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Triton Psychology Report

Undergraduate Research Journal
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Triton Psychology Report

Undergraduate Research Journal at UCSD

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Editor's Inkblot

The field of psychology arouses considerable interest at the larger universities—the University of California, San Diego is no exception. With approximately 1,300 undergraduate psychology majors, psychology ranks as the third most popular degree at this institution.

Numerous laboratories scatter the campus, and research plays an integral part of the education process for some undergraduate students. Our goal, at the Triton Psychology Report, is to share their hard work with the psychology community.

TPR was inspired by The Saltman Quarterly, the undergraduate biology research journal at UCSD. A childhood friend of mine played a major role in putting together the inaugural issue of SQ, and I thought it would be a great idea to start a similar endeavor for the psychology department.

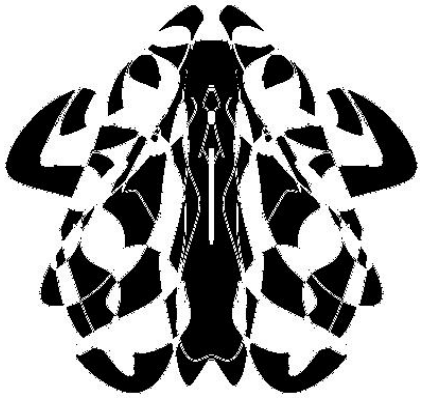
UCSD is well-known in academia for its strong research, yet most undergraduate work is overlooked in favor of faculty or graduate student papers. I envision TPR as an avenue that provides undergraduate students a voice among their peers, as well as the goal that their hard work and dedication to academics may result in an official publication. For those not currently involved in research, I hope TPR fosters the desire to participate during their remaining undergraduate careers at UCSD. I expect they will have wonderful experiences and feel the pride and sense of accomplishment that comes from contributing to the intellectual community.

In the early stages, TPR headed down the path of a strictly academic journal. However, such journals tend to be bland and overwhelming to the casual reader. We thought it would be a refreshing change of pace to include pieces such as book reviews, an interview with a UCSD psychology professor, and a biography on a famous psychologist recently portrayed in a major motion picture. With that in mind, the top priority of TPR remains showcasing undergraduate research.

In the following pages you will find papers and reviews written by UCSD undergraduates on topics ranging from eyewitness identification to child development. Because psychology contains many fascinating subfields, we here at TPR will do our best to cover as many topics as possible.

The creation of this journal would not have been possible without an amazing staff who embraced the idea and ran with it. Thank you all for your energy and passion, and I hope that we can keep TPR going for years to come.

Without further ado, I'd like to present you with the inaugural issue of the Triton Psychology Report. Enjoy!



Andrew Wong
Editor-In-Chief

The Effects of Thinking of One's Mother While Recovering From Stress

Suyen Rodriguez-Tolbert
Nicholas Christenfeld, Ph.D.

In order to determine how thoughts of social support affect recovery from stressful situations, a person's blood pressure is monitored throughout such an experience. Seventy six undergraduates underwent a stressful situation, followed by a period in which two different thought topics were assigned for them to contemplate. Blood pressure measurements indicated which of these conditions appeared to help in recovering from the stressful experience the best. A positive attitude and a high vividness of the memory of one's mother produced the lowest systolic blood pressure (SBP) in comparison to control subjects during recovery. Further, low vividness and a negative outlook of the memories of one's mother produced higher SBP in comparison to the controls during recovery. Thinking can influence recovery from stress and it appears that thought content drives this effect.

It has been found that stress, particularly chronic stress, is linked to the development of cardiovascular disease (Manuck, 1994), one of the leading causes of death in the United States (Uchino, Cacioppo, & Kiecolt-Glaser, 1996). With such a detrimental outcome, it is important to search for strategies that may help lower reactions to stress. Evidence that thoughts can give rise to physiological reactions come from studies indicating that social support is beneficial to the cardiovascular, endocrine and immune systems (Uchino et al., 1996). The extent and quality of such interactions have been associated with morbidity and mortality—people having the poorest social interactions have the highest mortality rates.

Most research conducted in the lab involves how support affects reactivity to a stressor (Linden, Earle, Gerin, & Christenfeld, 1996). Reactivity refers to the physiological change from baseline in response to a stressor. Many studies have involved situations in which individuals are placed in a stressful situation, and then given access to actual or potential support from another person. In studies in which different supportive conditions were controlled, lower levels of cardiovascular reactivity were sometimes observed in response to the psychosocial stressor (Uchino & Garvey, 1997). Far less research has involved the recovery process in response to stress. Recovery is the period following the end of the stressful situation in which the elevated physiological state implies the continued effect of the stressor (Linden et al., 1996). It may be important to study the recovery period because an ability to return to baseline levels of cardiovascular activity, or homeostasis, may indicate healthy functioning. (Gillin, Mill, Nelesen, Dillon, Ziegler, & Dimsdale, 1996). Some research findings indicate multiple factors that influence this ability to recover quickly from stress (Linden et al., 1996).

Results from one study indicate that listening to music facilitates blood pressure recovery after a stressor, when compared to doing nothing (Chafin, Roy, Gerin, & Christenfeld, in press). Most individuals find music pleasing, suggesting that the presence of something pleasant may influence the recovery process, among other factors. If the presence of support helps reduce reactivity at the time of the stressor, it may also be the case that it will help in the subsequent recovery period. Furthermore, support may not need to be physically present in order to have an effect; one might just need to think about having a network of support available. For instance, one study found that simply knowing that a supportive individual was in the next room was enough to attenuate reactivity (Uchino & Garvey, 1997). In addition, there is evidence indicating that receiving support from a family member has a stronger effect on the regulation of blood pressure than support from a stranger or a friend (Uchino et al., 1996). It appears that family is usually the leading network of support for people. Within a family, the mother is usually the most supportive. Such findings lead to the development of this research study, with the intent of determining whether thinking about having familial support available, specifically that of one's mother, would have a beneficial effect in the recovery period following a stressful event.

Method

The experiment was designed to test whether thinking of one's support network, specifically social support from one's mother, could facilitate the reduction of cardiovascular activity after a stressful situation.

The stressor consisted of a mental arithmetic task that participants performed while the experimenter continuously harassed them. Recovery involved three conditions: a "neutral" condition, a "mother" condition and the control condition. Each subject's condition was determined at random prior to their arrival. In the "neutral" condition, participants were instructed to think of experiences thought to have no emotional involvement, such as a recent trip to the grocery store, the drug store, or out for fast food. In the "mother" condition, participants were instructed to think about instances in which their mother had been nurturing or supportive of them. In the control condition, subjects were asked to sit quietly, and were not instructed to think of anything. The participant's blood pressure and heart rate were monitored throughout the baseline, stress, and recovery periods.

Participants

Undergraduate students served as participants in exchange for class credit. None indicated any history of hypertension or heart disease.

Materials

All participants were given a questionnaire at the conclusion of the experiment to determine how stressful they found the task to be, how the participants felt following the stressor, how much time they spent thinking about the stressor after it was over, and thoughts unrelated to the stressor. In the "neutral" condition, participants were asked whether they had a positive or negative impression of the activities they were instructed to think about. In the "mother" condition, participants were asked to rate their relationship with their mother, how supportive and nurturing their mother was to them, how pleasant they felt when thinking about their mother after the stressor, and to describe what kind of relationship the participant had with his or her mother. Finally, participants reported how much of the time they actually spent thinking of what they were instructed to think about.

Procedure

Upon arrival to the lab, each participant was given a consent form to read and sign, then further informed that they would be performing different mental tasks while their blood pressure and heart rate were being monitored. Before the experiment continued it was verified that the participant had no history of hypertension or heart disease. To assess resting blood pressure, the participant was asked to place the third finger of their non-dominant hand in a finger cuff which delivered readings of their heart rate and blood pressure to the Ohmeda Finapress 2300 blood pressure monitor. The participant was instructed to sit still and quietly for an initial 10-minute baseline period. The blood pressure monitor was turned on as the experimenter exited the room.

Following this 10-minute baseline period, the experimenter reentered the room. At this time, the participant performed the stressful task: count backwards out loud in intervals of 13, starting from 2,037. They were told to do this task quickly and accurately because their levels were a measure of their performance. Thirty seconds into the task, the experimenter harassed the participant by telling them to count faster, and telling them to restart. One minute into the task, the experimenter told the participant they still needed to speed up, and that they should restart, but to try counting backwards by intervals of seven instead, which "might be easier for them". One minute and 30 seconds into the task, the experimenter harassed the participant a final time telling them to restart and urging them to perform the task faster, or their data would be useless. Anytime during the task when the participant gave a wrong answer, the experimenter rudely told them that their answer was incorrect. After three minutes the participant was told they could stop counting.

During the next five minutes, participants were either instructed to think of specific thoughts for two of the conditions, or given no instruction for the control condition. When a subject was in the "neutral" condition, they were asked to think of three different instances in which they either went to the grocery store, to the drug store, or out for fast food, all to be considered in great detail because the experimenter would be asking them specific questions five minutes later. In the "mother" condition, the participant was asked to think of three different instances in which their mother was either nurturing or supportive of them in as much detail as possible. Once again, the subjects were allowed five minutes to think about this. In the control condition, subjects were given no instruction, merely told they needed to sit for a five-minute final reading period.

The experimenter then re-entered the room and told participants in the "neutral" and "mother" conditions that no questions would actually be asked. At this point, all participants were instructed to continue to sit still for a five-minute reading, which was used as a final baseline. When the experimenter re-entered the room and stopped the blood pressure monitor, the participant was presented with the questionnaire.

Questionnaire

Questions included rating how stressful and difficult participants found the arithmetic task to be (1=not at all to 10=very) and how pleasant or unpleasant they found it to be (-10=unpleasant to 10=pleasant). For the "mother" and "neutral" conditions, additional responses indicated what percentage of time participants spent thinking about the mental arithmetic task, the instructed topic and other topics during the five-minute period immediately following the mental arithmetic task. They were also asked to rate how vivid the memories of the instructed topics were (1=not at all to 10=very much). To assess shopping experiences in general, people in the "neutral" condition were asked to rate how positive or negative they considered shopping at the places mentioned (-10=negative to 10=positive) and how satisfied they were after shopping at these venues (1=not at all to 10=very much). To assess the relationship with their mother, participants in the "mother" condition were asked how positive or negative their relationship with their mother was (-10=negative to 10=positive) and how

supportive they found their mother to be (1=not at all to 10=very much).

Results

The original three conditions were further subdivided by a median split, creating five new conditions determined by participants' self-reports on the vividness of their memories and attitudes toward shopping or relationships with their mothers. In the "shopping" condition, those subjects with a positive attitude toward their experience and vivid memories of them were now called "Shop-Positive/Vivid." Those reporting a negative attitude toward the shopping experiences and a lack of vivid memories were now called "Shop-Negative/Non-vivid."

In the "mother" condition, participants reporting a strong relationship with their mother and vivid memories of their experiences were now called "Mom-Strong/Vivid." Those who indicated a weak relationship with their mothers and few vivid memories were now called "Mom-Weak/Non-vivid." Results for these groups are shown in Fig. 1.

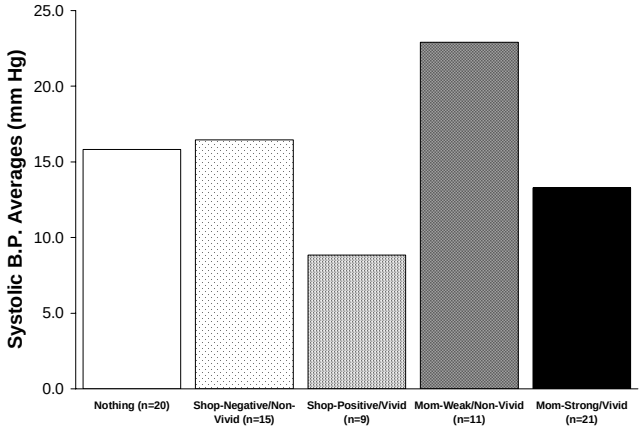


Figure 1. The average Systolic Blood Pressure measuring the stress level of subjects, plotted against time on a per minute basis for all conditions during the "stress", "think", and "recovery" periods.

We observed a relationship between attitude toward the thought topic, vividness of memory, and post-stressor physiological activity. The two most important periods for observation of systolic blood pressure (SBP) were the thinking period and the recovery period. We ran a one-way ANOVA comparing the means between the five groups, with systolic blood pressure as our dependent measure for both the thinking and recovery period. For the thinking period, the overall results were marginally significant inall conditions, $F(4,71)=2.449$, $p=0.0540$ whereas the recovery period yielded an overall significant effect for all conditions, $F(4,71)=3.441$, $p=0.0125$. It appears that a positive attitude toward the thought topic and vivid memories during the thinking period produces the lowest SBP versus the control group, as shown in Fig. 2. The people in the thinking period with the highest blood pressure were those in the "Mom-Weak/Non-Vivid" condition, with the largest difference between that condition and the "Shop-Positive/Vivid" condition. However Fig. 3, depicting recovery, identifies the lowest

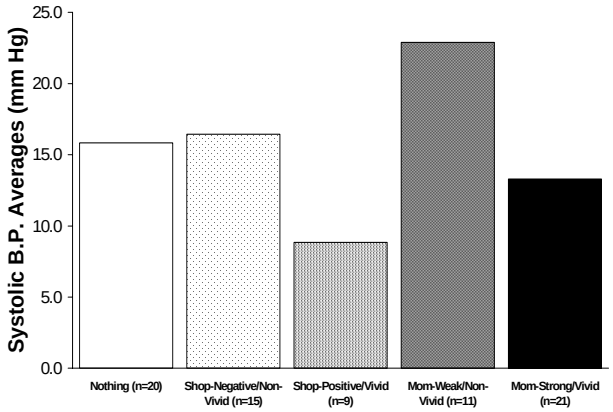


Figure 2. The average Systolic Blood Pressure measuring the stress level of subjects for all conditions during the "think" period.

SBP to be from subjects in the "Mom-Strong/Vivid" condition. Those in the "Mom-Weak/Non-Vivid" condition had the highest SBP. The largest difference in systolic blood pressure measurements was between these subjects and those in the "Mom-Strong/Vivid" condition.

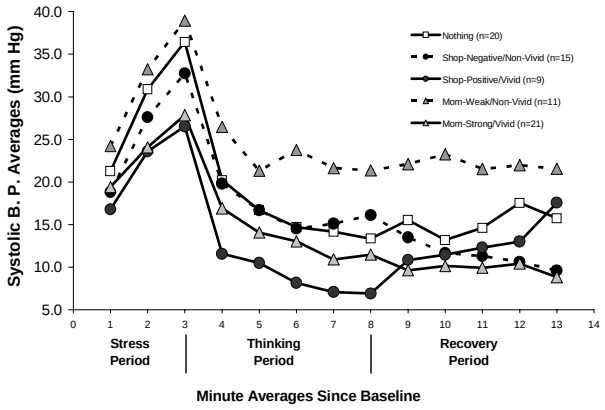


Figure 3. The average Systolic Blood Pressure measuring the stress level of subjects for all conditions during the "recovery" period.

Discussion

When thinking about shopping and about one's mother, vivid memories and positive attitudes produce lower systolic blood pressure during the thought process. When a person thought about shopping and was satisfied by the experiences with a vivid memory, this facilitated lower SBP than the control group during the thinking period. This effect disappeared during the recovery period, likely because such thought served as a distracter, whereas the more satisfying and the more vivid the memories of the shopping experiences were, the better distracter it was. The effect did not continue once this thought was out of

mind. For those who were dissatisfied with their experiences and for whom the memories weren't vivid, the effect appeared to be similar to that of the control group.

By contrast, if the person thought about their mother and their relationship was strong and memories vivid, this aided in recovery from stress during the thinking period as well as during the recovery period. This may have occurred because the thought topic involved a more emotional component, providing a stronger impact in combating stress, as opposed to merely serving as a distracter.

This emotional reaction can also be accounted for in the condition in which the relationship with the person's mother was weak and the memories less vivid. In this situation, people seemed to be reacting to the thought topic negatively, such that they were recovering poorly compared to those in the other conditions, indicated by higher systolic blood pressure. It may be possible that this particular thought topic was not serving as a distracter from the previous stress and that, in fact, it could be producing more stress. This added stress extended the elevated level of SBP into the thinking and recovery periods even after the original stress ended, thus prolonging recovery.

Some limitations of this experiment should be taken into account. Foremost is the inability of the experimenter to control the person's compliance to think only of the thought topic given. The questionnaires indicated that people usually spent a large amount of time thinking about the previously experienced arithmetic task as well as other thoughts. Hence, the amount of time spent thinking about the stressor may influence how well a person recovers.

Future research could include having participants choose the thought topics that they find particularly pleasant and most memorable, and comparing these to a control group.

These results suggest that thinking about having social support may not necessarily be the driving influence in the way people recover from stress. It appears that the content, whether positive or negative, is what makes the difference. This supports previous research findings that mental states do influence physiological states. Thinking of vivid as well as positive or pleasant thoughts, such as the enjoyment in shopping and a good relationship with one's mother, appear to help reduce the time required to recover from stress when compared to a normal recovery with neutral memories and vague thoughts. The most prominent observation is that thoughts of a bad relationship with one's mother prolong the time required to recover from stress. This thought may be causing stress in itself, which could lead to even higher blood pressure levels. It appears that thinking can influence the physiological recovery from stress and that thought content plays a central role.

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Suyen Rodriguez-Tolbert is a UCSD Alumnus who graduated in 2004. She was a psychology major from Marshall College with an area of interest in social psychology. During her time at UCSD, she was a member of Psi Chi and worked in Dr. Nicholas Christenfeld's Laboratory. Suyen was recently married on March 19, 2005 and plans to go back to graduate school in Philadelphia to pursue a degree in Marriage and Family Therapy.

Delay Discounting Rate Decreases as Reward Size Increases

Edward Vul
Christine Harris, Ph.D.

The rate of delayed reward discounting was assessed using a series of 20 forced-choice questions with varying delay and size of delayed reward. Delay length was manipulated to generate hyperbolic discounting parameters of varying magnitude, while delayed reward sizes were split into three categories: small, medium, and large. Among four age groups studied, delay discounting parameter was found to decrease with increasing reward size, supporting the theory that discounting rate is not constant across reward sizes. Furthermore, a significant quadratic interaction between age and reward size was found such that the youngest and oldest groups devalued future medium-size rewards less than the interim groups.

Why do people procrastinate? Why do they buy more with credit cards than they do with cash? Why do smokers who know perfectly well the negative repercussions of their habit persist in smoking? These questions can be answered by the fact that when people assess the value of future rewards, they invariably follow the adage, "the sooner the better." Therefore, the activity that supplants productive hours as one procrastinates seems to lose value if postponed until the completion of work. Similarly, while the immediate material gain of a purchase does not outweigh immediate financial loss (cash), it prevails over the same financial loss one month later (credit card bill). For the smoker, the long-term rewards of quitting are dwarfed by the immediate gratification of the next cigarette. This process of devaluing rewards and costs according to their delay is referred to as delay discounting; the phenomenon has ramifications for models of decision making and impulsiveness (Herrnstein, 1981) as well as delay of gratification research (Ainsley, 1992).

The rate of discounting has traditionally been described by the exponential model $V = Ae^{-kD}$, where V is the present value of a delayed reward, A is the actual value of the reward, D is the length of the delay, and k is the discounting parameter (Fishburn & Rubenstein, 1982). However, new research suggests that the hyperbolic model of discounting, $V = A / (1+kD)$, better fits collected data (Mazur, 1987; Kirby, 1997). Further, although traditional explanations of discounting have considered a constant discounting rate, Kirby and Marakovic (1996) found that as the size of the delayed reward increases from $35 to $85, the discounting parameter (k) decreases. Additionally, research has supported the commonsense notion that impulsiveness, as measured by discounting parameter, subsides with age (Green, Fry, & Myerson, 1994).

The goals of the present study are twofold. First, since Kirby and Marakovic (1996) employed a college-age sample, the current study is designed to replicate their finding that delayed reward size is inversely related to the hyperbolic discounting parameter in an adult population. The second goal is to investigate effects that age may have on the discounting parameter (and thus impulsiveness) when reward size is manipulated.

Method

Participants

Participants were recruited from a diverse internet research panel, which they joined by agreeing to serve in a variety of behavioral science studies in exchange for entries into prize drawings. Although multiple studies of delay discounting used this participant panel, no one member was allowed to participate in more than one such study. A total of 4,000 adult (M=35.4, SD=11.9 years) panelists were invited via email to participate. Of those invited, 1,285 responded and 889 (503F, 386M) panelists completed the study. A total of 151 participants provided responses that made calculation of a discounting parameter impossible; therefore, the remaining 738 were used for the analysis. Although this sample varied across demographic measures (e.g. nationality, ethnicity, environment, and education) none produced a significant difference.

Design and Stimuli

Participants were presented with 20 of the 21 questions used by Kirby and Marakovic (1996), wherein each question consisted of a decision in the format,

"Would you rather receive $[V] tonight, or $[A] in $[D] days?" The A (delayed reward) values fit into three ranges: small ($30-$35), medium ($55-$65), and large ($70-$85). The V (instant reward), and D (delay length) values were chosen to create seven discounting ranges. Questions from every delayed reward size category were included in each discounting range, with the exception of the highest discounting range, where (due to miscommunication) the large reward size question was omitted from the experiment. To study the effects of age, participants were split into age quartile categories, yielding four groups (18-24, 25-33, 34-43, and 44-81) of approximately 185 subjects per group.

Procedure

After providing demographic information, participants were presented one question at a time, in randomized order, and instructed to choose an immediate or delayed reward as if the monetary rewards offered were not hypothetical. Every subject was assigned a delay discounting parameter for each of the three delayed reward size categories according to their responses.

For each question a hyperbolic discounting parameter (HDP) was calculated using a transformation of the hyperbolic discounting model: $k=(A/V-1)/D$, where A is the actual value of the delayed reward, V is the value of the immediate reward, and D is the delay length. Hence, the value of k is the HDP at which the delayed reward is deemed to be equal in value to the immediate reward. Since subjects were forced to choose one of two options, rather than indicate indifference, no single question could identify the HDP; instead, this parameter was ascertained based on the "switch" from immediate to delayed rewards.

Questions within each of the prize value categories defined bounded ranges of HDP values. Each range yielded a parameter value which was computed by calculating the geometric mean of the HDPs of the two binding questions (the geometric mean was used to avoid underweighting small parameter values). This procedure yielded six potential parameter values for the small and medium delayed reward categories, and five for the large delayed reward category. Because a distinctive reliable switch is nearly impossible to ascertain due to imperfect response consistency, the discounting parameters were calculated probabilistically: for each subject, within each category, every potential parameter value was given a consistency measure, which is the proportion of trials in which answers were consistent with this given parameter value. The parameter value yielding highest consistency with actual answer choices was assigned to that subject for that category. If there was a tie in consistency, the assigned parameter value was the geometric mean of the tied values.

Results

Mean discounting rate parameters were 0.0292, 0.0209 and 0.0134 for small, medium and large reward size categories, respectively (higher values indicate a greater devaluing of delayed rewards for an equal delay length). The reward size categories each had respective mean consistency measures of 98.2%, 97.2%, and 97.3%, indicating that for any given subject less than one out of the 20 questions was inconsistent with the discounting parameter assigned to its reward size category. Because the participant sample was essentially self-selected for willingness to enroll in delayed prize drawings, the absolute values of the obtained discounting parameters should not be generalized to the population. However, there is no plausible reason to analogously discount the relative differences observed among the within-subject conditions. These within-subject effects on the computed hyperbolic discounting parameters were analyzed with a two-factor (3 delayed reward size categories x 4 age groups) repeated measures analysis of variance. Geisser-Greenhouse corrections were applied to the degrees of freedom when appropriate; only the corrected probability values are reported

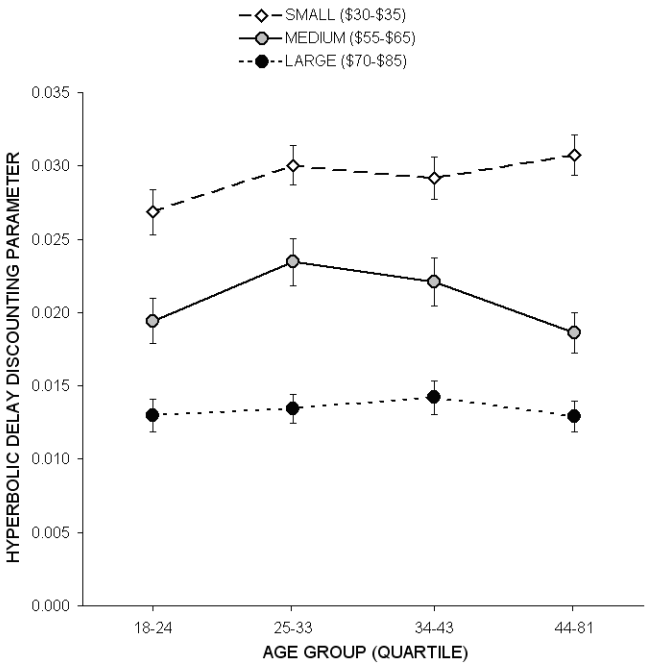

Figure 1. Hyperbolic delay discounting parameter (± 1 SEM) as a function of age across three delayed reward size categories.

Differences among the categories were reliable, with larger reward sizes generating lower discounting rates, $F(2,733)=277.2$, $p<.001$. The decreasing linear contrast for this effect was also highly significant, $F(1,733)=568.2$, $p<.001$, indicating a constant decrease across the three reward size categories. Although no significant effect of age was observed, there was a significant "between groups" interaction: subjects from 25 to 43 years of age had the highest discounting rates for medium prize values, $F(3,733)=2.52$, $p<.05$. The quadratic contrast for this interaction was also significant, $F(3,733)=3.39$, $p<.05$.

Discussion

The discounting parameter of delayed rewards decreased as delayed reward size-small ($30-$35),

medium ($55-$65), and large ($70-$85)-increased. These findings support the theory that the rate of discounting (namely, the discounting parameter) is a negative function of reward size. Furthermore, although age did not produce a significant main effect, age group was found to quadratically interact with delayed reward size. For medium reward sizes, the youngest and oldest groups were less impulsive than the two interim groups.

Although many factors such as maturation, personal income, or cohort effects (e.g., the "baby boom" expansion of the 1980s) may explain the above interaction, the precise reason is unclear. The fact that this effect was not found in the two other reward size categories adds to the muddled picture. Based on this oddity and because age groups were created to have equal size rather than equal age ranges and reward size categories were arbitrarily chosen, this interaction should be viewed with some skepticism.

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Edward Vul is a fourth year psychology/philosophy major from Thurgood Marshall College interested in cognition and perception. He has won the UC Regents Undergraduate Research Fellowship and received NSF Honorable Mention. Edward is a member of both Psi Chi and the Philosophy Forum. He has worked with Dr. Nicholas Christenfeld, Dr. Christine Harris, Dr. Harold Pashler, and Dr. Donald MacLeod. Edward is attending MIT next year as a contributing member of the Brain and Cognitive Science Department.

Effects of an Adolescent Alcohol Intervention Program on Drinking and Driving

Nicole Sintov
Sandra Brown, Ph.D.

A voluntary alcohol intervention that focused on changing attitudes toward alcohol use and related risk behaviors was made available to students in 9th through 12th grades at four high schools. School-wide surveys regarding alcohol use and risk behaviors of driving after drinking and riding with an intoxicated driver were administered in the fall and spring with intervention participants compared to a demographically matched control group. Results indicated that while intervention participants were generally more likely to drink and drive than control participants, older intervention participants were less likely to drink and drive than their same-aged controls. Additionally, intervention participants with driver's licenses were more likely to ride with a drinking driver than controls. Finally, a trend towards increased perception of risk for driving after drinking was found among intervention participants with driver's licenses. These findings indicate that adolescent development level and driver's license status may be important factors moderating the effects of adolescent alcohol interventions.

Alcohol is the most commonly used substance among adolescents (Johnston, O'Malley, & Bachman, 2002). For example, in studies measuring substance use among high school students, alcohol use was reported by over half of participants (Feldman, Harvey, Holowaty, & Shortt, 1999). Additionally, binge drinking is prevalent within this population, with 30% of twelfth grade students and 18% of tenth grade students reporting binge drinking within the past 30 days (Johnston et al., 2002). Alcohol use among adolescents can result in negative health, social, and legal consequences. Youth who drink alcohol more frequently, and in larger amounts, are at highest risk of developing alcohol abuse and incurring short-term negative consequences (Chassin, Pitts, & Prost, 2002). In addition, adolescents who use alcohol relatively more frequently are significantly more likely to engage in other risk behaviors such as drinking and driving and riding with a driver who has been drinking (Feldman et al., 1999).

Given the prevalence of alcohol use and concomitant risk behaviors and negative consequences, it is imperative that prevention and intervention efforts be created and empirically evaluated. Throughout the past several decades, such investigations have met with limited success. Didactic, school-based programs have generally been ineffective in reducing substance use and related consequences. For example, Drug Abuse Resistance Education (DARE) is a widely-implemented program, primarily focused on building self-esteem, honing general decision-making skills, resisting peer pressure, and postponing the initiation of drug and alcohol use (Dukes, Stein, & Ullman, 1997). Various studies evaluating outcomes of the DARE program have shown that throughout 10 years of follow-up, no program effects for alcohol, cigarette, or marijuana use were significant when compared to a no-treatment control group (Dukes et al., 1997; Ennett, Tobler, Ringwalt, & Flewelling, 1994; Lynam et al., 1999). Therefore, an alternative approach to substance use intervention for youth that is flexible and adaptive to personal needs should be researched.

The tactic of meeting an individual at his or her current personal stage of substance involvement is a key element of motivational interviewing (MI), a brief, client-centered treatment strategy that helps the client to resolve ambivalence regarding substance use behaviors (Lawendowski, 1998). MI intervention aids the client in recognizing his or her substance use as problematic and encourages the client to change substance use behavior. A menu of change options is usually presented from which the client may choose the most appropriate steps to develop a reasonable change plan (Miller & Rollnick, 1991). Findings from a meta-analysis of MI studies for substance abuse indicate that MI is effective in substance-dependent and substance-abusing adults, as well as with youth, with 11 of 15 studies producing significant effect sizes in the moderate to high range (Dunn, Deroo, & Rivara, 2001). Furthermore, a brief, single-session MI intervention with heavy-drinking college students resulted in significant reductions in frequency and quantity of alcohol consumed, and in negative alcohol-related consequences. At a 4-year follow-up, 43% of intervention participants had "resolved" risk-taking behavior compared to 33% of controls (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001). Thus, MI interventions seem to hold promise for reducing both alcohol consumption and alcohol-related consequences.

In addition to MI approaches, interventions which focus on multiple factors that play a role in adolescent alcohol use, including normative challenges, alcohol effect expectancies, and skills training, have been sug-

gested to be effective in reducing alcohol use (Brown, 2001; Johnson et al., 1988). For instance, a preponderance of research on interventions that challenge social norms demonstrates the efficacy of such an approach in reducing binge drinking (Donaldson, Graham, & Hansen, 1994; Haines & Spear, 1996) and risk taking behaviors including drinking and driving (D'Amico & Fromme, 2001; DeJong & Hingson, 1998; Shope, Elliott, Raghunathan, & Waller, 2001). Also, interactive prevention strategies that incorporate skills training and normative challenges have been effective in reducing alcohol prevalence estimates and improving drink-offer resistance skills among elementary school students (Donaldson et al., 1994), and have shown significant effects on post-treatment drinking and driving (D'Amico & Fromme, 2001; Shope et al., 2001) and riding with a drinking driver (D'Amico & Fromme, 2001) among high school students. A broad-ranging adolescent intervention including skills training, discussion of stress coping, and student identification of high-risk situations, social support, and alternatives to substance use was effective in significantly reducing alcohol, cannabis, and hard drug use (Wagner et al., 1999). Finally, a prevention program that aimed to alter risk perception of alcohol-related activities among high school students resulted in a significant decrease in riding with a drinking driver among prevention participants; an overall increase in drinking and driving was found, with a smaller increase among prevention participants than non-prevention participants (Sheehan et al., 1996).

Research to date supports a multifaceted, interactive approach for adolescent alcohol interventions. The majority of such interventions have had a positive impact on several variables, including alcohol-related knowledge, consumption patterns, and risk-taking behaviors such as drinking and driving. The present study evaluated the effects of a comprehensive, voluntary adolescent alcohol intervention on several drinking and driving outcomes. Using an interactive, MI-style approach, the intervention aimed to reduce alcohol use and alcohol-related harm by increasing motivation to change alcohol consumption patterns and related risk behaviors through providing resources and behavioral skills (Brown, 2001). The intervention was designed to be developmentally appropriate for adolescents (Brown, 2001). Preliminary evidence from pilot data suggested that this intervention resulted in the reduction of average number of drinks consumed per occasion, number of alcohol-related problems during the school year, and estimates of how often students drank alcohol per month (Brown, 2001). The present study investigated the impact of this intervention on drinking and driving, riding with a drinking driver, and perception of risk of driving after drinking. It also assesses the hypothesis that relative to demographically matched control participants, students who choose to utilize the intervention will show reduced rates of drinking and driving and riding with a drinking driver, as well as increased rates of perceived dangerousness related to drinking and driving.

Method

Participants

Students in the 9th through 12th grades at four high schools in San Diego County had the opportunity to voluntarily participate in an alcohol intervention program called Project Options during the 2001-2002 academic year. Approximately 350 independent students voluntarily attended at least one Project Options intervention session. Taking into account those students who attended multiple sessions, a total of approximately 800 Project Options visits were recorded during the study. Additionally, the student population at the same four high schools (school-wide surveys; N=4277) was surveyed in fall 2001 (Time 1) and spring 2002 (Time 2), representing 90-93% of all the students across the four schools.

For confidentiality purposes, no personally identifying information was collected from students at the school-wide surveys or intervention. To create a unique identifier for each student that allowed for matching student school-wide survey data over the academic year and intervention participants to their corresponding school-wide survey data, immutable characteristics (i.e. month and year of birth, number of older brothers and sisters) were assessed as part of the school-wide surveys and intervention questionnaires. This matching procedure enabled longitudinal evaluation of participants. Of those who had unique identifiers on the school-wide surveys (90% of 4277=3848), 74% were matched at both school-wide survey time points (N=2865). Of the 350 individual student intervention participants, 131 (37%) were matched to their fall and spring school-wide survey data.

A control group composed of students who did not attend the intervention was selected for comparison using their school-wide survey data. The control group was matched to the intervention group based on gender and grade. The groups did not differ in ethnicity, GPA, age, or alcohol involvement.

Procedures

The present study included both survey and intervention (Project Options) phases. Using procedures approved by the University of California, San Diego Human Subjects Committee and the individual high schools, data for the current study were collected as part of a larger study of adolescent substance use behavior (Brown, 2001; D'Amico et al., 2001).

School-wide survey. One month prior to each school-wide survey date, packets including consent forms, a cover letter from the principal, and information sheets were mailed to parents informing them of the upcoming survey. The packet also included notification that there would be an opportunity for their child to attend Project Options, which was described as a program students could voluntarily choose to participate in during lunchtime or after school to obtain information about alternatives to drinking alcohol. Parents could return the consent form if they did not want their child to participate in the study. Also, one week prior to the survey date, each student was given a consent form and common questions sheet to bring home to his or her parent. Less than 1% of parents refused participation for their student. In the fall and spring, surveys were administered at each high school by trained proctors during the same one-week period when normal absentee rates were expected (e.g., 5%) during a specified

time determined by the school (e.g., homeroom, first period class). Proctors described the survey to each class, answered students' questions, and reviewed confidentiality and voluntary participation guidelines.

Intervention. The opportunity to voluntarily participate in the Project Options intervention was available to all students throughout the academic year. To address adolescent preferences for intervention delivery, the intervention was offered in group, individual, and website formats. To decrease barriers to participation in intervention, Project Options individual and group formats were each offered once per week at consistent days, times (e.g., lunchtime or after school), and places for each school. The website could be accessed 24 hours a day. Intervention formats were six 30-minute group sessions, four 30-minute individual sessions, and unlimited website access. The first and sixth times that students participated in an intervention meeting of any format, they were asked to complete a brief questionnaire regarding demographic information (to facilitate matching students' intervention data to their fall and spring school-wide survey data) and alcohol use.

The Project Options intervention focused on increasing motivation to change alcohol use (e.g., reduction) and related risk behaviors (e.g., drinking and driving), generating resources for alternative behaviors, and teaching behavioral skills to increase the likelihood of successful personal change efforts. The content of Project Options was similar across formats and included topics that addressed normative feedback, alcohol expectancies, coping skills, alternative activities, behavioral management strategies, and communication.

Survey Measures

All data examined for the present study were from the fall and spring school-wide surveys. The school-wide surveys assessed an array of background characteristics and substance use and related risk behaviors. The following variables were examined for the present study.

Background. Background variables included gender, grade (9^{th}–12^{th}), ethnicity, grade point average (GPA), and age. Questions regarding immutable characteristics were included (e.g., month and year of birth, number of older brothers and sisters) to enable matching students' school-wide survey data from the fall and spring surveys, and to allow identification of school-wide survey participants who also participated in the intervention at any point during the school year.

Substance involvement. Students reported the average number of drinks consumed per drinking occasion for the past month (range=0 to 15 drinks), frequency of binge drinking (defined as five or more drinks at one time; range=0 to 15 times), and largest number of drinks consumed on a drinking occasion (range=0 to 15 drinks). One drink was defined as one can or bottle of beer or wine cooler, one glass of wine, or one shot-glass of liquor. Using items from well-established measures such as Monitoring the Future (Johnston, O'Malley, & Bachman, 1998) and the Customary Drinking and Drug Use Record (Brown et al., 1998), students reported alcohol-related problems for the past month (count of 26 problems, range=0 to 26), and current (past 30 days) and lifetime use of alcohol, marijuana, and other drugs such as amphetamines and ecstasy. Students also reported age of onset of regular alcohol use where applicable.

Driver's license and drinking and driving. Students reported whether they had received their driver's license and if so, when they received it. They were also asked how many times within the past 30 days they had driven a car or other vehicle after drinking alcohol and ridden in a vehicle with a driver who had been drinking alcohol (0 times, 1-2 times, 3-9 times, 10-19 times, 20 or more times).

Drinking and driving attitudes. Utilizing a 5-point Likert scale with higher scores representing higher perceived danger, a drinking and driving-related beliefs measure asked how dangerous students perceived drinking and driving to be after having three drinks of alcohol in two hours (1=not at all, 5=very much).

Outcome variables. Three dependent variables were created to represent changes in alcohol-related risk behaviors and beliefs from Time 1 (fall) to Time 2 (spring): change in drinking and driving, change in riding with a drinking driver, and change in perception of risk of driving after drinking.

Fall and spring survey data were combined to create a dichotomous change in drinking and driving variable representing participants who either continued to engage in or increased drinking and driving, or who never engaged in or decreased drinking and driving. For this variable, 12% of participants with driver's licenses continued or increased participation in the behavior from Time 1 to Time 2. Likewise, for change in riding with a drinking driver, fall and spring data were combined to create a dichotomous variable representing participants who either continued to engage in or increased riding with a drinking driver, or who never engaged in or decreased riding with a drinking driver. For the change in riding with a drinking driver variable, 13% of participants with driver's licenses continued or increased participation in the behavior. Finally, fall and spring data were combined to create a continuous difference score variable (spring score minus fall score) representing change in perception of dangerousness of driving after drinking three drinks of alcohol in two hours.

Results

Hierarchical logistic regressions were conducted to examine the influence of intervention attendance on the occurrence of drinking and driving and riding with a drinking driver. A one-way analysis of variance (ANOVA) was conducted to determine the influence of intervention attendance on change in perception of risk of driving after drinking three standard alcoholic drinks. Further, several covariates were considered in each analysis to account for variation in the dependent variables not attributable to intervention attendance.

Covariates

Covariates used in the drinking and driving analyses included lifetime alcohol use (r=0.26) and lifetime marijuana use (r=0.20). Additionally, to explore the relationship between level of adolescent development and intervention impact on drinking and driving, age was in-

cluded as an independent variable. Analyses for riding with a drinking driver included the following covariates: age (r=-0.16), GPA (r=0.14), lifetime alcohol use (r=0.20), lifetime marijuana use (r=0.19), largest number of drinks in the past month (r= 0.21), and the age of onset of regular drinking (r=.14). For the perception of risk of driving after drinking, no significant correlations were found and thus no covariates were included in the analyses.

Predicting change efforts

Drinking and driving. In order to examine only those individuals with the opportunity to drink and drive, analyses for drinking and driving outcome included only participants holding driver's licenses at Time 2 (n=159). A hierarchical logistic regression was conducted to assess whether those who attended the intervention were more likely to decrease or to continue to abstain from drinking and driving from Time 1 to Time 2. The covariates (lifetime alcohol use and lifetime marijuana use), along with age at Time 1, were entered on the first step; intervention attendance was entered on the second step; interaction of intervention attendance with age was entered on the third step. The overall percentage of correct classification at step three was 70%, with 79% of participants that reported continued or increased drinking and driving correctly classified and 69% of participants that reported never or decreased drinking and driving correctly classified.

A significant main effect was found for intervention attendance such that intervention participants were more likely to continue or increase drinking and driving than control participants (ß=1.10, Wald $\div^2$=4.30, p<0.05, odds ratio [OR]=3.04). However, a significant interaction effect was observed between intervention attendance and age, indicating that older intervention participants (17 or 18 years old) were more likely to abstain from or decrease drinking and driving than same-age control participants (ß=-1.47, Wald $\div^2$=3.94, p<0.05, OR=0.23). Regression results did not change when controlling for the effects of reported number of times driving during the past month.

Riding with a drinking driver. Hierarchical logistic regressions were conducted to assess the effects of intervention attendance on change in riding with a drinking driver. The covariates (age, GPA, lifetime alcohol use, lifetime marijuana use, largest number of drinks in the past month, and age of onset of regular drinking) were entered on the first step and intervention attendance was entered on the second step. To examine if adolescent developmental stage influenced the impact of intervention, separate logistic regression analyses were conducted to consider participants without driver's licenses at Time 2 (n=251) and participants with driver's licenses at Time 2 (n=152). For participants without a driver's license, the overall percentage of correct classification at step two was 59%, with 69% of participants that reported continued or increased riding with a drinking driver correctly classified and 55% of participants that reported never or decreased riding with a drinking driver correctly classified. For participants with driver's licenses, the overall percentage of correct classification at step two was 80%, with 52% of participants that reported continued or increased riding with a drinking driver correctly classified and 85% of participants that reported never or decreased riding with a drinking driver correctly classified.

For those without driver's licenses, there was no significant main effect for intervention attendance (ß=-0.20, Wald $\div^2$=0.36, p=0.55, OR=0.82). For those with driver's licenses, a significant main effect for intervention attendance was found, such that intervention participants were more likely to continue or increase riding with a drinking driver than control participants (ß=1.27, Wald $\div^2$=4.89, p<0.05, OR=3.54).

Change in risk perception

A one-way ANOVA was conducted to assess the effects of intervention attendance on change in risk perception of driving after drinking. To examine the influence of adolescent developmental stage on the impact of the intervention, separate analyses were conducted to consider participants without driver's licenses at Time 2 (n=262) and participants with driver's licenses at Time 2 (n=159). For participants without a driver's license, no effects of intervention were found (F=0.27, p=0.61). For participants with a driver's license, a trend (approaching significance) towards increased risk perception among intervention participants was observed (F=2.48, p=0.12).

Discussion

The primary goal of this study was to evaluate the impacts of an alcohol intervention program on changes in drinking and driving behaviors and related beliefs among high school students over an academic year. The intervention focused on increasing motivation to change alcohol use (e.g., reduction) and related risk behaviors, generating resources for alternative behaviors, and teaching behavioral skills to increase the likelihood of successful personal change efforts.

The specific behaviors and beliefs examined were drinking and driving, riding with a drinking driver, and perception of risk of driving after drinking. Results indicated that while intervention participants were more likely to drink and drive, overall, than control participants, older intervention participants were less likely to drink and drive than same-age control participants. Additionally, intervention participants with driver's licenses were more likely to ride with a drinking driver than control participants. Further, a trend towards increased perception of risk of driving after drinking was found among intervention participants with driver's licenses.

The goal of the current study was to evaluate the effectiveness of a developmentally tailored intervention that focused on multiple factors that play a role in adolescent alcohol use (e.g., stress and social norms) and provide multiple avenues for adolescents to receive intervention component information (i.e., group, individual, and website). Previous studies have shown the effectiveness of interactive, multifaceted, harm-reduction interventions in reducing drinking and driving and riding with a drinking driver among adolescents, even when those behaviors were not the primary foci of the intervention (D'Amico & Fromme, 2001; Sheehan et al., 1996; Shope et al., 2001). The mixed findings from the

current adolescent intervention study partially reinforce these findings.

Previous treatment outcome research supports the idea that adolescent alcohol interventions may have a differential effect depending on level of development. This helps to explain the outcomes of this study. Older adolescents may have been less likely to drink and drive after intervention as they were more likely to self-select into the intervention at a more advanced stage of change than younger adolescents, enabling them to make better use of intervention content to help them enact changes in their drinking and driving behavior (Prochaska, Johnson, & Lee, 1998). The finding that intervention participants with driver's licenses were more likely to ride with a drinking driver than control participants with driver's licenses suggests that the intervention may have stronger effects on drinking and driving behavior than on riding with a drinking driver. Perhaps the intervention aids adolescents in associating negative consequences with drinking and driving rather than riding with a drinking driver, with the latter being perceived by intervention participants as the less severe behavior.

Several limitations to the present study should also be taken into account. One limitation to the current study is that it did not directly investigate the relationship between perceived risk of driving after drinking and actual drinking and driving behavior. It is possible that intervention effects would be more pronounced if such analyses were conducted. Additionally, the voluntary nature of the intervention and inherent design of the analyses limit causal inferences about the association between intervention attendance and drinking and driving and riding with a drinking driver. The study was limited to students in four high schools in San Diego County, an urban area where driving may have different implications than in more rural communities.

Although the geographic area of the study was limited, the students at the high schools included in the study were ethnically diverse and represented a wide socioeconomic range, increasing the generalizability of intervention effects. Further, control and intervention participants did not differ in gender, grade level, ethnicity, GPA, age, or alcohol involvement at the onset of the study. Therefore, the observed differences in drinking and driving behaviors and related beliefs between intervention and control participants are likely valid effects attributable to the intervention.

The adolescent alcohol intervention examined for the present study was shown to be effective in both decreasing the likelihood of drinking and driving among older adolescents and increasing risk perception of driving after drinking among adolescents with driver's licenses. This type of intervention is important because it has implications for reducing the number of alcohol-related vehicle collisions, injuries, and fatalities. Differences in intervention effects by age and driver's license status point towards the need for future studies to investigate how the transition to driving and older adolescence influences the efficacy of interventions designed to decrease alcohol-related risk behavior. Findings of the current study suggest that driver's license status and age may be important factors moderating the impact of interventions on drinking and driving behaviors and related beliefs, but little is known about the independent contribution of each. Long-term evaluation of participants through the transition from early to late adolescence will be critical to detect the independent contributions of age, driver's license status and other variables related to development in adolescence. Long-term monitoring of intervention participants will enable further evaluation of the possibility of delayed intervention effects and help determine the optimal time to intervene with high-risk adolescents.

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Nicole Sintov is a UCSD alumnus as of Winter 2005 having received a degree in psychology from Thurgood Marshall College. She is particularly interested in addiction research. During her time at UCSD, she was part of the Psychology Honors Program, Thurgood Marshall Honors Program, the UCSD Competitive Cheerleading Squad, of Psi Chi, and participated in the SAFE Program. She worked in Dr. Sandra Brown's lab and worked with Dr. Murray Stein. Nicole is planning on taking a year or two off to gain more research experience before applying to a clinical Ph.D. program.

Cross-Racial Eyewitness Identification Accuracy as Determined by DNA Evidence: An Archival Analysis of Rape Cases

Lauren Wong

Ebbe Ebbesen, Ph.D.

People observe, encode, and recognize hundreds of faces under a variety of unique circumstances. This process is of critical importance for eyewitness identification. The criminal justice system depends, in part, on eyewitness testimony for the purposes of investigating and prosecuting crimes. Often, the content of a witness report will influence the course of a criminal investigation (Leippe, 1994). Errors in eyewitness accuracy could lead to the imprisonment of an innocent person; on the other hand, failing to believe an accurate eyewitness could result in the release of a guilty perpetrator. This review seeks to investigate the accuracy of eyewitness testimonies in the real world.

Many researchers and defense experts have asserted that eyewitness identification is often inaccurate (Wells & Lindsay, 1983; Cutler & Penrod, 1989; Leippe, 1994). One meta-analysis concluded that witness identification accuracy rates are as low as 50% for simultaneous lineups (Haber & Haber, 2001). However, the basis of their argument comes mainly from laboratory research. The present review proposes to challenge the above claim by looking at evidence from archival analysis of rape cases to show that witness testimony is correct far more than it is incorrect (Ebbesen & Flowe, 2003). First, we question whether laboratory results on eyewitness accuracy can be generalized to real-world witnesses and suspects. Second, we discuss ways of measuring a standard of accuracy, the decision of whether an identification made by an eyewitness should be classified as accurate or inaccurate. The present research evaluates the use of DNA evidence as a standard of accuracy. Third, we investigate the claims of eyewitness inaccuracy made by defense experts and proponents of the Innocence Project, a legal clinic that specializes in DNA exonerations. Finally, we consider the cross-race effect and the accuracy of witnesses when identifying cross-race suspects compared to same-race suspects in real-world rape cases.

Problems with Laboratory-Based Research

In laboratories, the majority of research is "simulation research" in which the researcher controls the conditions, environment, and variables. The typical laboratory paradigm consists of participants entering the lab and watching a simulated event on slides, video, or live enactment (Tollestrup, Turtle, & Yuille, 1994). Subsequently, subjects are asked to identify the culprit from a suspect-absent or suspect-present lineup. From their responses, experimenters calculate the rate of accurate or inaccurate identifications. The major advantage to this form of research is that it exhibits the highest level of control over the variables, therefore allowing for causal inferences. Since each individual experiences the same environment and stimuli, the experimenter can account for individual idiosyncrasies (Sporer, 2001).

However, many researchers see a lack of external validity as a problem with laboratory research (Yuille & Tollestrup, 1992; Wagstaff et al., 2003). Several reasons have led researchers to believe that there are higher proportions of accurate witnesses in real-life crimes than previously suggested (Ebbesen & Flowe, 2003). Laboratory simulations bear little resemblance to the crimes to which the findings are generalized. A laboratory simulation of rape would be unethical and simulating relevant memory processes may be difficult.

In the environment of a laboratory, subjects have a controlled experience and are cast into a uniform role —that of an unaffected observer (Tollestrup et al., 1994). This contrasts greatly with actual forensic contexts, where witnesses may play any multitude of roles that bear varying degrees of similarity to those in a laboratory. Since subjects are aware that they are in an experiment, the level of personal involvement and motivation of subjects in laboratory experiments cannot be compared to those of actual witnesses (Ebbesen & Flowe, 2003). The consequences for a decision made in a laboratory have little weight compared to the task of an actual witness in naming a suspect and potentially changing the course of not only an investigation but people's lives (Wagstaff et al., 2003).

Laboratory studies take data from nearly all participants. In the real world, not all witnesses to all crimes will come forth to present information. It is likely that real eyewitnesses who may be doubtful would be screened out by the judicial system and would not testify in court. In the laboratory, however, even witnesses who are very doubtful will give their input and thus could exaggerate the inaccuracy of real world witnesses (Wagstaff et al., 2003). In laboratory-based studies, the use of the yes-no recognition paradigm only serves to test general familiarity or recognizing a standardized face from a photo assortment. This contrasts with real-world witnesses whose task is to identify the perpetrator who committed a particular

crime at a specific time and environment. It is crucial for research to focus on identifying particular individuals and not simply the choice of similar stimuli from a lineup (Sporer, 2001).

Finally, laboratory results are "fixed-effect models" in which the variable of interest is changed on one or two levels and all other control variables are kept constant. Therefore, fixed-effect models may not be as effective at providing useful information to apply to real-world situations (Ebbesen & Konecni, 1996). Because of the nature of the laboratory fixed-effect model, laboratories often use the setup of 50% target-absent and 50% target-present lineups. Data gathered from various police departments suggest that the number of target-present lineups is much higher than this, thus implying that the actual number of correct identifications is higher than previously suggested (Ebbesen & Flowe, 2003).

It is important to recognize that eyewitness identification literature should not treat all eyewitness situations as if they were identical. In the real world, factors that influence accuracy are interactive, complex, and may vary from one context to another (Wagstaff et al., 2003; Tollestrup et al., 1994). Although a majority of research has been conducted in laboratory settings, there have been some exceptions in the field of archival research. Archival research does post-analysis on real-world crimes involving actual perpetrators and actual witnesses. Although archival research lacks the experimental controls of the laboratory, it allows for an extensive range of variables and a degree of realism impossible to simulate in a laboratory (Behrman & Davey, 2001). Using actual case files allows for increased external validity and applicability to real-world situations, which is one of the main purposes of applied research.

Measures of Accuracy

A standard of accuracy is an independent source of the guilt of the suspect that can be used to evaluate whether an eyewitness made an accurate judgment. However, previous literature has not demonstrated a consensus on what is considered an "accurate" testimony. One notable methodology discrepancy is that in laboratory simulations researchers control the total number of "facts" possible; some studies measure accuracy based on how many of these facts subjects can recall. In the real world, it is impossible to record how many facts are possible, and some facts might even be irrelevant to legal testimony (Ebbesen & Rienick, 1998). Current research emphasizes the importance of measuring accuracy not by the total number of facts from those available, but rather the accuracy of the facts that were recalled.

One method of investigation is field study, which is controlled testing conducted in a real-world setting. Cutshall and Yuille (1989) interviewed four sets of witnesses from violent or nonviolent incidents four to five months after the crime. They found only minor decreases in the amount of details or accuracy of details recalled over time, thus supporting the idea of real-world accuracy. The standard of accuracy used in this study was the comparison of the police report to a research interview based on the amount and accuracy of details given. A marked disadvantage is that there is a sampling bias because all data is from a single situation, in contrast with real-world situations, which can occur under a variety of contexts (Wright, Boyd, & Tredoux, 2001).

Archival analysis by Tollestrup et al. (1994) and by Behrman and Davey (2001) investigated police files of eyewitnesses in crime situations. Both classified data based on degree of evidence: strong forensic evidence (e.g., confession) and weak forensic evidence (i.e., minimally probative guilt). Eyewitness accuracy was determined by calculating the proportion of positive identifications by the type of evidence and eyewitness. However, this technique posed the problem of being unable to reliably distinguish between outcomes where the witness failed to select the police suspect and when they rejected the lineup (Tollestrup et al., 1994). Although a positive identification does not necessitate guilt, failure to identify also does not necessitate innocence (Wright et al., 2001). Wagstaff et al. (2003) evaluated the accuracy of characteristic descriptions in cases of robbery, rape, and assault, in which a suspect had been arrested and convicted of the crime. The standard of accuracy used in this study was the description of the suspect by the arresting officer. This standard of accuracy is unreliable because it is not explicitly stated on what grounds the suspect was arrested and convicted (e.g., confession, fingerprint evidence). Finally, Valentine, Pickering, and Darling (2003) evaluated lineups using whether or not the suspect was an acquaintance to the victim as a standard of accuracy. As expected, suspect identification and descriptions were more accurate if they were known to the witness.

There is no reliable theory of memory that has the ability to predict how capable witnesses will be at identifying a perpetrator in a particular real world situation (Ebbesen & Konecni, 1996). The difficulty arises in part due to the complexity of real-world eyewitness situations, which is composed of unique individuals interacting in multiple contexts with a multitude of variables and factors to be considered. Moreover, current theories have not been properly developed to take into account all of the interactions that take place between variables (Ebbesen & Konecni, 1996). The lack of a standard accuracy criterion introduces the need for a different type of research.

DNA Evidence

A few studies have claimed that in North America and Great Britain, identification errors are the leading cause of wrongful convictions (Brandon & Davies, 1973; Conners, Lundregan, Miller, & McEwen, 1996). The use of DNA evidence was proposed as a standard of accuracy. In two studies, of the 62 exoneration cases investigated, 85% (52 cases) involved false imprisonment based on 77 confident, but mistaken, eyewitnesses (Conners et al., 1996; Scheck, Neufeld, & Dwyer, 2000). The Innocence Project, run by the Benjamin N. Cardozo School of Law, also claims that of the 127 exoneration cases investigated, 61% involved erroneous identification of an innocent suspect by one or more eyewitnesses (Innocence Project, 2001).

However, the cases investigated by the Innocence Project are not a random sample, but rather cases in which the DNA testing was not conducted prior to the conviction of the defendant. The accused go through extensive screening to determine if the DNA evidence available would prove their *innocence* (Innocence Project, 2001). Note that they do not evaluate cases in which guilty suspects do not wish to submit their DNA because testing would only further incriminate them. The Innocence Project itself even admits that the DNA test results for about half of the cases studied serve to further implicate the defendant (Innocence Project, 2001).

As we have seen, in the field of eyewitness identification many different types of accuracy standards have been used, yielding varying results. However, the previously mentioned archival studies have been limited because experimenters had very little knowledge of how many lineups actually contained the culprit (Valentine et al., 2003). This leads to considerable difficulty in determining if the identification given was a hit, miss, false alarm, or false rejection. The present review proposes the use of DNA evidence as an independent scientific source of guilt. DNA evidence is generally recognized as a reliable source that can exonerate a suspect from questioning or link the suspect to the scene of the crime and corroborate a testimony. Since defense experts and critics use DNA evidence to attack eyewitness accuracy, it is an appropriate standard to disprove their claims. This review stands as one of the few that have begun to look at the accuracy of suspect choices in the real world.

Cross-Race Effect

In 69% of the misidentification cases cited by the Innocence Project, the victim was White, whereas in 57% of those cases the exonerated defendant was Black. This indicates that a proportionally greater number of misidentifications are occurring across racial lines (Conners, et al., 1996; Scheck et al., 2000). The forensic relevance of cross-racial accuracy is important since America is a multi-ethnic society and cases involve plaintiffs from one race identifying defendants of other races are becoming more commonplace (Chance & Goldstein, 1996; Lindsay, Jack, & Christian, 1991). The majority of facial recognition research has been conducted with same-race participants and targets and only 18% of studies have considered cross-racial effects (Shapiro & Penrod, 1986). The phenomenon known as the cross-race effect is defined as better recognition memory for faces of one's own race compared to those of other races (Sporer, 2001; MacLin, MacLin, & Malpass, 2001). Figure 1 illustrates the cross-race effect with Black and White witnesses and defendants, although this effect is applicable to any combination of cross-racial comparisons (e.g. Asian and Hispanic). Other researchers have also extended this definition to include a response bias, or the tendency to hold a more stringent or more lax response criterion which determines the frequency of "yes" or "no" responses (Sporer, 2001). However, it should be cautioned that a response bias also occurs in the same-race situation, although perhaps it is more prevalent in cross-racial identifications. Several researchers claim that there is a general consensus on the robustness of the cross-race effect, but still debate its social and cognitive underpinnings (Sporer 2001; Meissner & Brigham, 2001; MacLin et al., 2001; Kassin, Tubb, Hosch, & Memon, 2001; Chance & Goldstein, 1996; Shapiro & Penrod, 1986). Literature review reveals that approximately 80% of participants in cross-racial identification situations demonstrated the cross-race effect (Bothwell, Brigham, & Malpass, 1989). The following is a brief literature review of the results of various methodologies investigating cross-racial identification.

A meta-analysis conducted by Meissner and Brigham (2001) consolidated 39 studies with nearly 5,000 participants conducted over a period of 30 years. Results indicated that participants were 1.4 times more likely to correctly identify a previously viewed face (considered a "hit") of their own race, over that of another race. In addition, results reveal 1.56 times more false alarms (mistakenly identifying a face) when identifying a novel cross-race face compared to own-race faces. This led to the development of a "mirror effect" pattern in which cross-race faces received a lower proportion of hits and a higher proportion of false alarms.

Results from a survey conducted by Kassin et al., (2001) indicated that 90% of experts thought the cross-race effect was reliable, 72% would testify on this topic in court, 97% considered it research based, and 65% considered it common sense. Therefore, these statistics testify to the overall robustness of the phenomenon. The survey method is crucial because in *Frye v. United States* (1923) the court ruled that admissibility of scientific evidence for a particular phenomenon would be based on the general acceptance of that phenomenon within the scientific community. With such a high percentage of support for the cross-race effect, it could be considered sufficiently reliable to be presented in court (Kassin et al., 2001).

Brigham, Maass, Snyder, and Spaulding (1982) conducted a study in which White and Black confederates entered a convenience store, interacted with the clerk and later were asked to identify the confederate from a photographic lineup. Results indicated a slight cross-race effect with White participants, who more frequently misidentified Black confederates compared to White confederates. A very similar study was also conducted using Hispanic, Black and White confederates (Platz & Hosch, 1988). Similar results were found as White and Hispanics showed more frequent misidentification of other races. In addition, cross-continental studies have illustrated the cross-cultural prevalence of the cross-race effect. A study conducted in South Africa and England using Black and White participants found that if the confederate and participant were of the same race, the odds of correct identification were twice as high. If participants were of a different race the chances of false alarm in the identification of a foil (i.e., distracter person in a lineup) was 150% higher (Wright et al., 2001).

The face recognition paradigm used for the majority of laboratory studies on the cross-race effect is divided into three parts (Sporer, 2001). In the presentation stage, a variety of unfamiliar target faces

of either one of two races is presented, one after another. During the retention interval a filler task is completed to temporarily distract the participant and ensure that recall is not mere stimulus recognition. In the test stage participants indicate "yes" or "no" to recognizing the new set of pictures which are half foils, and half previously seen faces. The three stages are repeated for the other race and counterbalanced for order. Correctly recognized faces represent hits and false identification of a suspect who is not a perpetrator is a false alarm. These responses are typically evaluated in terms of signal detection theory in which independent estimates of recognition performance (i.e. measure of memory strength) and response bias (Sporer, 2001). Several laboratory studies on the cross-race phenmenon indicate the presence of a cross-race effect. For example, in a study by MacLin et al. (2001), Hispanic participants observed Hispanic and Black target faces. The results indicated that participants more easily recognized same-race (Hispanic) faces. In a cross-continental study examined cross racial identification in Asians from Singapore and Thailand and Whites from Canada and found that both recognized faces from their respective race more accurately than cross-race faces (Ng & Lindsay, 1994).

A few archival studies have included cross-race as a part of their analysis. Behrman and Davey found small-to-moderate decreases in cross-racial identification rates. They also found that unless there was substantial evidence, the tendency for a witness to choose a cross-race suspect was lower than the tendency to pick a same-race suspect. Another archival study found a significant effect for suspect race on suspect identification (witnesses were more likely to identify European suspects over African-Caribbean suspects), but did not find an effect for same versus different race of witnesses and suspects. In other words, there was no cross-race effect, in that the faces of different races were not recognized less accurately than same-race faces (Valentine et al., 2003). In archival studies the actual rates of same- versus cross-race identifications are divided.

Although the cross-race effect seems to be an intuitive social perception, its robustness should be evaluated with caution. A few researchers have suggested that: (a) research conducted in the field of cross-racial identification is inconsistent, (b) the effect size is not sufficiently large, (c) research methods used to draw these conclusions lack external validity, (d) not all individuals are equally affected by this effect: effect size may be related to the individuals experience with those of other races, and (e) there is no generally accepted theory to explain this phenomenon (Lindsay & Wells, 1983; Ebbesen & Konecni, 1996).

Therefore, this review proposes to examine the breadth of the cross-race effect in real-world rape cases. Studies have indicated a lower hit and higher false alarm rate for cross-race identifications in the real world. As previously discussed, using DNA as a standard of accuracy would perhaps allow us to have a clearer view of how the race of a witness or suspect can effect identification accuracy. However, it must be cautioned that the existence of the cross-race effect does not necessarily mean that identifications made interracially are inaccurate, but rather they may be less accurate than same-race identifications (Ebbesen & Konecni, 1996).

Predictions

Predictions for the outcome are twofold. First, it is predicted that eyewitness identifications should be correct far more than they are incorrect. This conclusion contrasts with the currently held view of defense experts whose evidence lies mainly in laboratory experiments. Challenges to this view not only affect academics in psychology, but also have significant applications in the courtroom, specifically in expert testimony. In a survey collecting the opinions of psychologist and experts in the field of eyewitness testimony on 30 eyewitness phenomena, it was found that experts testified 15 times more for the defense (837 times) than for the prosecution (56 times) in criminal cases (Kassin et al., 2001). Frequent testimony for the defense indicates that most experts are willing to give and have given testimony about factors that supposedly reduce (rather than enhance) eyewitness testimony (Ebbesen & Rienick, 1998). The ramifications of such testimony are played out in the courtroom, where overconfident experts may be leading jurors astray about the accuracy of eyewitness identification. However, practically speaking, the assertions made in the survey are opinions and not explicitly tested theories based on experiments or data; therefore, not enough information is provided to predict the accuracy of an eyewitness in specific situations (Ebbesen & Konecni, 1996). The review was designed to challenge the views commonly held by defense experts and thus provide advice for courts, lawyers, and police on how to develop more efficient and just procedures for eyewitness testimony (Valentine et al., 2003).

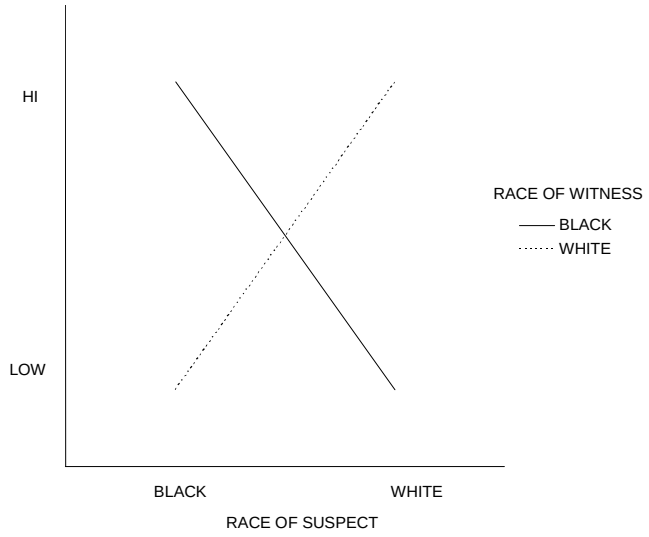

Figure 1. The accuracy of memory performance of witnesses as a function of the race of the suspect.

The second prediction states that the cross-race effect will cause witnesses to make fewer identifications in addition to more false positive identifications of innocent suspects. Real-world inferences for these results apply in court cases such as *State v. Cromedy* (1999) and *United States v. Norwood* (1996). In both cases, the court ruled in support of distinct treatment of cross-race cases such as special instructions for the jury. On the contrary, the courts have not made rulings regarding expert testimony on how same-race situations could *increase* eyewitness accuracy (Ebbesen & Konecni, 1996). The current review used distinct divisions in racial categories (i.e., Black, White, Asian). For future studies, experiments could be conducted to determine eyewitness accuracy in mixed-race identifications. This review serves as an additional method in achieving the goal of understanding real-world eyewitness accuracy. Field studies, laboratory simulations, case studies, and archival research all compliment each other and may be used to create a more comprehensive picture of eyewitness identification (Tollestrup et al., 1994).

Table 1

Error analysis for same and cross-race data where DNA determines correct or incorrect choices and foils constitute an error

	DNA test results for suspect ID	
Witness Choice	DNA positive	DNA negative
	Same-race	
Suspect	Correct	Incorrect
Foil	Incorrect	Incorrect
No Choice	Incorrect	Correct
	Cross-race	
Suspect	Correct	Incorrect
Foil	Incorrect	Incorrect
No Choice	Incorrect	Correct

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Bio can be seen in Staff Bios.

The Fifth Dimension: A Model of the Zone of Proximal Development

Elizabeth Fogaren
Michael Cole, Ph.D.

When teaching a child, it is important to understand his or her limitations; they may not progress if not pushed beyond his or her current abilities; if pushed too far, they may also fail to acquire new knowledge. Noting this phenomenon, Lev Vygotsky identified the gap between what a child can achieve independently and what a child can accomplish under the guidance of adults or peers as the zone of proximal development, or ZPD (Vygotsky, 1978). To help children reach their next stage of development, Vygotsky argued that it is beneficial to strive for their ZPD by building on what they already know to reach a level slightly beyond their existing competency (Vygotsky, 1978). Since the ability to maximize learning may depend on identifying and exploiting a child's ZPD, many educators are seeking out opportunities to do so. The current paper argues that the Fifth Dimension, "a distributed literacy consortium comprised of a collective of after-school programs," provides one such opportunity (University of Miami, 2005). Most research dedicated to figuring out the optimal way to reach this gap in development note the importance of capable adults or peers, imitation, play, and computers. Because the Fifth Dimension is centered on computer games and employs college undergraduates to help the children in a play-like atmosphere, it embodies the very essence of the zone of proximal development.

One vital component for helping children reach their ZPD is making sure that they are not simply given the solution to problems. If children are given the end result, they are no better off than if they had not interacted with the teacher. In other words, they are left without the tools and techniques necessary to solve the problem independently. So as not to fail to work within a child's ZPD, the Fifth Dimension requires that undergraduates refrain from scrutinizing the child or giving out answers, but rather help lead the child to their own conclusions. A conversation between Zachary, a child in the Fifth Dimension, and me exemplifies this method:

> *Lauren, Zachary, and I began talking about surfing and I asked Zachary how tall his board was. He told me that it was about four feet tall. So I replied that it was bigger than him. But Zachary told me that he was bigger than the board. I figured that Zachary was smaller than four feet, so I asked him how tall he was. He told me that he was about five feet tall . . . I stood up and told Zachary that I was about five feet two inches tall. Zachary looked up at me, and replied with a grin, 'well, I guess I am not quite five feet tall.'*

While it would have been easy to tell Zachary that he was not five feet tall, I helped him reach his zone of proximal development by telling him how tall I am. As a result, Zachary worked within his ZPD and was able to use his own reasoning to declare that he must not be "quite five feet tall." Zachary was still not satisfied, however, because he did not know his height. So, I decided to pursue the issue by showing him the height chart and how to measure himself. Zachary found out that he was three feet ten inches tall. By doing this, I helped Zachary "fill the gap" within his ZPD, giving him the tools to solve his problem.

Another method that is often cited as being effective in reaching a child's zone of proximal development is play (Lerman and Meria, 2001). The reason behind this is that playing allows children to act out roles that would otherwise be inaccessible. As Vygotsky points out, play allows a child to reach his or her ZPD because the child can behave "beyond his average age, above his daily behavior..." (Vygotsky, 1978). As a result, the design of play within the Fifth Dimension is vital; college undergraduates are instructed to ask the children if they want to play, rather than asking to help or observe them. This creates a friendly atmosphere in which the children understand that undergraduates are not parental figures, but people who want to have fun with them. Using this strategy, children are not only more comfortable, but are likely to engage in more naturalistic games, allowing for insight into children's ZPD. One such example of this occurred when an undergraduate helped a young girl, Jazmin, reach her ZPD by playing house:

> *By this time it was almost five o'clock but Jazmin wanted to play with Kerryn and me. She said that first we would play school... she would be the teacher and we would be the students. She told us where to sit in the activity room. Then she asked me to go over to the wall to get the attendance sheet. She held my hand and led me over to the wall. Then she called Kerryn over and gave her the imaginary lunch slips to hold. By this time, Kerryn and I had to leave but Jazmin was in the middle of her game. She walked us over to another table and*

told us that underneath were all of the other kids in their classrooms. I asked Jazmin when recess was; hoping that it was then so Kerryn and I could leave, but unfortunately she said it wasn't until 8:30. We made our way into the computer room and Jazmin was still pulling Kerryn and me around telling us about her class and being a teacher. At one point I interrupted Jazmin and she said to me very authoritatively, 'Kristina, you need to pay attention.' Kerryn and I found this game of 'school' very amusing, but Jazmin took it very seriously.

This example in which Jazmin attempts to play teacher with Kristina and Kerryn is a perfect model for the function of play in a child's ZPD. Through playing, she was allowed to reenact her typical day in kindergarten. Jazmin was able to do things that she would normally never be able to do, such as telling Kristina to pay attention or showing the girls where they must sit. It is also important to note that while the undergraduates took this as merely a game, Jazmin took it seriously because she adopted the role of her teacher. This example suggests that the Fifth Dimension allows children to play in a way that is within their zone of proximal development.

Another way in which the Fifth Dimension's design allows undergraduates to help children reach their Zone of Proximal Development (ZPD) is through the explanation of games. Because most college students are unfamiliar with the games the children want to play, children are required to explain the basics of the games, thereby giving them an excellent opportunity to take on the role of teacher. In doing so, they utilize different techniques to show the much older, but "less-wise" undergraduates how to play. As a result of this reverse role-playing, the kids are able to do things beyond their normal command and reach their ZPD. One impressive example in which this occurred was when I attempted to play chess with five-year-old William:

I was a little nervous at the prospect of playing chess because I had never played before, and William's speech is sometimes inaudible. Nevertheless, I asked William if he would show me how to play. He said that he would and he began showing me the different moves that the corresponding chess pieces could make . . . I watched in awe as this five year-old boy set up all of the chess pieces and explained the game to me. Throughout our game, I was completely confused, but William had a lot of patience with me as he showed me all of my options and pointed out my best move. Although he was hard to understand, he made up for it by moving my pieces in the correct direction and then signaling me to make up my mind . . . I noticed that William's moves were planned and not compensated for. I found this out when he informed me that I should move in one direction because on his next turn he could move it forward once more, and then on my third move, move it to the left to kill my king or whatever piece it happened to be.

Because I had never played chess before, I needed William to explain it to me. While this would normally be something that a five-year-old with a speech impediment would not be asked to do, William had to take on this new role if he wanted to play his favorite new game. Furthermore, William normally plays chess with older people who set up the board for him. He was forced to do it himself and explain the rules to me. This interaction made William rely on his speech skills, something that was a struggle for him. When William could not explain the game in words, he was forced to think of other ways of communicating, such as showing me with his hands. From this example, it is clear that my lack of knowledge pushed William to take on the role of teacher. As a result, he exceeded his current level of competency, and in doing so, reached his zone of proximal development.

In more recent studies, researchers have observed the role that computers take in helping a child reach his or her ZPD. Most of this research suggests that computers work to both automatically set up a child's ZPD by responding to a child's strengths or weaknesses, and creating a medium for interactions between the child and teacher (Crook, 1994). The Fifth Dimension takes such an approach because computers and undergraduates play a joint role in helping children achieve their ZPD; the children are able to perform very advanced and adult-like actions in computer games such as Roller Coaster Tycoon and SimCity. One such example comes the field notes of an undergraduate named Sarah, in which she plays Roller Coaster Tycoon with Garrett, a fifth grader in the Fifth Dimension:

The coaster mainly went in a series of hills, and he was careful to make each hill one height measurement lower than the previous one . . . he asked me if I knew why he had to do that. He quickly explained it to me, using hand motions, that if each one was the same, the cars wouldn't make it up to the top each time, because they had to go down more than they came up, otherwise there wasn't enough speed. I was also surprised at Garrett's patience when he ran out of money and couldn't increase his loan from the bank anymore— he would systematically go to the screen for each existing coaster and raise the price of admission a bit, and then wait until he had enough profit to complete what he wanted. At one point I asked about the awards; if you received money as a prize. It turns out, according to Garrett, that you don't get money when you win the awards, but it makes more people want to come to your park and that is better than a monetary award. He explained that you would only get money directly tied to an award once, but if it continues to draw more people to the park, they will continually be paying for the rides, and therefore continually generating more profit.

While Garrett is in fifth grade and has most likely not learned physics, he had to apply laws of physics to complete a roller coaster with many hills. Furthermore, this part of the game opened up

conversation between Sarah and Garrett, in which Garrett explained those physical principles to her. The game also allowed Garrett to do things that he would normally never do, such as apply for loans. To compensate for his spending, he learned to raise the prices of the other attractions. Furthermore, the game allowed Garrett to think about long-term results as seen with the awards. Garret used higher order reasoning to realize that the awards will help him in the long run because they will advertise the park, and thus lead to the generation of more profit. Roller Coaster Tycoon and the interactions it created with Sarah aided Garrett to reach his ZPD.

One last way in which the undergraduates are able to help children reach their ZPD in the Fifth Dimension is by helping them realize that they can do more than what they believe they are capable of doing. It may be the case that children deny certain abilities or talents because they do not recognize that they can do them or that it is not their strong point. With a little probing, however, undergraduate teachers may be able to find out exactly what the child can do, and what the child needs help doing. With this information, teachers can bring the child up to his or her ZPD. An excellent example of this can be seen when Erin helped five-year-old Emalyse write part of an art project:

> *I asked her if she wanted to write what she was thankful for on her turkey, and she explained that she didn't know how to spell. I know she has a general idea of her letters, so I told her that I would give her the letters if she wrote them down…So I helped her write 'Thanksgiving.' I gave her the 't' and she asked me how to write a 't.' I said how do you think you write a 't'... So she wrote a 't' and asked me if that was correct. I told her it was. We continued in the fashion for the rest of the letters... she wanted to write more. This time she wanted to write the whole statement, 'I am thankful for my cousins.' She wrote 'I am' after I prompted her with the letters... She had difficulty with the letters 'f', 'u', 'y', and 'g.' For 'y', I wrote a word with that letter in it ('goodbye') and asked her which one it was. She knew right away because it was in her name.*

In this interaction between Erin and Emalyse, Emalyse claims that she cannot spell. Rather than write the words for her, Erin encouraged Emalyse by giving her the letters and having her write them out herself. Even when Emalyse asked how to write specific letters, Erin still did not show her. She first asked Emalyse how she thought it was done, and she then gave her feedback. When Erin noted what letters Emalyse definitely could not write on her own, she wrote out a word for her, and then asked her which letter in the word she thought was correct. In doing so, Erin made sure that Emalyse was still participating in a challenging task and recognizing the letter. Consequently, Emalyse was constantly being asked to do things that she did not even know that she was capable of doing. Through Erin's persistence and creativity, Emalyse was continually working within her zone of proximal development.

In sum, the Fifth Dimension is designed with a child's optimal development in mind. College undergraduates take a leading role in helping children reach their zone of proximal development through verbal interaction and play, among other activities. Computers are also used to assist children in reaching their ZPD, both as an assessor of a child's strengths and weaknesses, as well as an intermediary between student and teacher. The Fifth Dimension allows undergraduates to guide a child to work within his or her zone of proximal development.

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Elizabeth Fogaren is a fourth year psychology major from Muir College. She is a member of the Muir Caledonian Society, Psi Chi, Golden Key, NSCS, and is a SAFE (Substance/Alcohol Feedback and Education) Peer Educator. Elizabeth worked in Dr. Michael Cole's laboratory and with Dr. Jerry Phelps in the Substance Abuse Research Laboratory. After graduation, Elizabeth is moving to Boston to attend Northeastern University for a Master's Degree, certificate of advanced graduate study, and a credential in school psychology. She then plans on being a school psychologist in a public school.

Book Reviews

Party of One
-Anneli Rufus

Anneli Rufus embarks on a mission to describe a population within US culture that is rarely mentioned: the "loner" population. It is a group of people that prefer to hang out by themselves rather than relax with a group of friends. We have all seen these people; they are the ones that sit alone at coffee shops sipping their mocha and reading a collection of poetry, relaxing on the grass in the sunshine, and not necessarily following the newest fashions, but rather making an attempt NOT to be noticed.

Rufus' work examines the life of these people by focusing mainly on how they are misinterpreted and misunderstood by the "non-loners" in society. Consideration is given to the mental processes that go on behind the façade of loners. Most importantly, it also examines how being misunderstood can affect the budding loner-child and how that later manifests in adulthood. She discusses both famous examples of loners, such as Emily Dickinson, Barry Bonds, J.D. Salinger, and Syd Barrett (lead singer of the band Pink Floyd), and examines how certain changes in society (such as the increases in technology) have made life easier or harder for the loner subset.

I think one of the most interesting parts of Rufus' work is when she discusses the tendency for news reports to pin criminal acts on loners. She does a small case study on the Columbine shooters, Theodore Kaczynski and Hadden Clark, coining the phrase "pseudo-loner" to describe the vilification of the term "loner" by the media, who imitate criminals that are loners, which is causing society to believe that all loners are violent and vicious. She points out that on closer examination; criminals show that they live not as loners, but as outcasts—people who want to be accepted but are not. She then claims that the big difference between pseudo-loners and loners is that loners do not want to be included.

I found this book thoroughly enjoyable and a must read for anyone who wishes to understand the mind of the lone wolf.

-Kristy Cahoon

First Person Plural
-Cameron West, Ph.D.

First Person Plural is a narrative describing Cameron West's struggles with Dissociative Identity Disorder (DID) and the chaos that results from the midlife emergence of 24 distinct identities created by his mind in response to early childhood trauma. It is a journey that changes West's perspective as a capable businessman and father to that of a vulnerable man who must face his forgotten past and the many unwelcome new identities. At times West is Dusty, a shy, 12-year-old girl who likes grocery shopping; or Clay, a nervous eight-year-old boy. At other moments he is Bart, a smooth-talking flirt; Switch, an angry boy who inflicts harm on West's body; Lief, a driven, clear-headed businessman, or Davy, a four-year-old child haunted by graphic memories of forced sexual activities with a white-haired grandmother. There are others too, but they remain mainly in the background. Most of the time West struggles to simply be Cam, loving father to young Kyle and faithful friend and husband to wife Rikki. West's struggles with DID tear his life and marriage apart as he is usually unable to control the emergence of different identities. His denial of the condition and attempt to repress the alters impedes his recovery and return to normality, landing him several times in the emergency room with self-inflected wounds from Switch or in a specialized mental hospital far from home, calling his son with lies about a business trip.

Dissociative Identity Disorder, formerly known as Multiple Personality Disorder, is a psychiatric condition in which a person has two or more distinct personality states or identities that take over his or her consciousness and behavior. Dramatic mental and even physiological changes result in response to the emergence of a different identity. One poignant moment in the novel occurs when West, as the pre-teen girl Dusty, falls in love with a boy, the alter identity of another woman in treatment for DID. With the help of several therapists and his devoted wife Rikki, West learns to manage "his guys" with techniques such as a journal, where the identities release their thoughts in unique handwriting styles, and through counseling of the individual identities to overcome their trauma. Cameron West obtained a PhD in psychology during this tumultuous period in order to understand more about himself and to help others like him. His book is a testament to the power and mystery that is the mind and to the strength of the human spirit. This book was recommended by Dr. Fred Rose; it is not overly rich in scientific details, yet it clearly demonstrates the impact of this crippling disorder on one man's life.

-Marian Shieh

Interview With Stuart Anstis

by Michael Hard

Born in England, Dr. Stuart Anstis became a scholar at Winchester and at Corpus Christi College, Cambridge University. He then continued his education by earning a Ph.D. from Cambridge with supervision from Dr. Richard Gregory. Dr. Anstis has published nearly 120 papers on visual perception, including such topics as perception of apparent and real motion, movement and motor aftereffects, colored afterimages, normal and defective color vision in newborns, and adaptation to gradual change in brightness. He has already given over 250 invited presentations on his research throughout the United States, Europe and Asia. From his consistent dedication to teaching and research, Dr. Anstis earned a full professorship in the Department of Psychology at the University of California at San Diego.

TPR: Thank you for participating in this interview… what is your personal history? Where did you complete your undergraduate education?

SA: I was born and brought up in England. I won a scholarship to a British so-called public school—actually a private school—called Winchester. There were 70 of us there in the original 14th Century building. The academic caliber of the students was high and it was naturally assumed that we would receive scholarships to either Oxford or Cambridge Universities… which we all did. I even received a scholarship—to everyone's surprise—to attend Corpus Christi College at Cambridge University. While I had a background in French and German literature, I lost interest in the subject after a year of study in the first year of my undergraduate career. For one thing, all of the teachers had terrible British accents! So I then switched to "moral sciences." This was Cambridge jargon for philosophy, including logic, ethics and psychology. When I finished my three years of undergraduate study I received a first class degree equivalent to majoring in philosophy and minoring in psychology. However, I didn't know what I wanted to do next so the department said to me: "You ought to stay and study for graduate school" and I said "All right". "What do you want to study?", "I don't know" I replied. "Well, you should go around and talk to some professors for ideas."

TPR: Why didn't you end up pursuing philosophy?

SA: The reason why I did not go into philosophy was this: At Cambridge there exists an excellent form of education in which a student such as myself would visit his tutor once a week. Even though these days it might be a ratio of five or six students to an individual tutor, there exists a great deal of personal contact, criticism on projects, and the opportunity to practice writing—a very valuable skill in which students do not get enough practice. Anyway, I wrote an essay on philosophy that I was very proud of and read it out in its entirety to my tutor. There was a long pause. My tutor replied: "Well you're not exactly Bertrand Russell are you?" I was crushed but I realized that I was not. In my case I felt that unless you are Bertrand Russell there is no point in pursuing philosophy. People have been arguing about philosophy since Plato and not getting very far. So then I switched to my minor in psychology which I enjoyed. At the end of my three years, I was asked what I was going to study in graduate school. I replied: "I don't know." I was advised to go and talk to all the professors. As we all know, most professors are a bit on the dull side. However, there was one amusing, outstanding and fantatistical professor who showed me his many toys he used for conducting research experiments. He was filled with life, vitality and enthusiasm: his name was Richard Gregory. So I thought to myself, "I'll pick this one." I turned out to be his first graduate student and in my second year in graduate school, Dr. Gregory came over to the United States to teach summer school at UCSD and UCLA. During that brief time he wrote a book called "Eye and Brain", which I believe has sold over a million copies. He was a brilliant scientist and I am honored that he served as my advisor.

TPR: From your knowledge of both the United States and British educational systems, how do the two differ?

SA: If you are a graduate student at Cambridge it doesn't matter what college you are enrolled in. The academic side of the school is run by the department—the home life is run by the colleges. Grad school is a different experience at Cambridge than in the U.S. It is easier at Cambridge because you can pursue your own interests. A Cambridge B.A. is typically 1-2 years ahead of an American B.A. However, the US students catch up in graduate school by working much harder than the British students. When you go to graduate school at Cambridge, you never take a single course—your entire time is devoted to research. That means you are not distracted from your research by having to

deal with the chores of being a teaching assistant. I was never a TA or research assistant. And this I believe is excellent for developing one's scientific acumen and talents because of this limitation on distractions.

TPR: Professor Anstis, how did you make the transition between graduate school and a professional career?

SA: When I earned my Ph.D. from Cambridge I entered the job market during an extremely fortunate time. Things were very different then and as you can see they would give a professorship to almost anyone. When I graduated, I applied for 4 jobs and I received 5 offers. That is, I was accepted to all the jobs in which I applied and to one in which I didn't spend any effort applying to. I was offered a job at Bristol University for £1500 per year—about $2500—in addition to Durham University in the north of England for an additional 100 pounds a year. So during my interview with the hiring committee of Bristol, I politely urged that I had been offered 100 pounds more at Durham. They asked me to please step outside. After waiting for thirty minutes I was expecting that they would match the price, however, they refused, "You cannot have the extra money." Off to Durham I went. Shortly thereafter, the chair of Cambridge, Prof. Oliver Zangwill, wrote me a letter encouraging me to go to Bristol despite the lower pay because it would be better for me. He was absolutely right and I was too dimwitted to see this for myself. I ended up staying at Bristol for about a decade and I am very thankful to this day for Zangwill's advice.

TPR: What made your experience at Bristol so delightful?

SA: When I first went to Bristol I had severe separation anxiety from not being at Cambridge. England is a very snobbish place and people at Oxford and Cambridge often imagine that the two universities are the only places in the country to receive a quality education—they are quite mistaken. Bristol had an excellent academic atmosphere, a beautiful town. I even lived in a house built in 1810, faced with stone perched on the cliffs of Clifton—a very pleasant atmosphere.

TPR: Where did you go afterwards?

SA: While I was still at Bristol, I decided to visit the United States to teach summer school. So I went to an international conference and met an Englishman I knew who was at a university in North America. At this time the U.S. was the land of opportunity: A second professor at the table who was listening interrupted our conversation by saying "don't go to his, come teach at my university." It turned out that the first professor, Ian Howard, was not in the US but in Toronto, Canada. So I went there, taught summer school, and then accepted a position at York University in Toronto. During my stay at York University, I wrote an article for *Vision Research* to which a jumped-up interloper from the British Empire wrote an impertinent critique. His name was V.S. Ramachandran. This article was the catalyst for my visiting UC San Diego every Christmas holiday season during which Ramachandran and I would work on a paper which might occasionally appear in the journal, *Nature*. After doing this for some years, an employment opportunity at UCSD opened. Ramachandran encouraged me to apply; I was able to squeak into the job.

TPR: What is the significance of your research on vision?

SA: I have always been interested in visual adaptation. Just over 100 years ago, George Stratton did a famous experiment at UC Berkeley. He looked at the world through an inverting mirror attached to his head so that he saw everything upside down. He wore this contraption for 3 weeks and at first he was felt nauseated when he moved his head. But after 3 weeks, he could navigate around the world without bumping into the furniture. Later in Austria, Ivo Kohler in Austria, did similar experiments in which he reversed the world right-left and found that after adaptation he could even ride a bicycle through a left-right reversed world. Instead of inverting position, I inverted brightness. I wore special video goggles that converted the video world into a photographic negative with black becoming white and vice versa. I wore this for several days and nights to figure out how well I would adapt to brightness inversion.

TPR: What is the evolutionary significance of your experiments?

SA: We used to think the brain was plastic during the process of development from birth to early childhood and that the brain possibly sets, as it were like plaster, in adulthood. But now we think the brain is flexible regardless of developmental age. My research supports this idea.

TPR: You have also conducted research on the "motion aftereffect." Would your explain your interest in this behavior?

SA: In the short term—as opposed to long term—there is an adaptation for color after images. We all know that if we stare at a red light and then glance away to a white wall you would see a greenish after image because you have adapted your red receptors. A similar phenomenon appears in motion: If you gaze at a rock in a waterfall for about 30 seconds, when you look at the stationary riverbank you would see an illusory movement upwards. This shows you have adapted motion sensitive cells in the brain. This was first described by Aristotle in 300 BCE and rediscovered in the 19th century. There has been a huge amount of research on this motion aftereffect which we encapsulated in a book that I edited together with George Mather and Franz Verstraten, *The Motion Aftereffect: A Modern Perspective* (MIT Press, 1998).

TPR: In contrast to the motion aftereffect you have also done work on the motor aftereffect. What are the differences between the two?

SA: About 5 years ago I broke my leg. I told my students I did this hang gliding from the La Jolla cliffs but in reality someone backed into me in the parking lot. During the rehab process I ran on a treadmill—something I've never done before. When I got off the treadmill I felt a funny feeling in my legs that I recognized as an aftereffect. Specifically, you can measure this perception as follows: before you get on the treadmill close your eyes and try to jog in place. One can do this very well—even wearing a hole in the carpet! Now get on the treadmill and run forward for 30 seconds with your eyes closed (holding on to the rails of course). Then step off the treadmill and try to jog in place with your eyes closed. You might think you are jogging in place but in reality you will most likely run forward 5-10 feet. Some people even bump into the wall. This shows adaptation of specific parts of the legs and controlling mechanisms for the motor behavior. Next, I got my subjects to hop on one leg in the treadmill and then get off and hop on the ground. If the subjects hopped on the same leg once off the treadmill, they still inadvertently hopped. But if they hopped on the other leg there was no transfer of the aftereffect across to the other, unadapted leg. This shows the motor after effect is localized to one leg or to the region of the brain that controls that individual leg. Since the eyes of the subjects were closed, this demonstrated that the motor aftereffect has nothing to do with vision. Some researchers at Cambridge University claimed that the aftereffect had a visual component. I disproved this with three blind observers who very bravely ran on a treadmill and showed a strong aftereffect of running forward when they stepped of the treadmill and attempted to jog inplace. Therefore, the motor aftereffect is a motor-based, not visual, aftereffect.

TPR: In addition to you professional career. What do you do for your spare time?

SA: I like to a modest amount of outdoor exercise. I generally cycle into work once or twice a week, running along the cliff tops outside my house in Del Mar or walk along the beach. At home, I like to play on the piano. Exercise is important in my life because I would like to stay alive and healthy for as long as possible.

TPR: Being a tenured professor demands constant attention to publishing quality research. However, you are additionally dedicated to supporting the student community—graduate and undergraduate. What are your passions and philosphies that drive this dedication and interest?

SA: It is a matter not of dedication but of interest. For example, I could retire tomorrow if I wished but it is far more interesting to teach and research than to do nothing. Any scientist does research because he or she finds their subject fascinating, not because he has been reading too many "publish-or-perish" slogans. If you are a tenured professor it is possible to coast along and become a piece of dead wood, however, this would be very bad for one's morale. Further, early in one's life work and play are typically separated. As time moves on, work and play ideally merge together. If you are going to achieve any form of success in your career, your work becomes your hobby. It becomes one of the leading interests in your life. If it doesn't there is no way you are going to sustainably create and contribute to your field or profession.

Spotlight on Alfred Kinsey

As you may be an aspiring scientist yourself, you will be fascinated hearing the story of Dr. Alfred Kinsey, a Harvard trained zoologist who pioneered research in human sexuality and sexual behaviors. Dr. Kinsey's story is inspiring because of his relentless, in fact, obsessive dedication to collecting candid ethnographies of his subject's sexual histories. His 15 year data collection resulted in two published volumes that analyzed over 18,000 interviews elucidating the diversity of human sexual behaviors and revealing undocumented truths concerning human sexuality.

For the greater part of his career, Kinsey was not investigating sex or human behavior. How is it then that Kinsey wound up becoming the forefather of human sexuality research? By 1938 and before peaking an interest in human sexuality, Kinsey had already become a well-respected scientist, renowned for his twenty-year effort at the University of Indiana to catalog all the taxonomic variation in gall wasps. Through twenty years of dedication his collection grew to an unbelievable 8.3 million specimens of wasps. At that point Dr. Kinsey began teaching in a new "Marriage and Family" class that the university had created in response to students' demands for access to sexual education. It was in teaching that class that Kinsey realized the gaping hole in literature and in people's awareness about the nature of human sexuality.

> *I discovered that there was practically nothing known about human sexual behavior in comparison with what we knew about sexual behavior of other animals and in comparison with what we knew about the activities of other parts of the body* (Alfred Kinsey) (NPR, 2004).

He became set on interviewing students to asses the variety of behaviors that existed. Obsessive by nature, Dr. Kinsey strove for his methods to be as purely scientific as possible. He was particular about avoiding judgment of his interviewees. "We are the recorders and reporters of facts - not the judges of the behaviors we describe" (Kinsley Institute for Research, 2005). He developed his interview method over several years, requiring his interviewers to memorize the 350 questions asked and where the responses went on the unmarked coding sheet. The sheet was meaningless without the questions, and to protect subject confidentiality, the questions were never allowed to exist in written form.

Kinsey was looking to catalog something very specific - sexual behavior - without regard for other factors like love, emotions, morals, or opinions; he just wanted to know what actions took place. His interviews encouraged people to provide candid reports on their sexual histories and habits. He travelled, collecting data from different locales and demographics, and he was fascinated with cataloging the sexual histories of all the members within a population, for example, in a fraternity.

Of all the great knowledge to have grown out of his extensive study, one of the most interesting theories Kinsey proposed is that heterosexuality and homosexuality are not mutually exclusive, but rather coexist in varying degrees with one another. He developed a 7-point rating scale to describe one's degree of homo or heterosexuality which is still used and reprinted in academic literature.

Of course, Kinsey's topic was not pursued without controversy. There were those who fought to keep his ideas and topics out of the university, but the president of the University of Indiana supported his endeavor, believing in the university's responsibility to study topics that could not be discussed elsewhere. The president helped Kinsey to establish the Institute for Sex Research that would serve as a center for all things related to sexual behavior including erotic art. This attracted the attention of US Customs which tried to confiscate the collection, citing the works as "grossly obscene." The ensuing suit between the Institute and US Customs lasted 7 years until finally settling in the Institute's favor.

Overall, the 15 years of data collection resulted in the publishing of Dr. Kinsey's two famous compilations, *Sexual Behavior in the Human Male* (1948) and *Sexual Behavior in the Human Female* (1956), known as the Kinsey Reports. The two academic volumes were instant bestsellers, however comically, were also known as the two least-read best sellers of all time because their style was staunchly scientific and too turgid for most popular readers.

Both volumes comprising the "Kinsey Reports" are available at UCSD libraries, as are many other works of his including his earlier study of gall wasps. Dr. Alfred Kinsey's literally relentless devotion to science lasted until the end of his days. He passed away before his completion of *Sexual Behavior in the Human Female*. Today, his work and literature are still regarded as staples for the study of human sexual behavior. Most recently in late 2004, Fox Searchlight Films produced a major motion picture depicting Dr. Kinsey's life as a scientist. The film is a beautifully produced close-up of Alfred Kinsey's life, revealing the dedication he had to science, his unorthodox approach, and a glimpse of the inspiration that motivated him to become as driven as he was.

- Joshua Wortman

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Meet the Staff of TPR

Kristy Cahoon is a third year psychology major from Eleanor Roosevelt College with particular interests in forensic psychology and interpersonal relationships/social psychology. She has won APA Honorable Mention and is a member of Psi Beta. She is a member of Psi Chi, works as the copy editor for the ERC yearbook staff, and works in Dr. Nicholas Christenfeld's lab looking at the effects of reinforcement and expectation on blood pressure. After taking a year off to work in a psychiatrist's office following graduation, Kristy plans to attend graduate school for clinical or social psychology.

Michael Gibson is a fourth year psychology major from Revelle College. He is the current President of Psi Chi, as well as a member of Masa and Golden Key. Previously working in Dr. George Koob's lab at the Scripps Research Institute studying heroin addiction, Michael now serves as a TA for Dr. Koob's Impulse Control course. Throughout college, he has worked in the Dr. Stephen Howell's lab at the Cancer Center. Next year, Michael will attend Albert Einstein medical school in New York. Over the summer, Michael will be working at a Red Cross Hospital in China under a plastic surgeon with only one year's knowledge of the Chinese language.

Michael Hard will graduate Fall 2005 in biological anthropology/psychology from Thurgood Marshall College. He is interested in pursuing graduate studies in quantitative methods applied to human factors engineering or public health. Michael was a Teaching Scholar for the National Science Foundation in 2003 and won Provost Honors in 2004 at Revelle College. His activites include being on the triathlon team at UCSD and the Foosh Improv Comedy team for Muir College. He has volunteered in the Emergency Room Department at Sutter Medical Center. Valuing self-growth and learning, Michael attempts to understand the many wonderful mysteries of life. He also enjoys sailing and taking statistics courses.

Ravichandra "Ravi" Mutyala is a fourth year biochemistry/cell biology major with a psychology minor from Warren College. He has won Provost's Honors for his college, is a member of PASS (Premedical Association of Students for Service), and was the organizer of the club FOOS (Futhuring Opportunities Of Students). Currently Ravi works at the Burnham Institute researching cancer and Metabasis Therapeutics. He has been a TA for Dr. Muriel Nesbitt's genetics class twice. After graduating this spring, Ravi plans on attending medical school.

Marian "Micki" Shieh is a fourth year Psychology/Human Biology major from Muir College interested in social and personality psychology. Micki is currently in the first year of the Psychology Honors Program and is actively involved in Psi Chi, as well as, a middle school mentoring program as part of the Nationial Society of Collegiate Scholars. She has worked in Dr. John Newport's biology laboratory helping with research on drosophila genetics and circadian rhythms and is currently working with clinical data at UCSD Health Outcomes Assessment Program. Micki has been a TA for Teresa Jacob's "Intro to Behavior" psychology class. After graduation, she would like to work for Teach America or the Peace Corps before attending graduate school for psychology.

Tristan Shuman is a second year psychology major from Warren College. Within psychology, he is particularly interested in biopsychology. Currently a member of the Warren College Honors Program, International Honors Society in Psychology, and the Psychology Honors Program, Tristan escapes the academic world by playing on the UCSD men's rugby team and as an active member of Psi Chi. He studies learning and memory in mice at Dr. Stephan Anagnostaras's lab. He later plans to go to graduate school in biopsychology.

Celeste Vinluan is a fourth year general biology major from Revelle College particularly interested in developmental psychology. She has received Provost's Honors from her college and is a member of the National Society of Collegiate Scholars. Eventually Celeste wants to become a graduate student in pharmaceutical research. A little known fact about Celeste is she was named after a Japanese car that was popular in the 1980's in the Philippines.

Andrew Wong is an alumnus of UCSD and the Editor-In-Chief of the Triton Psychology Report. He graduated in 2004 with a double major in psychology and computer engineering. Within psychology, Andrew is interested in judgment and decision-making, and interpersonal relationships. During his stay at UCSD, Andrew received Provost's Honors three times, was an active member of Psi Chi, worked for Dr. Craig McKenzie and served as a TA for a statistics class with Dr. Michael Roy. Currently, he is working at Anteon Corporation as a programmer/analyst on a contract for the Department of Defense.

Lauren Wong is a fifth year psychology major with a Spanish literature minor from Thurgood Marshall College. She is interested in social and organizational/industrial psychology. Keeping busy as a member of Psi Chi, Intervarsity Christian Fellowship, and the Justice Corps, Lauren dedicates herself to psychology being involved in the Psychology Honors Program. During her time at UCSD, she has worked with Dr. Ebbe Ebbesen and Dr. Kang Lee. Lauren has been a TA for the Advanced Statistics classes for Dr. John Polich. Before applying to PhD programs in industrial/organizational psychology, she plans to take a year off to find herself. She aspires to work in international social justice with underprivileged populations. While studying abroad in Spain, Lauren worked in a maximum security prison as a legal psychology intern.

Joshua Wortman graduated from Eleanor Roosevelt College at UCSD in 2004 with degrees in psychology and mathematics/applied science. While at UCSD, he investigated color perception and cognition under the advisement of Dr. Don MacLeod. In 2002 he received a Chancellor's Research Scholarship to conduct perception research in Brazil. Over the last four years, he has been a leader in UCSD's Psi Chi and continues to be an active member. Joshua was an active resident in UCSD's International House for three years. Currently, he works as an analytical engineer for a start-up company developing technologies to stop identity fraud. He also teaches Sunday school at Temple Beth El. In a few years, Joshua intends to return to graduate school and study cognitive science or information theory.

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