembered to complete the form at the end of the computer task.

Participants in the current study were instructed to perform a series of tasks. They were told that the most important task was remembering to fill out a form at the end of the experiment. We hypothesized that the more personally relevant the goal (the credit sheet), the more likely it would be remembered. We also hypothesized that individuals would be more likely to remember to perform the prospective memory task if a salient cue, the form itself, was present during the window of opportunity (at the end of the experiment).

Experiment 1

Method

Design and Participants. The experiment was a 2 (high or low personal relevance) X 2 (environmental cue hidden or present) between-subjects design. Fifty-nine students, aged 18-30, enrolled in an introductory course in psychology at San Jose State University participated for one course credit. Age was restricted because some studies find that prospective memory declines with age (Maylor, 1993, 1996a; Park, Hertzog, Kidder, Morrell, & Mayhorn, 1997, cited in Einstein, Smith, McDaniel, & Shaw, 1997). These participants were distributed across four conditions.

Materials. For the high relevance condition, we created a credit sheet with *NASA Ames Research Center Internship Program Participation Form* written across the top of

the page. For the low relevance condition, we used a survey about the attitudes of citizens toward police officers. The questionnaire was labeled *Female Police Officer Questionnaire.* Both the credit sheet and survey versions were printed on bright yellow paper. An unrelated experiment lasting 20-minutes was employed as a delay task. This task was conducted using a Macintosh G4 powerbook computer and required participants to respond to GRE-type multiple-choice questions.

Procedure. Upon entering the laboratory, the experimenter provided an overview of the procedure, which included showing the participant a form (credit sheet or survey) that they would need to complete at the end of the experiment. The experimenter then gave the participant one page of instructions to read that included an overview of the tasks to be performed. After the participant completed the instructions the experimenter administered a 5-minute unrelated task. Before leaving the participant to begin a 20-minute computer task, the experimenter reiterated the need to complete a form after the computer task. Half of the participants were told to remind the experimenter about the credit sheet and the other half of the participants were told to remind the experimenter about the police officer survey. The experimenter showed the participant the form one more time and left out of the lab. The experimenter put the form on the shelf outside of the lab room until the participant had completed the computer-based experiment.

The experimenter conducted a debriefing at the end of the computer task. This was considered the beginning of the window of opportunity for performing the prospective memory task, remembering to ask about the form. When the debrief was

completed, the experimenter excused the participant. If the participant did not remember to remind the experimenter about the form before leaving the lab, the trial was recorded as a prospective memory failure. In such cases, the experimenter reminded the participant about completing the task and followed with a series of questions. Half of the participants saw the form at the end of the experiment as it was lying on the table to the left of the computer. The other half of the participants did not see the form. They were instead supposed to remember without the presence of a cue. If the participant remembered to remind the experimenter about the form (credit sheet or survey) before leaving the lab, the experimenter asked the participant a similar series of questions (see Appendix B). The post-experiment questionnaire was designed to determine whether the manipulations had an effect, (i.e., did the color of the paper help the participant think about the form during the 20-minute task or did the presence or absence of the form help the participant remember the task) whether the participants had used particular strategies, and how the participants managed the task.

Analysis. The data were analyzed using a chi-square test, due to the nominal nature of the prospective memory task. Planned comparisons were conducted on the levels of the independent variables in order to determine the nature of significance as well as the main effects and interactions of participants' responses.

Results and Discussion

We hypothesized that prospective memory performance would be enhanced when there was a salient cue available during the window of opportunity, namely the presence of the form itself. This factor was significant, $x^2(1) = 5.45$, $p < .05$. The participants in

the cue present condition remembered more often than the participants in the hidden condition (M = .97 and M = .76, respectively; see Table 1). These data support the hypothesis that salient cues can enhance prospective memory. We hypothesized that the more personally relevant the goal (the credit sheet), the more likely it would be remembered. In line with our hypothesis, the survey task was forgotten more often than the credit sheet (M = .79 and M = .93, respectively; see Table 2). However, these tests did not reach significance, x^2 (1) = 2.47, p = .12, despite the trend in the right direction.

We expected participants in the hidden condition to perform less well than participants in the cue present condition because they were given the opportunity to see the cue. The salience of the cue, namely the brightness and uniqueness of the yellow paper, might have enabled it to be easily remembered. However, the color may have also influenced the way in which the participants monitored during the delay. Perhaps they thought about the form more often during encoding, and during the 20-minute computer task. In addition, mentioning a survey about police officers may have sparked the interest of these participants, because completing a survey about police officers is not a regular occurrence in the daily life of a student. As a result, they may have thought about the form more often making it more likely that they would remember it later.

Experiment 2 was designed to decrease the salience of the cue and decrease the inherent appeal of the survey. We modified the procedure such that: a) the paper color was changed to white, and b) the survey no longer read "Police Officers", nor did we stipulate that it was a survey about police officers.

Table 1

Proportion of Participants Remembering to Complete the Task By Cue Condition

Cue	Mean	Standard Deviation	Sample Size
Present	0.97	0.87	30
Hidden	0.75	5.44	29

Table 2

Proportion of Participants Remembering to Complete the Task By Relevance Condition

Relevance	Mean	Standard Deviation	Sample Size
High	0.93	1.95	30
Low	0.79	4.81	29

Experiment 2

Method

Design and Participants. The design of Experiment 2 was identical to Experiment 1, with a 2 (high or low personal relevance) X 2 (environmental cue hidden or not) between-subjects design. We recruited 97 participants from San Jose State University enrolled in an introductory course in psychology, aged 18-30. This number was based on Cohen's estimation for a medium effect size using chi-square (1992). Each participant received one course credit for participating in the experiment.

Materials. The materials used in Experiment 2 were identical to those used in Experiment 1, with the exception of the color of the forms (credit sheet and survey). They were white rather than yellow.

Procedure. The procedure in Experiment 2 was the same as that in Experiment 1. The one exception was that participants in the survey condition were not told the nature of the survey, only that it would need to be completed at the end of the experiment.

Results and Discussion

A 2 (cue) X 2 (relevance) Chi-square analysis was conducted on the data. As can be seen in Table 3, a greater number of the participants in the credit sheet condition remembered to remind the experimenter than participants in the survey condition (M = .65 and M = .55, respectively), but again this trend was not significant, $x^2(1) = .91$, $p = .34$. As can be seen in Table 4, participants in the cue present condition remembered more often than participants in the hidden condition (M = .65 and M = .55, respectively), but this time the trend was not significant, $x^2(1) = .91$, $p = .34$.

Table 3

Proportion of Participants Remembering to Complete the Task By Cue Condition

Cue	Mean	Standard Deviation	Sample Size
Present	0.65	10.92	48
Hidden	0.55	12.13	49

Table 4

Proportion of Participants Remembering to Complete the Task By Relevance Condition

Relevance	Mean	Standard Deviation	Sample Size
High	0.65	10.92	48
Low	0.55	12.13	49

Post hoc questioning revealed that most of the participants intended to carry out the task, and of those who forgot, their explanations were quite similar. They were absorbed in completing the unrelated experiment and concentrated on responding correctly, such that they never rehearsed the prospective memory task. All but five participants out of 97 stated that they did not think about the survey or credit sheet while performing the unrelated experiment.

A 2 (cue) X 2 (relevance) Chi-square analysis was also conducted between Experiment 1 and Experiment 2. The mean proportions of people remembering from Experiment 1 (M = .86) to Experiment 2 (M = .60) differed greatly. Furthermore, we conducted a logistic regression between cue condition, relevance, and semester. The only factor that significantly added to the variance was semester, $p < .01$ (see Table 5).

General Discussion

We hypothesized that the more personally relevant the goal, the more likely it would be remembered. We also hypothesized that individuals would be more likely to remember the task if a salient cue was available during the window of opportunity. The results of Experiment 1 support the second hypothesis, but not the first. The data for Experiment 2 did not support either hypothesis, though there were numerical trends. Although the results are not conclusive, observation of the mean proportions suggest that when personal importance for a task is high and the salient cue is seen, prospective memory performance may be enhanced. Memory for the cue exhibited continuity where people remembered the credit sheet more often in both Experiment 1 and Experiment 2 (M = .93 and M = .65, respectively).

Table 5

Summary of Logistic Regression Analysis for Remembering (N = 97)

Remember	B	Standard Error	Exp (B)
Cue	-0.73	0.38	0.48
Relevance	0.60	0.38	1.82
Semester	-1.49	0.44	0.22*

*p < .01.

An effect of the relevance variable did not happen in either experiment. We believe it may be due to the participants being college students in that when they came to the lab to participate in the experiment, they brought green sheets with them that were supposed to be signed by the experimenter so that they would receive one hour of course credit. We told the participants (in the credit sheet conditions) that they needed to remember to complete the credit sheet at the end of the experiment in order to get credit for participating in our experiment. The participants may not have bought our story or paid attention to the fact that it had "credit" attached as a signifier of importance.

Based on research in the area of memory, we thought cue presence would enhance prospective remembering. We actually found support for memory of the cue (present or hidden) because it remained continuous across both experiments. Participants remembered to complete the task in the cue present condition as opposed to the hidden condition. These findings, when all data were observed, are in line with previous research (e.g., Meacham & Colombo, 1980; Guynn, McDaniel, & Einstein, 1998).

In Experiment 1 we found it most interesting that overall, only14% of the participants forgot to complete the task (see Appendix B). Again, perhaps the salience of the cue (i.e., bright yellow paper) led to ceiling effects because even when the cue was hidden, people remembered to remind the experimenter of the task. In contrast, 40% of the participants forgot to complete the task in Experiment 2 (see Appendix B). These data show that we found cue location (hidden or present) to be an important aspect of prospective memory performance. We successfully decreased the salience of the cue in

Experiment 2, which is also an effect of the cue location when taken together (both Exp. 1 and Exp. 2). Although this was not what we had expected would happen, these results are important all the same.

Another explanation for why we found an effect in Experiment 1 and not in Experiment 2 may come from the fact that data were collected at different times across two different semesters. Experiment 1 data was collected at the end of a semester. Experiment 2 data was collected at the beginning of a semester. In general, participants remembered at the end of a semester (Exp. 1) more often than participants at the beginning of a semester (Exp. 2) (M = .86 and M = .60, respectively). One thought is that, participants completing experiment requirements at the last minute (Exp. 1) may feel under pressure to complete course credit. Students participating at the end of the semester, therefore, may care less about how they perform on the task, and more about their goal of getting credit. In that case you would expect to see a larger effect (i.e., more remembering for the credit sheet) among these participants. This is what was observed by looking at the mean proportions of the participants who remembered the form (credit sheet) in Experiment 1. A numerical trend was observed in the right direction for Experiment 2 and the findings did not reach significance.

Given the findings for our hypotheses, further research should be conducted in order to determine the nature of importance of cue presence and task relevance in experimental situations. An important question is whether there are special conditions under which these two variables matter. In the present study we assumed that the participants remembered as a function of needing course credit. In observation of the

findings, we believe the survey was low in self-relevance because these participants seemed to work harder (i.e., remembering the credit sheet) to receive course credit. This does not explain why the findings were not significant. Perhaps using a pool of participants who do not see any extrinsic reward except the fact that the task is important to them would prove to be beneficial, because there would not be any outside influence associated with task importance. Using some sort of monetary reward may increase the strength of the relevance variable for this type of manipulation (e.g., Meacham & Singer, 1977).

The study of prospective memory is not only important to the advancement of cognitive research, it is especially important for airplane pilots who must remember to fulfill their intentions in order to secure the safety of the passengers flying aboard the vessel. Many airplane accidents occur due to pilot error (generally, memory error). How then can researchers help pilots decrease flight error? What might be the underlying reasons (or factors) for pilot error? In hindsight all errors in the cockpit seem very obvious, but with the cognitive workload during takeoff and landing, pilots are vulnerable to making mistakes. Prospective memory research may make it possible to suggest countermeasures for decision-making and memory failure as well as helping to train flight crews to improve their thinking so they can better assess situations.

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Appendices

Appendix A
Signed Approval Form

San José State
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Office of the Academic Vice President

Academic Vice President Graduate Studies and Research

One Washington Square
San José, CA 95192-0025
Voice: 408-283-7500
Fax: 408-924-2477
E-mail: gradstudies@sjsu.edu
http://www.sjsu.edu

To: La Quisha Beckum
415 S. Bernardo Avenue, # 314
Sunnyvale, CA 94086

From: Pam Stacks,
Interim Academic Vice-President
Graduate Studies & Research

Date: October 7, 2003

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

"Memory for Intentions."

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to any and all data that may be collected from the subjects. The approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Pam Stacks immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information. This approval for the human subjects portion of your project is in effect for one year, and data collection beyond October 7, 2004 requires an extension request.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.

cc: Dr Kevin Jordan

Appendix B
Tables: Mean Proportions for
Experiment 1 and Experiment 2
Debrief Questionnaire

Table B1

Mean Proportions of Remembering for Experiment 1

	Relevance		
Cue	High	Low	
Present	1.00	.93	.97
Hidden	.87	.64	.76
	.93	.79	.87

Table B2

Mean Proportions of Remembering for Experiment 2

	Relevance		
Cue	High	Low	
Present	.65	.65	.65
Hidden	.65	.45	.55
	.65	.55	.60

Debrief Questions

1. Did you forget about the form (survey or credit sheet)?
2. Why did you forget the form? Or, How did your remember the form?
3. Did you think about the form at all during the computer experiment?
4. Why didn't you remind me of the form?

Table B3

Participant Answers to Debrief Questions

Answers	Number of Responses
-How did you remember the form?	
You told me to remind you	45
I saw it	10
I wanted to get credit	6
I don't know	2
It had NASA Ames written on it	1
The ethnicity questions stood out	1
I wrote on my hand	1
I saw the experimenter walk into the lab	1
The paper color was a bit different	1
-Why did you forget the form?	
I completely forgot	22
I forgot after the debrief was complete	5
The computer experiment was really hard	4
I thought the debrief was the credit sheet	3
I was in a rush	2
I thought experimenter would remind me	2
I did not think it was important	1
-Did you think about the form during the experiment?	
Yes	11
No	86