

*Chapter 10*

## PROSPECTIVE PERSON MEMORY

*James Michael Lampinen*<sup>1</sup>, *Jack D. Arnal*<sup>1</sup> and *Jason L. Hicks*<sup>2</sup>

<sup>1</sup>Department of Psychology, University of Arkansas, Fayetteville, AR, USA

<sup>2</sup>Department of Psychology Louisiana State University, Baton Rouge, LA, USA

### ABSTRACT

We explore a new application of prospective memory, namely, *prospective person memory*. Prospective person memory refers to situations in which one is asked to "be on the lookout" for a particular person who may be encountered during one's day to day activities. Specific examples include being on the lookout for a missing child, a wanted fugitive, or a terrorist. Three lines of ongoing research are described. First, in the laboratory studies, participants engaged in simulated tasks on a computer (e.g., grocery shopping). While engaged in these tasks, participants were asked to "be on the lookout" for a group of "wanted" individuals. If they spotted these individuals, they were asked to press a key (i.e., 'alt' button) thereby alerting authorities. Second, in the field experiments, participants viewed a mock news broadcast describing two "wanted" individuals. Participants were told that if they spotted the individuals and alerted the experimenter they would receive a portion of a \$100 prize. Seemingly unrelated to this experiment, participants had an opportunity to identify the wanted individuals at a departmental cookie sale. We then examined the probability that the experimenter was contacted. Prospective person memory in the laboratory studies was relatively poor and in the field studies it was even worse. Third, field research was designed to determine how much attention customers pay to posters of missing children. In the project, posters of missing children were placed at the exits of participating supermarkets. As patrons left the stores, they were asked to complete a survey. The survey asked them to indicate the degree to which they looked at the posters and to complete a recognition memory test for the children's pictures. We also describe research on the utility of forensic age progression in the recovery of missing children. The research reported in this chapter represents the first program of research specifically aimed at using basic research and theory on prospective memory in order to help better understand these important applied memory issues.

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1 Corresponding author.

## INTRODUCTION

The general public serves as an important resource in helping law enforcement track down individuals (Witkin, 1995). When investigators are attempting to apprehend a suspect or fugitive in an investigation, they sometimes release his/her picture to the general public, with the hope that someone will see the suspect and contact authorities (e.g., Lafayette, 1998). Military, intelligence, and anti-terrorist applications of person identification also exist. When intelligence agencies or the F.B.I. learn that particular terrorist suspects may be present in the United States or abroad, they may provide the news media with pictures of the suspected terrorists and ask them to alert the general public (USA Today, 2004). Law enforcement also relies on the news media in cases in which a missing child is sought (Office of Juvenile Justice and Delinquency Prevention, 2004). Particular approaches include “Amber Alerts” (Zgoba, 2004) and placing pictures of missing children on products such as milk cartons (Brown, 1997) or at the exits of stores such as Walmart (Walmart Foundation, 2001).

The purpose of the research described in this chapter is to better understand the mechanisms by which persons are identified in these forensic contexts, in the hopes of developing approaches that will increase the probability of a “hit” when an individual is being sought by law enforcement, military, or anti-terrorism personnel. The examples described above all involve *prospective person memory*. Prospective memory refers to a set of processes that allows one to remember to engage in a future activity such as mailing a bill the next time one is near a post office (Ellis and Kvavilashvili, 2000; Guynn, McDaniel, and Einstein, 1998; Marsh, Hicks, Cook, Hansen, and Pallos, 2003). In the case of prospective person memory, successful completion of the task requires members of the general public to contact authorities (delayed intention) when they encounter a particular person (PM cue) as they go about other attention demanding tasks during their daily lives (ongoing activities).

The program of research described in the present chapter follows analogous research on eyewitness identification, and seeks to identify both system and estimator variables that influence prospective person memory (Wells, 1978). We have examined these questions in the context of both laboratory analog experiments and in field experiments. The research is important for a number of reasons. First, it is the first systematic program of research aimed at understanding prospective person memory. Second, the research has made use of well-established paradigms within the field of event based prospective memory. Third, the research has been informed by a theoretical understanding of prospective memory, as well as being heuristically guided by the system variable / estimator variable distinction that has been useful in studies of retrospective eyewitness memory. Fourth, the research has combined tightly controlled laboratory based experiments with ecologically valid field experiments, providing an opportunity to answer important scientific questions at the intersection between behavioral science and the law.

## TRACKING DOWN FUGITIVES AND RESCUING MISSING CHILDREN

Law enforcement has been seeking the help of the general public for years in tracking down wanted fugitives. For instance, pictures of wanted fugitives may be publicized in local and national news media, sometimes receiving extensive coverage (Lafayette, 1998). Since

1949, the Federal Bureau of Investigation has maintained a most wanted list (Witkin, 1995) by which it publicizes the identities of criminal suspects and fugitives. Since its inception, 479 fugitives have been placed on the F.B.I.'s most wanted list. Overall, 147 fugitives have been caught because of tips from the public (Johnson, 2005). More recently, the syndicated television program, *America's Most Wanted*, has publicized the identities of wanted fugitives (Russell, 1997). The show features weekly sequences on fugitives being sought by law enforcement. Eight-hundred and fifty-one of these fugitives have been apprehended (*America's Most Wanted*, 2005). Law enforcement also uses a number of additional venues to seek help from the public in tracking down fugitives (e.g., press releases, news conferences, Internet). Prospective person memory is thus important in tracking down fugitives wanted by U.S. law enforcement agencies.

Anti-terrorist and military personnel also rely on prospective person memory. U.S. military personnel in Iraq were given playing cards with faces of 55 wanted individuals (Stone, 2003). The global war against terrorism has also made use of publicity in order to track down terrorist suspects (USA Today, 2004). The F.B.I. has released a most wanted terrorist list, in addition to their most wanted fugitive list (Levitt, 2001). In the second wave of terror bombings in London, during the summer of 2005, British police publicized pictures of four suspects and sought the aid of the public in finding them (Cable News Network, 2005a). Improving prospective person memory has the potential to aid U.S. military operations and the global war against terrorism.

Another important law enforcement function involves finding and recovering missing children (Blomquist, 1990). Estimates of the number of missing and exploited children in the United States are staggering (Tedisco and Paludi, 1996). According to the second *National Incidence Study of Missing, Abducted, Runaway, and Thrownaway Children* (NISMART2), 797,500 children were reported missing in the year 1999 (Sedlak, Finkelhor, Hammer, and Shultz, 2002). Approximately 9% of all cases involve abductions either by family members or strangers. Law enforcement in many states put out "Amber Alerts" when children go missing, resulting in the child's photograph being made available to media outlets, to be shown to the general public (Office of Juvenile Justice and Delinquency Prevention, 2004; Zgoba, 2004). Some missing children cases receive a great deal of media attention, whereas other cases receive far less attention (Office of Juvenile Justice and Delinquency Prevention, 2004). The National Center for Missing and Exploited Children (NCMEC) maintains a national database of missing children (Girouard, 1990). The NCMEC also sends out direct mail advertisements featuring the pictures of missing children to about 75 million homes every week (Office of Juvenile Justice and Delinquency Prevention, 2004). Missing children have also been publicized by corporations. One early strategy was to place the pictures of missing children on products such as milk cartons (Brown, 1997). Since 1996, Walmart Corporation has been posting photographs of missing children at the exits of its stores leading to many recovered children (Walmart Foundation, 2001). In addition to these efforts, parents of missing children often institute their own grass-roots efforts to publicize details about their child's disappearance (Office of Juvenile Justice and Delinquency Prevention, 2004).

A recent example of the successful use of these strategies occurred with the case of Shasta Groene (Cable News Network, 2005b). Shasta was abducted in the course of a triple homicide and later recovered. After extensive national media coverage, a waitress at a Denny's restaurant recognized Shasta and contacted authorities. Although this case ended with a successful recovery, it is noteworthy that news reports indicate that just hours earlier,

Shasta had been in the plain view of a number of people at a local convenience store, none of whom identified her. Unfortunately, many missing children cases do not end with the child being safely recovered (Blomquist, 1990).

Note that the prospective person memory problem has two components. The first problem concerns missed opportunities for identification by members of the general public. When Shasta Groene was taken by her abductor to a local convenience store, she was not disguised in any way. If the customers and employees at the store had seen the extensive news reports, then they had an opportunity to contact authorities. For whatever reasons, they did not. A second problem with prospective person memory concerns false identifications. When a fugitive from justice or a missing child receives a great deal of media attention, authorities receive a large number of leads that end up being false alarms. Although law enforcement prefers to receive information, even if it uncertain, false leads necessarily consume investigative resources that might be better utilized elsewhere in the investigation. Because of these dual problems, the research in the present proposal measures both the correct identification rate in prospective person memory tasks, as well as the false identification rate.

## THEORETICAL ACCOUNTS OF PROSPECTIVE MEMORY

There has been growing interest among basic memory researchers on the topic of prospective memory (e.g., Einstein and McDaniel, 1990; Marsh et al., 2003; Marsh, Hicks, and Landau, 1998; McDaniel, Robinson-Riegler, and Einstein, 1998). Prospective memory concerns the ability of people to remember to engage in some action in the future. The present chapter focuses on a particular type of prospective memory called *event based prospective memory*. Event based prospective memory refers to situations in which a person has to remember to engage in an action when they encounter a particular cue in the environment (e.g., remembering to mail the letter the next time one is by a mailbox). Research on event based prospective memory has been dominated by a series of clever laboratory based paradigms (e.g., McDaniel and Einstein, 1993; McDaniel et al., 1998).

In a typical study, participants are presented with one or more *prospective memory cues* (i.e., *PM cue*) that they are to be on the lookout for during the course of the experiment. For instance, a participant might be told to be on the lookout for the words *chair*, *monkey*, and *toothbrush*. Participants are told to make a specific response, such as pressing the 'alt' key on the computer keyboard, when they encounter these items (i.e., *PM response*). Because prospective memory involves remembering to engage in a behavior during the course of one's normal day to day activities, laboratory based prospective memory tasks embed the target items in an attention demanding *ongoing activity*. For instance, participants may be presented with several hundred words and might be asked to make pleasantness ratings for each of these words. During the course of this ongoing activity, participants encounter the PM cues and the main dependent measure is whether or not they remember to make the PM response (e.g., pressing the 'alt' key). It is also important to note that in order to discourage active item-by-item monitoring, participants often engage in filler activities during which the prospective memory targets are never presented.

Theoretical accounts suggest that prospective memory tasks involve both a prospective and retrospective component, and that performance of the tasks engage both automatic and controlled processing (Cohen, Dixon, Lindsay, and Masson, 2003; Einstein and McDaniel, 1990; Ellis, 1996). To successfully perform a prospective memory task, participants need to remind themselves when encountering the PM target that it is significant in some way (e.g., “I was supposed to do something when I saw the word *monkey*.”)—this has typically been considered the prospective component of the task. Once the target has been identified as significant, participants have to successfully remember the delayed intention associated with the target (e.g., “*Monkey* is associated with pressing the ‘alt’ key”)—this has typically been considered the retrospective component of the task. This distinction is important, because it would hardly be surprising if participants failed at a PM task, if they are unable to remember what targets they were supposed to be on the lookout for or the relationship between the PM target and the delayed intention. Many studies of event based prospective memory, therefore, include standard measures of retrospective memory subsequent to the performance of the PM task.

Theoretical accounts of prospective memory also make a distinction between automatic processes leading to the recognition of PM cues and controlled processes that lead to the recognition of PM cues (McDaniel and Einstein, 2000). Note that in the course of an experiment, it is possible that participants could actively prompt themselves, during each item’s presentation, whether or not it is one of the PM cues. This process has been referred to in the literature as *conscious monitoring*, or *strategic checking* (Guynn, 2003). Conscious monitoring involves comparing each item as it is presented with a mental representation of the PM targets. With regard to this view, Smith and Bayen (2004) have proposed a model that suggests that successful prospective memory always requires monitoring. Smith (2003; Experiment 3) found that working memory capacity was positively correlated with performance on prospective memory tasks (see also Reese and Cherry, 2002; West and Craik, 2001). Researchers have also found that prospective memory tasks often interfere with performance on the ongoing task, suggesting that a monitoring process was using some of the capacity available for working memory (Marsh et al., 2003). Other theorists, however, argue that there are some situations where recognition of the prospective memory targets occurs automatically (Einstein and McDaniel, 2005; McDaniel and Einstein, 2000). According to these multi-process views, whether the PM task is performed automatically or strategically depends on the importance of the task, how distinctive the PM cue is, how stereotypical the PM cue is, planning strategies and characteristics of the participant engaged in the task.

## SYSTEM VARIABLES AND ESTIMATOR VARIABLES

Some time ago, Wells (1978) argued that the variables that influence eyewitness accuracy can be divided into two categories, estimator and system variables. Estimator variables are factors that are likely to influence eyewitness accuracy but that are not under control of the legal system. For instance, some research suggests that witnesses are more accurate when identifying members of their own race than members of a different race (Anthony, Copper, and Mullen, 1992; Bothwell, Brigham, and Malpass, 1989; Chance and Goldstein, 1996; Platz and Hosch, 1988). Eyewitness accuracy can also be influenced by the amount of stress the

witness experienced at the time of the event (Deffenbacher, 1983; Kramer, Buckhout, Fox, Widman, and Tusche, 1991; Loftus and Burns, 1982) and the amount of time the witness had to view the event (Memon, Hope, and Bull, 2003). Estimator variables are useful because they provide investigators with information that can help them assess the reliability of the witness's recollection. For instance, a police investigator may put more stock in an eyewitness identification when the witnessing conditions are good than when they are poor.

System variables, on the other hand, are factors that are under the direct control of the police investigator. For instance, simply informing witnesses that the perpetrator may or may not be present in the lineup can considerably reduce false identifications without reducing correct identification (Malpass and Devine, 1981). Lindsay and Wells (1985) proposed that the photographs in a photo-array should be presented sequentially rather than simultaneously. Recently, it has also been suggested that the lineup administrator should be blind as to the identity of the suspect so as not to inadvertently influence the witness's choice or level of confidence (Garrioch and Brimacombe, 2001; Phillips, McAuliff, Kovera, and Cutler, 1999). The system variable approach is useful in that it provides practical guidance as to how police can limit false identifications rather than merely diagnosing the problems after the fact. The program of research described in the present chapter has been informed by a theoretical understanding of the nature of prospective memory and empirically derived factors known to influence success at event based prospective memory tasks. The research is also informed by the system variable / estimator variable distinction, which provides a heuristic for generating forensically useful research questions concerning prospective person memory.

## **TO CATCH A THIEF**

One important application of research on prospective person memory concerns law enforcement efforts to catch missing fugitives or wanted terrorists. We have examined this issue with laboratory analog experiments, as well as with field experiments in which participants have had an opportunity to win a reward if they identify a particular individual during the course of their day to day lives. In one laboratory study, we presented participants with pictures of 4 individuals and asked them to imagine that these individuals were wanted by police. In one condition, participants were asked to imagine that the fugitives were wanted for a serious felony (armed robbery). In another condition, participants were asked to imagine that the fugitives were wanted for a relatively trivial misdemeanor (unpaid parking tickets). In both conditions, participants were told that if they saw the fugitives at any point during the experiment that they should immediately press the space bar to inform authorities. A control condition was also used in which participants were not asked to be on the lookout for anyone.

Participants also performed two ongoing tasks. The prospective memory targets were embedded in the second ongoing task. In the first ongoing task, participants viewed a slide presentation on a computer screen of a trip through a grocery store. Participants were given a shopping list and were asked to press a response key every time they saw one of the items on their grocery list indicating whether the item was on the left or right side of the screen. In the second ongoing task, participants viewed a slide presentation depicting a walk through the campus. As students watched the presentation they had a series of goals to accomplish (e.g., mail a letter, recycle a soda bottle). The ongoing task involved pressing a response key every

time an opportunity to accomplish one of the goals occurred (e.g., a mailbox was shown, a recycling bin was shown). Students pressed the 'z' key if the opportunity to accomplish the goal occurred on the left side of the screen and the '/' key if the opportunity to accomplish the goal occurred on the right side of the screen. A number of people, including the four missing fugitives, appeared in the slides making up this second ongoing task. In the felony condition, only 26.61% of the "fugitives" were correctly identified during the prospective person memory task. In the misdemeanor condition, 36.76% of the "fugitives" were correctly identified. This difference was not statistically reliable and was in the opposite direction of what we had predicted. Consistent with the view that prospective memory engages strategic processing, participants in the control condition responded about 200 msec faster on ongoing task than did participants in either of the prospective person memory conditions.

We have also conducted field research aimed at understanding prospective person memory. In one study, students in five introductory psychology classes were shown pictures of two male suspects with one of the suspects being the critical suspect who the students would have an opportunity to identify later. Students were asked to imagine that these individuals were wanted by authorities. The participants were told that if they spotted these individuals and contacted the experimenter that they would win a portion of a \$100 prize. For half of the subjects, the picture of the critical suspect was shown with facial hair and, for the other half of the subjects, the picture of the critical suspect was shown clean shaven. Participants were allowed to study the pictures for four minutes. Two days later, the critical suspect came to the classroom and delivered some papers to the class instructors. The suspect turned and faced the class, said "Good morning", paused for a few seconds, and then left the classroom. In his appearance, the critical suspect was clean shaven. Only 5% of the students present at during both class sessions contacted the experimenter and correctly identified the suspect. Of those who identified the suspect, 75% had seen a picture of the suspect without facial hair, although it is important to note that the number of identifications was too low to provide a reliable comparison between the facial hair and no facial hair conditions.

In another study, participants from four different introductory psychology classes watched a mock news broadcast showing pictures of two individuals. The news broadcast was meant to simulate a search for two wanted bank robbers. Participants were told that the individuals shown in the news broadcast were not actually wanted by authorities, but that if they spotted the individuals on campus and contacted their instructor, they would win a portion of a \$100 prize. Two days later, the wanted individuals held a cookie sale for the psychology club on the second floor of the psychology building. The classrooms for general psychology were all on the third floor, and the only way students could get to their class or leave their class required that the students walk past the cookie sale. Overall, less than 4% of the students who were present in class both on the day of the cookie sale and on the day of the mock news broadcast made a correct identification. To examine focus of attention, students for half of the classes were sent an email, prior to the cookie sale, telling them about the cookie sale and providing them with a coupon promising two cookies for the price of one. This additional manipulation increased identifications, but only slightly. Students who had been told of the cookie sale correctly identified the "fugitives" 6.67% of the time compared to 2.47% of the time for the control condition.

The studies described above suggest that the ability of members of the general public to correctly identify wanted fugitives in realistic real world conditions is quite limited. In no study that we have conducted has the identification rate exceeded 7%. This is in spite of the

fact that the wanted suspects have appeared either in the very same classroom where the initial encoding of the suspects occurred, or immediately outside the classroom. Indeed, initially we were concerned that we were making the task too easy for subjects. Apparently we were mistaken.

## FINDING MISSING CHILDREN

Since the 1980s there has been an increased awareness in the United States of the problem of missing children (Asdigian, Finkelhor, and Hotaling, 1995). To obtain data on the nature and extent of the problem, the Department of Justice funded the National Incidence Studies of Missing, Abducted, Runaway, and Thrownaway Children (Finkelhor, Hotaling, and Sedlak, 1990). These studies found that 797,500 children were reported missing in 1999 (Sedlak et al., 2002). Forty-three percent of these cases involve a benign explanation such as: the parent is temporarily unaware of where the child is, contacts police, and later determines that the child is safe after all (e.g., the child went to a friend's house without telling the parent). Forty-six percent of cases involve children who have either runaway or have been "thrownaway" (i.e., have been expelled from their domicile by their legal guardians). Eight percent of cases are children who are lost, injured, or otherwise missing. Family abductions, such as when a non-custodial parent takes a child from the parent with legal guardianship, represent 7 percent of cases. Non-family abductions occur for 2 percent of cases.<sup>2</sup> "Stereotypical abductions", in which a child is taken by a stranger, transported more than 50 miles, held for ransom, kept permanently or killed are rare, representing a little more than 100 cases per year (Finkelhor, Hammer, and Sedlak, 2002).

Missing children represent an important problem and society has been aggressively responding to the problem in a number of different ways including direct mail advertising campaigns, supermarket posters, television coverage, and Amber Alerts. We believe that these efforts are laudable and important. A central goal of our program of research thus far has been to examine these approaches from the perspective of our theoretical understanding of prospective person memory with an eye towards making these approaches more effective.

In one early study we examined the effectiveness of campaigns which place posters of missing children at the exits of supermarkets (Lampinen, Arnal, and Hicks, in press). With the help of a local grocery store that does not currently have a missing children campaign, we placed posters of eight missing children at the exit of the store. The posters were closely modeled after those used by major national campaigns and the children depicted in the posters were active cases from the website of the National Center for Missing and Exploited Children. One week after we first placed the posters in the supermarket we surveyed customers as they left the store. Customers were asked how important they thought the problem of missing children was, the degree to which they looked at the posters in the supermarket, as well as a number of other questions. Participants were also shown pictures of 16 missing children and were asked to circle the 8 pictures that were depicted in the grocery store.

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<sup>2</sup> The authors of the NISMART studies point out that these totals sum to more than 100% because some children are involved in more than one incident.



Results of the survey are shown in Figures 1, 2 and 3. About 90% of people indicated that the problem of missing children is either a very important problem or an extremely important problem. Despite this concern, most customers did not look at the posters. More than 90% of customers either did not look or looked only briefly. The memory data were equally discouraging. Memory for the photographs shown in the store did not reliably differ from chance. Note that the results indicated that participants could not distinguish between presented and non-presented pictures within minutes of their visit to the store, even when the pictures on the test were identical with the pictures in the store.

In a follow up survey, we asked participants to indicate why they did not spend more time looking at the posters that were in the grocery store. The reasons given by customers were coded and are depicted in Figure 4. About 40% of customers indicated that they simply walked by the posters without taking note of them. About a third of customers indicated that they were simply too busy to look. A little over 10% indicated that they simply did not think to look. The results of these initial surveys are discouraging, although not especially surprising. Customers at grocery stores are typically busy people, eager to get home or to continue on to other errands. Placing posters at the exits of grocery stores requires that customers will interrupt their important ongoing activities long enough to look at the posters and attempt to commit them to memory. This may not be a realistic expectation.

However, there is reason for hope. Customers are concerned about the problem of missing children and many of our respondents were downright apologetic about the fact that they did not stop to look at the posters. Moreover, the contributions of large corporations in publicizing the problem of missing children are both laudable and promising. We believe that it should be possible to take advantage of work in marketing psychology to develop more effective campaigns for publicizing missing children. In particular, we are currently working on making use of point of purchase advertising approaches to help find missing children. Point of purchase campaigns place advertisements at and around cash registers. Marketing psychologists have shown that point of purchase advertising can dramatically increase sales and product memory (Bennett, 1998; Woodside and Waddle, 1975). We believe that these same techniques can be used to better publicize missing children cases.

Another problem that arises with regards to missing children has to do with obtaining pictures of the children that match their current appearance. Sometimes children go missing and remain missing over extended time periods. The longer a child is missing, the more likely they are to suffer physical and psychological harm (Plass, Finkelhor, and Hotaling, 1996). These problems are complicated by the fact that children change dramatically as they age, hampering attempts to find them (McQueen, 1989).

The dominant strategy for dealing with this problem has been to make use of forensic age progression (McQueen, 1989). In forensic age progression, a child's picture at one age is digitally altered by a forensic artist to project what the child would look like at another age. For instance, if a child goes missing at age 5 and is still missing 5 years later, a forensic artist might be asked to make use of the picture from age five to project what the child likely looks like at age 10. The forensic use of age progression is a relatively recent technique. In 1985, medical illustrators Barrows and Stadler conducted the first forensic age progressions for law enforcement (McQueen, 1989; Sadler, 1986). They based their technique on a large database of children's faces that provided them with statistical information about the craniofacial growth patterns of typical children as they age. In their technique, a computer program projects changes in the relative location of 40 anatomical landmarks on the child's face.

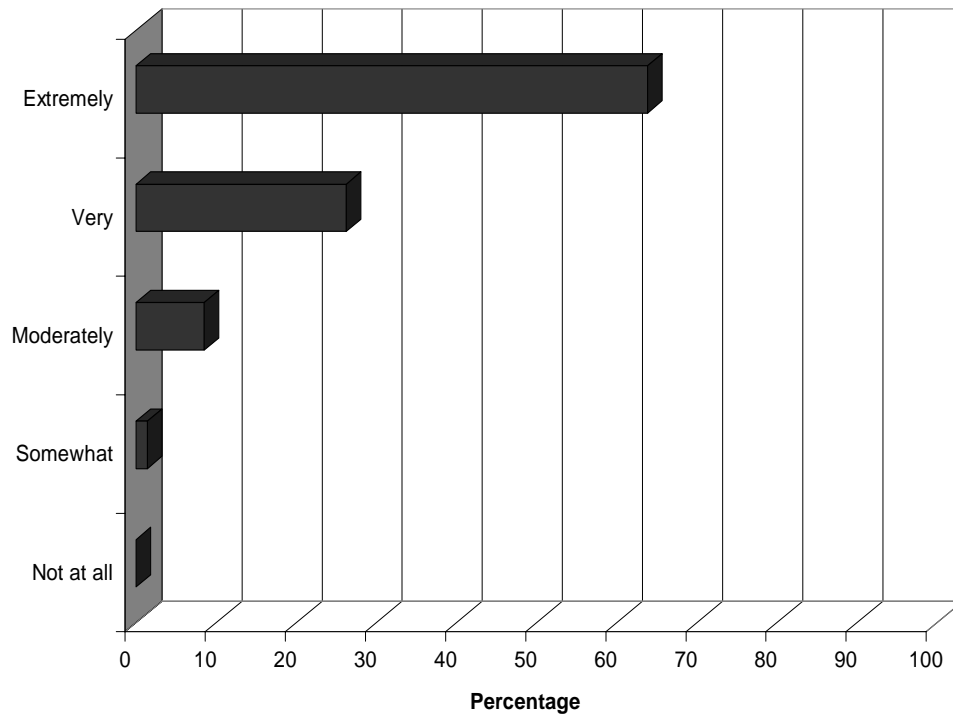


Figure 1. How important is the problem of finding missing children?

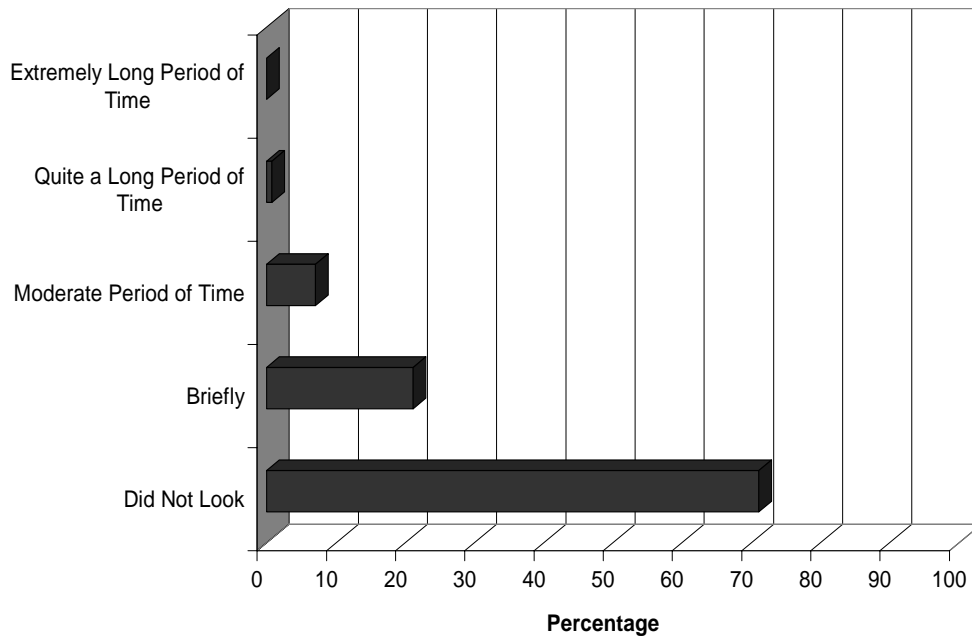


Figure 2. How long did you look at the posters of the missing children?

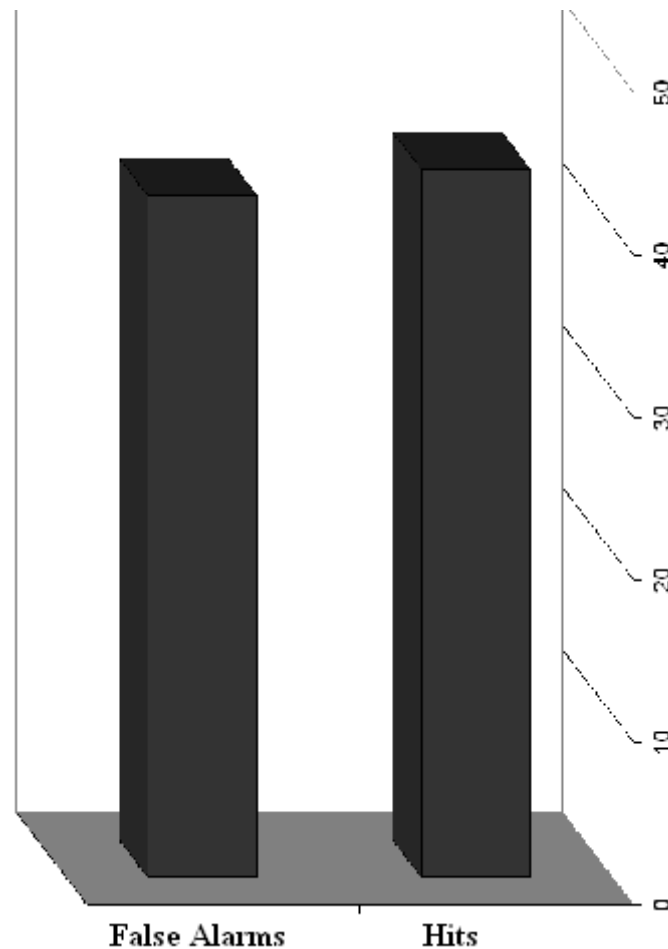


Figure 3. Memory accuracy in recognizing children that were depicted in the supermarket posters.

In addition to these techniques, some forensic artists make use of pictures of the child's biological relatives at the target age to help guide the projection. For instance, a picture of the missing child's father at age 10 might be used to help guide the projection of what the child looks like at age ten.

Forensic age projection is a very common technique in missing children cases. Recently, we randomly sampled 100 cases from the website of the National Center for Missing and Exploited Children. Thirty-nine percent of the cases we sampled involved a child that has been missing for more than 5 years, meaning there is no recent picture of the missing child. Forty-one percent of the cases we sampled made use of forensic age progression. Many of the cases involve a substantial amount of age progression. The median number of years a case has been age progressed is 11 years. Clearly, then, the effectiveness of forensic age progression is an important issue.

We recently undertook a study to examine the effectiveness of age progressed pictures in allowing participants to identify children. Undergraduate volunteers provided us with pictures of themselves at age 7, pictures of their parents at age 12, and pictures of siblings at age 12. The volunteers also provided us with pictures of themselves at age 12.

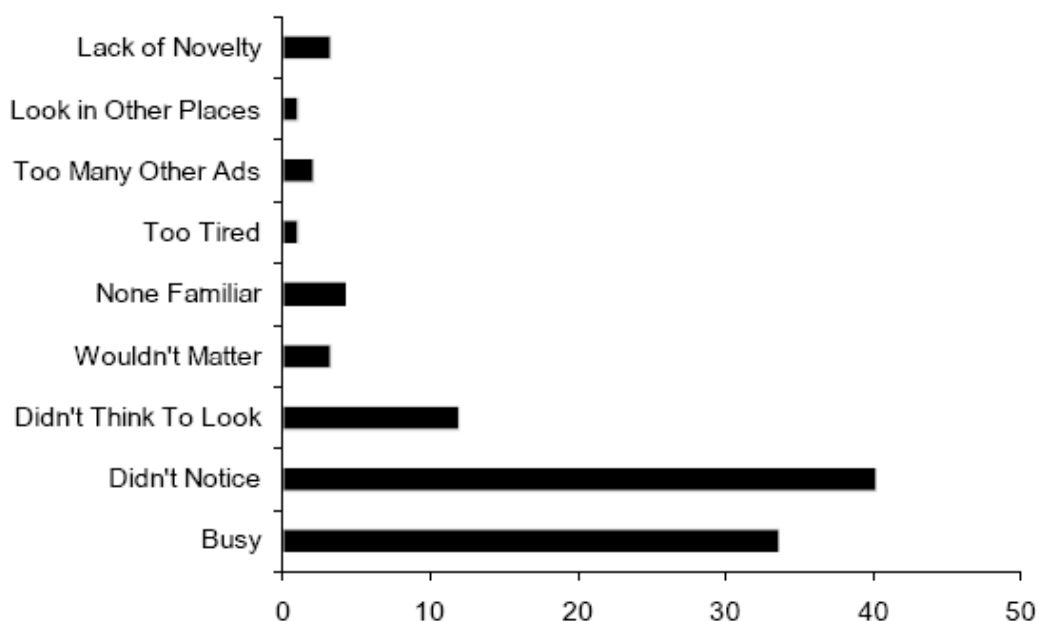


Figure 4. Reasons given by customers for not looking at posters of missing children.

Forensic artists who are experienced at conducting age progression for law enforcement were provided with pictures of the students at age 6-7, as well as the pictures of their siblings and parents. The artists were asked to provide us with age progressed pictures of the students with a target age of 12.

To examine the effectiveness of these age progressed photographs, participants engaged in a laboratory based prospective person memory task. Participants were asked to imagine that 4 children went missing, and that they went missing several years ago. In the *age matched condition*, participants studied 4 pictures of children at age 12, and they were later tested with different pictures of those same children at age 12. In the *age mismatched condition*, participants studied 4 pictures of children at age 7, and they were later tested with pictures of those same children at age 12. In the *age progressed condition*, participants studied pictures of 4 children that had been age progressed to age 12, and they were later tested with actual pictures of those same children at age 12. In all three conditions, participants were shown the pictures four times, at a presentation rate of 3 seconds per presentation.

After this study session, participants engaged in a prospective person memory task, followed by a retrospective person memory task. During the prospective person memory task, participants viewed 44 pictures of children who were approximately 11-12 years old. Four of the pictures were of the “missing children” and 40 of the pictures were new foils. Participants were told that they were to imagine they were placing children into two teams: the P team and the Q team. To place a child on the P team, they were to press the ‘P’ key on their keyboard. To place a child on the Q team, they were to press the ‘Q’ key on their keyboard. Participants were instructed to create teams that had an equal number of boys and girls. This ongoing task was moderately difficult because the pictures were randomly presented, requiring minimally

that the participant keep track of which team they placed the last girl on and which team they placed the last boy on. In addition to this ongoing task, participants were told that if at any point they saw one of the “missing children,” that they were to press the ‘H’ key on their keyboard.

Immediately following the prospective memory task, participants engaged in a retrospective memory task. In the retrospective memory task, participants were shown four lineups. Each lineup contained a picture of one of the “missing” children at age 12 and seven foils. All pictures were of children who had previously been in the prospective memory task. Participants were to select the picture of the “missing” child or to indicate that none of the pictures were of one of the “missing” children.

Results of the prospective and retrospective memory task are shown in Figure 5. Prospective memory was corrected by subtracting the proportion of false identifications of foils made. As can be seen, forensic age progression did not appear to be especially effective. With regard both to prospective memory and retrospective memory, age progressed photographs did not lead to better identifications than simply studying the picture of the child at age 7. Studying the picture of the child at age 12 led to significantly better prospective and retrospective memory than either of the other conditions. Regression analyses indicated that performance on the prospective memory task was predicted by performance on the retrospective memory task. This suggests that the type of picture shown is primarily influencing the retrospective component of the prospective memory task.

Forensic age progression is an extremely common technique in cases involving missing children. We had a forensic artist age progress childhood pictures given to us by adult volunteers. Age progressed pictures did not appear to improve prospective person memory for missing children relative to a condition where participants simply studied to pictures of the children at the younger age. Age progressed pictures also did not appear to improve lineup identification. These findings are troubling, because in a large proportion of cases a current photograph of the missing child is simply not available.

It is important to note, however, that this study represents simply an initial look at age progression and is part of a larger ongoing program of research. The results are based on one company that does age progression for law enforcement. Moreover, we looked only at age progressions from age 7 to age 12, and it is plausible that the success of age progression techniques may depend crucially on how much the pictures are age progressed, as well as the starting points and end points of the age progression. We also only looked only at age progression with Caucasian children, and it’s important to note that there are a large number of missing children who are African American or Hispanic. All of these issues are currently being addressed in our ongoing work.

The problem of missing children is extremely important and the general public evinces great concern over the issue. Additionally, considerable societal resources are being devoted to the problem of helping to find missing children. We have argued that these efforts can best be characterized as an instance of prospective person memory. While efforts by law enforcement, the media and corporations is laudable, we believe that research on prospective person memory can be utilized to help improve the effectiveness of these programs. A major focus of our current research is on finding ways of accomplishing these objectives in hopes of helping secure the return of missing children.

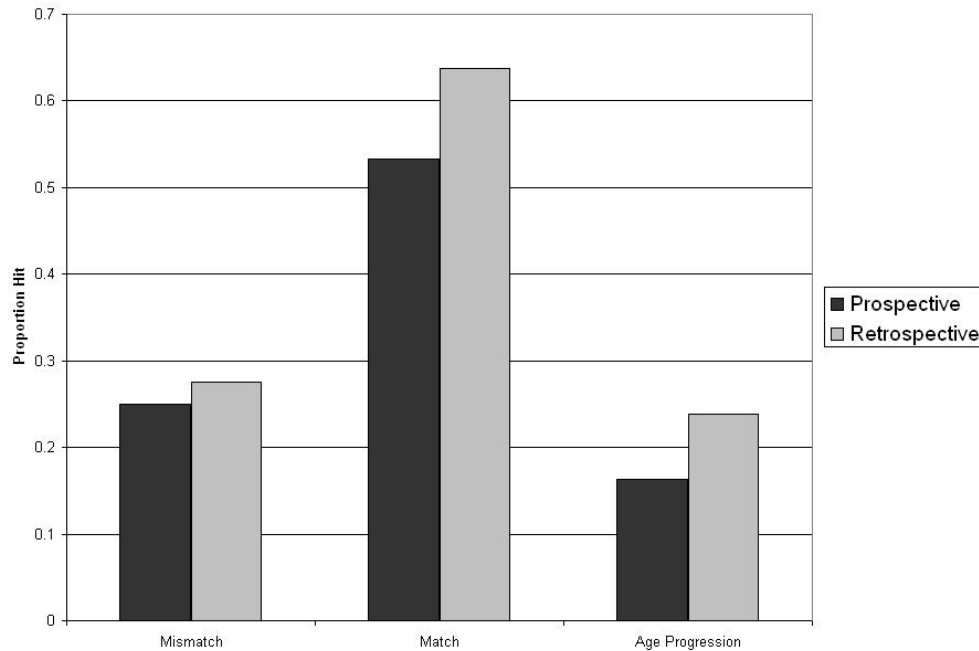


Figure 5. Mean proportion correctly recognized in the prospective and retrospective tasks in the forensic age progression study.

## CONCLUSION

The contemporary, experimental study of prospective memory is now a couple of decades old, and the naturalistic study of prospective memory is even older. The research reviewed in this chapter represents a novel combination of both methods to address an important application of prospective memory in the real world, namely, identifying missing children and fugitives from the law. The study of person prospective memory holds promise for continued application and theoretical innovation in the prospective memory literature. What follows are some conclusions and thoughts regarding future directions in this area.

A notable feature of the research described in this chapter is that we are getting an idea of how often people naturally form intentions on their own. This can be contrasted with experimental work in which participants in studies are uniformly given the intention to respond to a cue in the future and are often asked to repeat those instructions for an experimenter to confirm the encoding. The supermarket survey study is an exemplar case for the study of naturally-formed intentions (Lampinen, Arnal, and Hicks, in press). Very few customers spent time even looking at photographs of missing children, which essentially limits the number of people that could have formed the intention to be on the lookout for those children, and only about 10% of customers reported forming a meaningful intention. Thus, more research needs to be done exploring how to get people to take the time needed for forming intentions about such photographs.

A promising area for further development in this regard may lie with implementation intentions (Gollwitzer, 1999). Implementation intentions are those that take the form “When

situation x arises, I will perform response y” (Gollwitzer, p. 494). These are contrasted with goal intentions, which are more generally formed as “I will perform y.” As applied to the routine aspects of life, people often form very general goal intentions (e.g., “I need to pick up the dry cleaning”) without specifying the critical conditions under which the intentions are to be fulfilled (e.g., “I need to pick up the dry cleaning on my way to work just as I pass the local supermarket”). A number of recent papers have explored the utility of implementation intentions in both naturalistic and experimental prospective memory paradigms (e.g., Cohen and Gollwitzer, 2007; Liu and Park, 2004). Implementation intentions can be quite effective and take very little time and effort to encode. The potential combination of implementation intentions with imagery and pictorial encoding of faces holds great promise for the study of person prospective memory.

As a word of caution, we are careful not to assume that the study of *person* prospective memory is necessarily unique as compared with the traditional methods of investigating prospective memory. But what is unique about this research is the way in which both experimental and naturalistic (i.e., field) research is being done in tandem to uncover the theoretical principles of identifying people in service of carrying out intentions and the degree to which people develop such intentions on their own. Thus, our research program lies at the intersection of a budding theoretical interest in prospective memory and one of the more compelling everyday aspects of memory performance—remembering to carry out intentions.

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