HELPING UNDERGRADUATES IMPROVE THEIR GRADES: A COMPARISON OF VERBAL AND IMAGERY REHEARSAL FOR ENHANCING TRAINING TRANSFER

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ABSTRACT

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The purpose of this study was twofold: to explore an imagery-based alternative to verbally based training transfer interventions and to examine whether individual differences in preferred processing style impact transfer.In sport and therapeutic settings, imagery-based rehearsal has been found to be very effective at changing behavior.Despite the widespread use of techniques related to future-oriented mental rehearsal in other fields, there has been very little exploration into the possibility of its use in workplace or classroom training.

For this study, undergraduate students were presented with training on strategies to improve their scores on multiple-choice exams followed by a verbally based intervention, an imagery based intervention, or no intervention. Within the month following training, all of the students completed at least one multiple-choice exam in a psychology course. After the exam, the students reported whether they had used the strategies they learned in training and whether their exam grade had improved.

The evidence showed that the training had a positive effect on transfer, but that the interventions were no more effective than the control. It was expected that the participants in both the verbal and imagery based intervention groups would use more of the trained skills and show more improvements in their exam scores than the participants in the control group. However, there were no differences between the participants in the three groups, indicating that the interventions were not effective at promoting transfer.Although the interventions were not

effective, the training was. The use of trained skills was positively related to improvements in exam scores.

Although the original experimental hypotheses could not be addressed, the study contributed to the literature by providing evidence that processing style may be an important characteristic to consider for training design. Participants who naturally process information visually (rather than verbally) had more test anxiety and felt less efficacious about performing the trained skills. In addition, the study provided more evidence that trainees' motivation to transfer the trained material is a key predictor of whether they use the trained skills.

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Introduction

Training transfer has been defined as the extent to which the learning that results from a training experience transfers to the job and leads to meaningful changes in work performance (Baldwin, Ford, &Blume, 2009; Goldstein & Ford, 2002). Baldwin and Ford (1988) introduced a model of training transfer which included three broad categories of factors influencing transfer: learner characteristics, intervention design and delivery, and work environment influences (Burke & Hutchins, 2007).Since 1988, research on factors impacting training transfer has largely been conducted within this framework.Recent research about training transfer has focused on how factors prior to and after training affect transfer. Reviews of training transfer have pointed out substantial knowledge gains about how individual traits of trainees and how the climate of the workplace impact transfer (Blume, Ford, Baldwin, & Huang, 2010; Burke & Hutchins, 2007; Cheng &Hampson, 2008).

Although such information is valuable for understanding the processes associated with changing behavior on the job, trainers have little control over who participates in a training session and what their workplace is like. Trainers do have a high degree of control over the experience of the trainee during the training event. They are responsible for designing the content of the training as well as to prepare trainees to transfer that content on the job. For that reason, it is especially important to know what types of training design interventions impact subsequent transfer and why.That is the main goal if this study.

Transfer Interventions

The training design interventions that have been linked to positive transfer can be divided into two broad categories: practice and self-management. There are a variety of interventions that have to do with different ways of having trainees engage with and practice the material presented

in training that have been linked to transfer (Driskell, Willis, & Copper, 1992; Frese et al., 1991; Goodman & Wood, 2009; Keith &Frese, 2008; Latham &Saari, 1979; Rohrer et al., 2005; Schmidt & Bjork, 1992; Taylor, Russ-Eft, & Chan, 2005). In addition, researchers have proposed strategies or tools for teaching trainees to self-manage the transfer process during or soonafter the training event (Brown, 2003; Brown & McCracken, 2010; Brown & Morrissey, 2004; Gollwitzer&Sheeran, 2006; Hutchins & Burke, 2006; Marx, 1982; Millman& Latham, 2001; Orbell, Hodgkins, &Sheeran, 1997; Wexley& Baldwin, 1986). Whereas practice interventions are designed to enhance learning of the training content, self-management interventions are specifically intended to enhance transfer.

Practice. Practice interventions are designed to help the trainee acquire and retain the material to meet training objectives. The practice interventions typically occur during the training event and are primarily intended to develop knowledge and skills. Learning is an important precursor to transfer (Baldwin & Ford, 1988). Therefore, the interventions areprimarily designed to enhance learning, which is expected to prepare the trainee to generalize and maintain the trained knowledge and skills once on the job.

Making learning more difficult.In 1992, Schmidt and Bjork pointed out a series of paradoxes they found in the experimental learning literature. First, they showed that whereas blocked practice (sequential practice of a single element of a task at a time) resulted in higher performance during a training event, spaced practice resulted in higher transfer after the event. Second, they showed that whereas providing feedback to trainees at frequent intervals produced higher performance during training, providing feedback at less frequent intervals produced higher transfer. Third, they showed that whereas constant practice on each dimension of a task at a time produced higher performance during training, variable practice on the different

dimensions of a task produced higher transfer. They summarized all three of their findings by pointing out that requiring learners to participate in additional information-processing activities during a training event may degrade performance during the event but is likely to increase transfer. Their explanation for why this phenomenon occurs is that requiring the seemingly detrimental informational processing during learning prepares learners for the processes that will be required of them when they perform the learned tasks outside of the training environment. In general, Schmidt and Bjork's synthesis and summary have been supported by more recent experiments in more organizationally relevant contexts (i.e., Holladay & Quinones, 2003).

Overlearning. Overlearning refers to the immediate continuance of practice beyond the criterion of one instance of perfect performance (Rohrer et al., 2005). Overlearning is believed to be an effective training intervention because it creates automatic responses that conserve a trainee's cognitive resources so that cognitive ability may be dedicated to solving novel or more complex tasks (Burke & Hutchins, 2007; Shiffrin& Schneider, 1977). For many years, overlearning has been considered to be a very effective intervention for improving retention of material. Driskelland colleagues(1992) conducted a meta-analysis of 11 overlearning studies and found a moderate effect on retention. What they were unable to thoroughly evaluate, however, was whether the effect was lasting. They noticed that, as time increased between the training event and the retention test, there were fewer differences between participants in overlearning conditions and control conditions, indicating that the effects of the overlearning intervention may not last beyond a few weeks. Rohrer and colleagues (2005) conducted two experiments in which they evaluated the effect of overlearning on the long-term retention of paired words. In both experiments, they found that participants in the overlearning condition outperformed those in the control condition for several weeks, but that the effects disappeared by four weeks. They

concluded that overlearning might be an appropriate strategy for students who are studying for a test coming up soon and whose main goal is short-term retention, but that overlearning wouldlikely be an ineffective strategy for trainers who wish to provide lasting effects unless supplemented by other techniques.

Providing feedback.Feedback is information provided to the trainee about his or her performance on the trained task (Kluger&DeNisi, 1996). The rationale behind providing feedback to trainees as they learn is that the trainee may be able to adjust his or her performance based on the feedback. As discussed above, though, there is a paradox associated with providing feedback to trainees as they learn. Providing specific, immediate, and frequent feedback during training has been associated with improved performance during training (i.e., quicker learning), but is also associated with lower levels of transfer (Goodman & Wood, 2009; Schmidt & Bjork, 1992).

One method for reaping both the short-term benefits of providing frequent feedback and the long-term benefits of spacing or withholding feedback is called fading. Using this method, the trainer provides high levels of feedback during initial skill acquisition and then, as the trainee begins to master the skill, gradually reduces (or fades) the amount of feedback. Goodman and Wood (2009) conducted a study to explore the efficacy of fading feedback,using a computer simulation task in which participants were given responsibility for managing a group of workers in a factory. They found that fading feedback led to less exploratory behavior on the part of trainees even after feedback was reduced. In other words, participants in the group that initially received high levels of feedback which was later faded made less of an effort to experiment with the different decision choices allowed by the simulation and, therefore, were exposed to fewer opportunities to score highly. Given that exploratory behavior tends to be associated with

increased transfer (see the discussion below about error-based training interventions), Goodman and Wood's findings suggest that fading feedback may not be effective for increasing transfer. Their findings, however, are not conclusive about the optimal amount and timing of feedback to use as an intervention for enhancing learning and transfer.

Using behavioral models.Goldstein and Sorcher (1974) presented behavioral modeling as an alternative training method (especially for supervisory training) to the prevalent strategy of training for attitude change. They argued that the attitude change strategy focuses on convincing trainees that they should change their behavior (an attitude shift), but that behavioral modeling trainingteaches trainees *how* to change their behavior. Knowledge about how to act differently should presumably lead to a more direct behavioral shift. Behavior modeling training generally consists of four components: a) describing to trainees a specific set of behaviors to be learned, b) modeling the behavior for trainees, c) having the trainees practice the behaviors, and d) providing trainees with feedback about their performance of the behaviors.

Latham and Saari (1979) conducted an early study of the effectiveness of behavioral modeling training with a group of male supervisors. Participants who received the training participated in a 9-week course with a 2-hour session per week. At each weekly session, participants were trained in a different set of supervisory skills (for example, giving recognition and motivating a poor performer). Each session opened with introductory remarks about the topic by two trainers, which was followed by a film of a supervisor model effectively handling a situation by following specific learning points. After the film, the trainers led a group discussion of the effectiveness of the model, the participants practiced role playing related situations, and then the class gave one another feedback about their behavior during the role play exercise. After each session, participants were required to practice the new skills with at least one employee and

report back to the class about their experience. Participants in the control group did not receive any training because they were told that they would be receiving the training at a later date. Three months after the training, both the training and the control groups participated in tape-recorded role play exercises designed to evaluate the skills presented in the training. The trained group outperformed the control group. Six months after the training, both the training and the control groups took a situational test designed to evaluate interpersonal supervisory skills. The trained group outperformed the control group, despite the fact that the test included situations not trained. One year after training, the participants were compared on job performance using two measures, one specially designed for the study and another used regularly in the organization. The trained participants outperformed the control group on both measures of job performance.

In a meta-analysis of the effects of behavior modeling training on training outcomes, Taylor, Russ-Eft, and Chan (2005) reported that whereas effects on learning outcomes were substantial and consistent across studies, effects on transfer were smaller and less consistent. They found that transfer was greatest when both positive and negative models were presented to trainees (as opposed to positive models alone). This finding is consistent with Baldwin's (1992) finding that trainees who were presented with both positive and negative models performed better in a generalization task than trainees who were presented with only positive models. Baldwin suggested that one reason that mixed models lead to better transfer is that the contrast between effective and ineffective behaviors provides greater distinctiveness to the stimuli. Taylor et al. also suggest that trainees may be more motivated to perform the desired behaviors when they see the positive model reinforced for effective performance whereas the negative model does not achieve the desired outcome. Taylor et al. also found that transfer was greater when trainees practiced work-related scenarios that they developed themselves (as was done in the

Latham and Saari study), as opposed to practicing scenarios provided by trainers. One possible explanation for this finding is that having trainees generate their own work-related practice scenarios leads to greater retention because of the personal relevance (Decker & Nathan, 1985). This explanation is supported by the principle of identical elements and the theories of encoding specificity and situated cognition (Anderson, Reder, & Simon, 1996; Greeno, 1998; Tulving& Thomson, 1971, 1973)

***Encouraging errors*.** In error-based training, participants are explicitly encouraged to make errors during the learning process. The rationale for error-based training is that errors can have an informative function for the learner as they identify areas where improvement is needed (Ivancic&Hesketh, 1995/1996). In other words, errors made during training serve an important feedback function by helping the individual to form a more complete mental model. Trainers using error-based methods encourage trainees to explore the training material and to view errors as opportunities to learn rather than as negative feedback. Frese et al. (1991) conducted an early study comparing the outcomes of error-based versus error-avoidant training for a word processing system. Participants in the error-avoidant condition (the control) received step-by-step instructions for each tutorial whereas the participants in the error training condition were left to figure out the steps through exploration and were encouraged to learn from errors. The participants in the error-based training condition outperformed those in the error-avoidant condition on several performance tests immediately after the training. The differences in performance were most pronounced for the most difficult tasks.

Keith and Frese (2008) conducted a meta-analysis comparing error-based training with alternative training methods, such as error-avoidance instructions or immediate correction by a trainer. Consistent with the paradox introduced by Schmidt & Bjork (1992), they found that error

management training was more effective than the alternative methods for post-training performance, but not for performance measured during training. They also found that error management training was most effective for adaptive transfer (or generalization) of the learned skills to tasks not presented in the initial training. One limitation in the existing literature on error based training is that few, if any, researchers have evaluated on-the-job performance as a measure of transfer. All of the studies included in the meta-analysis measured post-training performance via tests of performance rather than by measuring behavior on the job.

Self-management strategies. In contrast to practice interventions, which were primarily designed to enhance learning and retention, self-management strategies were developed specifically to enhance the generalization and maintenance of trained knowledge and skills to the job. Self-management is an umbrella term that is used to describe strategies that are taught to trainees (often at the end of training) for use in managing their own behavior after the training event. Although trainees are ultimately responsible for using the self management techniques on their own, the choice to include self management strategies in the training content is that of the trainer.

***Goal setting*.** Participants in training interventions that use goal setting strategies are asked to set goals about their use of the training material back on the job. In an early study of goal setting as a transfer intervention, Wexley and Baldwin (1986) examined the effects of assigned goals versus self-developed goals on changes in behavior related to time management. All of the undergraduate participants received training in time management followed two days later by a transfer intervention. One treatment group was assigned behavioral goals and a second treatment group was led through the process of developing their own behavioral goals. Both treatment groups received feedback about their goal achievement at the end of four weeks. A

third group served as the control and received no intervention or feedback. Self-reports of behavioral change were collected eight weeks after the initial training. Both treatment groups reported greater levels of behavioral change than the control group, indicating that both goal-setting interventions successfully led to increased transfer.

Brown and McCracken (2010) reviewed the literature on goal setting and summarized the findings about how different types of goals contribute to training transfer. They found that distal outcome goals, which focus on longer term performance, may be suited for simple, straightforward tasks for which trainees have the prerequisite skills, but that distal outcome goals alone are generally not well suited for transfer of complex skills. Learning goals, in which trainees are encouraged to focus on learning the material as thoroughly as possible, are slightly more effective than distal outcome goals. Breaking distal goals into short term goals is a more effective intervention. Setting short-term goals designed to help achieve a longer-term goal may be effective because each "check in" point provides the individual with feedback about how effective the current path is toward reaching the longer term goal. Interventions in which participants are asked to set short term goals are most in line with Locke and Latham's (1990) finding that specific, challenging goals lead to better performance than easy or non-specific goals. Similarly, behavior outcome goals, or goals for specific performance, also seem to be effective in promoting transfer. One limitation of the existing research on goal-setting interventions highlighted by Brown and McCracken is that the majority of goal-setting studies use simulated and/or short-term tasks. There have been fewer naturalistic studies of people setting goals to implement trained behaviors in the long-term, so it is unclear how powerful the intervention can be.

Implementation intentions. The formation of implementation intentions is a type of goal-setting intervention that capitalizes on the literature suggesting that more specific and behavioral goals are more likely to be achieved. Whereas goal intentions specify what an individual wants to achieve ("I will achieve X"), implementation intentions specify the behavior required to achieve the goal and the situational context in which the individual will perform the required behavior ("If situation Y occurs, then I will initiate goal-directed behavior Z;" Gollwitzer&Sheeran, 2006). Implementation intentions are hypothesized to be more effective than goal intentions for facilitating goal achievement because the process of developing if-then plans leads to increased accessibility of the critical cues associated with performance (or inhibition) of the desired behavior. The performance of behavior specified in an implementation intention exhibits features of automaticity such that individuals do not have to be consciously aware of recognizing and responding to the critical cue in the planned way to do so.

In an early study of the efficacy of implementation intentions, Gollwitzer (1993) asked university students to write a report within two days of Christmas about how they spent Christmas Eve. Half of the participants were asked to specify, in writing, where and when they planned to write the report. The other half were not asked to do so. Seventy-one percent of the participants in the implementation intentions group completed the report within the two days after Christmas whereas only 32% of the control group did so.

Gollwitzer and Sheeran (2006) conducted a meta-analysis of 94 tests of the impact of implementation intentions on goal achievement. They found an effect size of d = .65 with a 95% confidence interval from .60 to .70, indicating that forming implementation intentions has a relatively stable moderate effect on goal achievement. Although the authors tested a variety of moderators, they found that the effect was fairly stable across different samples and tasks. As

discussed above in relation to goal-setting, one limitation of the literature on implementation intentions is that it has largely been limited to tasks in a laboratory setting so more study is needed to evaluate whether implementation intentions are effective interventions in a less structured and self-managed context.

***Relapse prevention*.** Relapse prevention is based on a program of interventions developed for use by clinicians in treating addictions (Marlatt& Gordon, 1980; 1985). The original purpose of relapse prevention was to help addicts anticipate and cope with setbacks in efforts to curb addictive behavior. Relapse prevention is based on social cognitive theory, which suggests that people can control their own behavior if they understand their motives as well as how to reinforce desirable behavior (Bandura, 1982). In relapse prevention training, individuals are trained to become aware of situational threats that jeopardize the maintenance of their behavior change and are given strategies for dealing with those threats (Hutchins & Burke, 2006).

Marx (1982) adapted relapse prevention strategies to the training environment. For trainees, relapse prevention involves learning how to identify and recover from setbacks in transfer behavior. Relapse prevention is hypothesized to work because individuals who feel capable of managing their reactions to slip-ups and situational threats experience increased self-efficacy, which in turn motivates them to keep working toward successful transfer (Hutchins & Burke, 2006; Larimer, Palmer, &Marlatt, 1999). Although relapse prevention is recognized as a potentially effective transfer intervention, empirical studies have demonstrated inconsistent findings with regards to its efficacy.

Hutchins and Burke (2006) reviewed all published and in-press studies using relapse prevention strategies to increase training transfer in order to explore the reasons for inconsistent findings. They found eight studies spanning two decades that met their criteria for inclusion in

their review, which indicates that there has not been a large amount of empirical research in the area. From their review of the studies, Hutchins and Burke came up with three main reasons for inconsistent findings: insufficient samples, inconsistent operationalization of relapse prevention, and poor design. First, they pointed out that five of the eight studies reported extremely small sample sizes (under 40), which limited the statistical power of analyses. Second, the eight studies included inconsistent definitions of relapse prevention and, thus, did not consistently provide the same intervention nor did they include the full range of characteristics of a relapse prevention program as outlined by Marx. Third, most studies failed to measure whether the relapse prevention strategies trained were utilized after training and, in all but one study, the effects of the intervention were measured as a main effect, making it virtually impossible to examine the efficacy of individual components of the relapse prevention program. Therefore, despite some encouraging studies of relapse prevention and its intuitive appeal, the jury is still out on relapse prevention as a unique intervention. However, it is likely that some of the components, like goal-setting and coping strategies are promising interventions for transfer.

***Self talk*.** Another self management intervention involves training individuals to covertly talk themselves through a task. One intervention involving self talk is called verbal self guidance. (Meichenbaum,1975; 1977).Verbal self guidance includes teaching individuals to talk themselves through a task as well as teaching individuals to monitor their self-statements and change negative statements to positive statements. Like relapse prevention, verbal self guidance interventions were originally developed for clinical settings and have been adapted by organizational researchers. Although there is a small body of evidence that suggests that verbal self guidance is an effective intervention in organizational settings, only a few studies have examined verbal self guidance on its own without combining it with other interventions.

Millmanand Latham (2001) trained unemployed managers using the verbal self guidance technique. Nine months after training, a greater number of trained participants were employed than control group participants. Trained participants also had higher levels of self-efficacy. Brown and Morrissey (2004) found that participants trained in verbal self guidance had higher self efficacy about class presentation skills than participants in the control group. Higher self efficacy was associated with better presentation performance. Similarly, Brown (2003) presented evidence that verbal self guidance training was related to improvements in both individual and team performance and efficacy for student teams in a business school class.

Summary. Two types of training interventions have been linked to positive transfer. Practice interventions are those that were designed to enhance learning, but also have implications for transfer. Paradoxically, many practice interventions that enhance immediate learning (i.e., overlearning and frequent feedback) inhibit transfer whereas interventions that appear to inhibit initial learning (i.e., spaced practice and error-based training) enhance transfer. Schmidt and Bjork (1992) suggested that interventions during learning that are distracting or detrimental to initial learning better prepare learners for the processes that will be required of them outside the training environment. Another practice intervention, behavioral modeling appears to be most successful when it is personally relevant and increases self-efficacy, which increases motivation to transfer.Self-management interventions were developed specifically to increase transfer. Setting specific goals, such as implementation intentions, is effective at increasing transfer because it increases accessibility to critical cues associated with the desired behavior and allows responding to the cues with the desired behavior to become automatic. Like behavioral modeling, self talk is related to increased self-efficacy, which is related to increased performance.

The most effective transfer interventions seem to share two main characteristics, similarity to the transfer environment and the enhancement of an individual's feelings of competence. Training interventions that are similar in some way to the context of the transfer environment are effective probably because they provide realistic practice, increase self-efficacy for performance of the desired behavior in the transfer context, and increase motivation to transfer. Training interventions that increase participants' self efficacy for the desired behavior are very effective becauseself-efficacy is related to motivation to act and to effective performance.

There is a lot of evidence about what makes for effective practice during training. Effective practice is difficult and may hinder performance at first, it can involve viewing and mimicking a model performing the desired (and undesired) behavior, and it incorporates errors or allows the trainee to make mistakes and to learn from them. In addition, there is some evidence that self management strategies can add to effective practice by helping people stay focused on the goal to apply what they learn in training to the job.

Although there is evidence that self-management strategies can be very effective transfer interventions, one limitation of the existing literature is that all of the strategies involve verbal rehearsal. Goal-setting, implementation intentions, and self talk all involve the use of verbal statements. Marlatt's model of relapse prevention (1988) included visual imagery rehearsal as part of a set of tools that patients are taught to use to help manage their own behavior. Although Marlatt's model of relapse prevention has been widely accepted and used, Marlatt never elaborated on the original suggestion about using visual imagery techniques as a component. In sport and clinical settings, however, imagery-based rehearsal has been found to be very effective at changing behavior. Imagery-based interventions share many of the most effective elements of

the transfer interventions described above, such as the personal relevance associated with modeling and goal-setting and the planning and rehearsal involved in forming implementation intentions. There is also some evidence that certain individuals may respond better to imagery-based rehearsal than to verbal statements.

Imagery Rehearsal as an Intervention

We spend a significant portion of our time thinking, daydreaming, and fantasizing about the future (Singer, 1966). A recent study suggests that we think about the future approximately once every sixteen minutes during waking hours (D'Argembeau, Renaud, & Van der Linden, 2011). Despite the fact that most people spend a considerable amount of time and energy focused on what will occur in the future, it is unclear how much of that time and energy is productive – applied towards planning, strategizing, or other effective ways of improving future experiences. Clinicians and athletes have both utilized future-oriented thinking to their advantage. Two examples of how clinical psychologists and practitioners in related fields have utilized what they call mental rehearsal and covert modeling include helping people with addictions resist temptations and helping patients with phobias to reduce their anxiety. Elite athletes use mental imagery techniques to rehearse physical performance as well as to strategize and to manage anxiety.Despite the widespread use of techniques related to future-oriented mental rehearsal in several fields, there has been very little exploration into the possibility of its use in workplace training.

There are good reasons to believe that interventions using mental imagery could be very effective in increasing training transfer. First, the interventions used by clinicians and athletes adhere to effective learning principles, including practice and self-generation. Second, behavioral modeling, practice and rehearsal have proven extremely effective as interventions in training.

Mental imagery interventions are a less expensive and less time-consuming (at least for the trainer) alternative or supplement to active practice. Training individuals to use mental imagery on their own is practical because it allows those who wish to do so to practice on their own time wherever they can.

Relatively recently, cognitive psychologists and neuroscientists have begun to conduct basic research on the phenomenon of future-oriented thought. Although this area of research is still in its infancy, it is already apparent that future-oriented thoughts are both prevalent and natural. This new and emerging literature is summarized below, followed by a summary of applications of future-oriented imageryto changing behavior in sport and clinical settings.

Episodic future thought. Even thoughfuture-oriented techniques have existed in the literature for many years, it is only recently that cognitive psychologists and neuroscientists have begun to explore the processes related to future thought. The most relevant research is on the phenomenon called episodic future thought. Episodic future thought involves the simulation or pre-experience of personal events that may happen in the future (Atance& O'Neill, 2001). The term is drawn from the emerging relationship between future simulation and episodic memory (Szpunar, 2010). Episodic memory is memory of one-time events from one's past. It is typically contrasted with semantic memory, which is memory about the past, but without a feeling of re-experiencing it. For example, remembering the events from your wedding would come from episodic memory, but remembering the fact that you were married in East Lansing, Michigan would come from semantic memory.

The connection between simulation of the future and episodic memory emerged from studies of patients with brain damage who demonstrated deficits with both episodic memory and future simulation (Szpunar, 2010). It is not completely clear how the two phenomena are related,

but one hypothesis is that future simulations may be formed from fragments pulled from episodic memory. In other words, the ability to think about future events may rely on the ability to pull ideas from events experienced in the past (Addis, Wang, &Schacter, 2007).

Despite the fact that the study of episodic future thought is relatively new, Szpunar (2010) suggests that there are already several consistent findings that can be drawn from the literature. First, it appears that the neural regions related to the retrieval of personal memories are engaged during episodic future thought. Second, damage to those neural regions is associated with impairments in both episodic memory and episodic future thought. Third, patient populations that demonstrate poor episodic memory also tend to have difficulty with imagining the future. Fourth, verbal protocols of episodic future thought are characterized by content that is highly familiar to participants. In other words, when people imagine the future, they tend to stay within the context of their own lives. Fifth, episodic future thoughts make up a considerable portion of daily thought. In addition, episodic future thoughts are rated as less vivid than memories. Mental representations of events occurring in the near future are more vivid than events in the distant future. Finally, mental representations of the future have more positive valence than memories, indicating that people are generally optimistic in their simulations of the future.

The study of episodic future thought has mainly been limited to the laboratory using the word-cuing technique. In the word-cuing technique, participants are presented with a word cue and asked to mentally generate a future scenario (e.g., Szpunar, Watson, & McDermott, 2007). For example, participants might be given the word cue “birthday” and then describe specific details about a future scenario related to whatever first comes to mind when they hear that word (Szpunar, 2010). A participant might describe a detailed mental representation of what her son’s

first birthday party will be like. Recently, researchers have also begun to utilize thought-sampling procedures outside of the laboratory. Thought-sampling procedures require participants to either estimate or systematically monitor the frequency and content of their thoughts throughout the day (Berntsen& Jacobsen, 2008; D'Argembau, Renaud, & Van der Linden, 2011).

There areseveral implications that can be drawn about the functional role of episodic future thought. First, given the relationship between episodic future thought and episodic memory, mental simulations will probably need to remain within the realm of the experience of the individual in order to be effective. In other words, asking people to simulate an event that is unlike any they can imagine is unlikely to be effective. Second, episodic future thought is natural for most people, so asking people to simulate the future should be familiar to them and should not require an overwhelming amount of training.

Mental imagery in sport psychology. Mental imagery is used widely by athletes in competitive sports hoping to improve performance. This focus on mental imagery suggests that practice of motor skills is not enough for success. Athletes of all types report using imagery in many different ways and for a variety of reasons. Researchers have gathered data about typical use of imagery by athletes. Athletes tend to use imagery more for performance enhancement (i.e., planning strategy for competition) than for learning skills (Barr and Hall, 1992; Hall, 2001). The most common time that athletes use imagery is immediately prior to competing (Barr & Hall, 1992; Hall, Rodgers, & Barr, 1990; Munroe et al., 1998), although many athletes use imagery during breaks in their daily activities and just before going to sleep at night (Hall et al., 1990; Rodgers, Hall, &Buckholz, 1991). Both elite and nonelite athletes report extensive use of visual imagery. Athletes are more likely to imagine themselves performing their sport skills

accurately than inaccurately and are more likely to imagine winning than losing (Barr & Hall, 1992; Hall et al., 1990). One of the most consistent findings is that the higher the skilllevel of the athletes, the greater their use of imagery (Hall, 2001).

The existing literature related to the application of mental simulations of the future for athletes mainly focuses on the practical details of using the interventions and less on why or how the interventions are effective. Although sports psychologists present models of the processes believed to be involved in the imagery process, those models have generally not been tested or are not testable. However,there is evidence to suggest that athletes successfully apply mental simulation to improve performance and impact behavior.

There is a small body of literature examining the efficacy of using imagery to improve performance of motor skills in sports. In studies directly pitting physical practice against mental practice using imagery, physical practice tends to be more effective for learning motor skills. However, mental practice using imagery appears to facilitate learning and performance of motor skills in comparison to a control condition of no practice (Driskell, Copper, & Moran, 1994; Hall et al., 1994). In studies in which a combination of physical and mental practice was compared with physical practice alone, the combination condition appears to be comparable to physical practice alone (Durand, Hall, &Haslam, 1997). Therefore, it appears that is often possible to substitute some imagery practice for physical practice without detracting from learning and performance of motor skills. This finding has important implications for athletes in situations in which they cannot physically practice as much as they would wish (for example, while traveling or while injured) (Hall, 2001). In addition to the practical implications of this finding for athletes who cannot conduct physical practice, the finding that mental imagery can be substituted for some physical practice without detracting from the performance of motor skills is powerful

because it suggests an important psychological component to motor skill performance that is often overlooked with a focus solely on physical practice.

In general, researchers recommend that athletes supplement physical practice with imagery practice. Research examining the visual imagery perspective of athletes suggests that both an external perspective (imagining oneself performing as if watching a video) and an internal perspective (imagining what one would see through one's own eyes during performance) are effective in different contexts (Cumming &Ste-Marie, 2000; Hardy & Callow, 1999). Task differences probably impact the efficacy of the use of each perspective (Hardy, 1997; White & Hardy, 1995). For example, the external perspective probably is better for the acquisition and performance of skills that depend heavily on form (so "seeing" oneself is beneficial for the correction of mistakes in form) whereas the internal perspective is probably better for skills that depend heavily on perception and anticipation (where "seeing" from one's own perspective is beneficial).

In addition to the literature on using imagery to improve motor performance, researchers have also examined what types of athletes are more likely to use imagery and to use it effectively. Athletes with greater knowledge about imagery techniquesare better able to use those techniques more effectively (Calmels et al., 2003). Athletes who view imagery as more relevant use it more frequently and athletes at higher competitive levels find imagery to be more relevant (Cumming & Hall, 2002; Cumming et al., 2006). Athletes who are more motivated and athletes who are encouraged by their coaches to use imageryhave been found to use imagery techniques more frequently (Cumming et al., 2002; Harwood, Cumming, & Fletcher, 2004; Harwood, Cumming, & Hall, 2003; Hall & Rodgers, 1989; White & Hardy, 1998). Evidence suggests that

imagery is a skill and, like any skill, can be improved through regular, deliberate practice (Rodgers et al, 1991).

In sport psychology, there has been relatively little exploration of the effectiveness of mental imagery for purposes other than motor skill improvement. Weinberg (2008) suggests that this is probably due to the overlap between imagery and mental practice. Whereas mental practice is a broader term that involves other types of mental preparation such as self-talk or relaxation, imagery is generally limited to picturing or seeing oneself performing. However, two meta-analyses of mental practice and performance combined effects from studies that used various forms of mental practice (Feltz& Landers, 1983; Hinshaw, 1991). Both meta-analyses found evidence that mental practice is more effective than no practice, but did not evaluate the effectiveness of imagery alone. Weinberg (2008) synthesized the evidence for whether imagery alone is an effective intervention for athletes. He evaluated multiple case studies and determined that the overwhelming evidence was that imagery enhances performance. One case study that Weinberg includes in his analysis was conducted by Savoy and Beitel (1996). They followed 10 players on an NCAA women's basketball team. The researchers used an ABABAB time series design in which the participants practiced both physical and mental practice during the intervention period (A) followed by only physical practiceduring the control period (B). The intervention and control periods were repeated twice. The participants increased their free-throw percentages significantly between the control and intervention periods. Unfortunately, Weinberg found that although there has been a fair amount of research into the use of imagery by athletes, the studies share few aspects in common, so he was unable to provide meta-analytic estimates of effect size. For example, the studies vary in terms of the control or comparison condition for mental imagery practice. Some studies used no intervention for the control group, so that mental

imagery is compared to no practice, whereas others compared mental imagery practice in combination with physical practice as compared to physical practice alone. In addition, the criterion for some studies was performance, but other studies examined outcomes presumably related to performance, such as self-efficacy, anxiety (reduction), and motivation.Weinberg's conclusion based on his synthesis of diverse studies of mental imagery use by athletes is that it appears that mental imagery use positively impacts performance and related factors, but that more systematic research is needed.

In the sport psychology literature, there are two main models used to explain how to use mental imagery to improve performance. The first model is based on the theory of functional equivalence, that imagery draws on the same neural network that is used in actual perception and motor control that activate neural circuits used in memory and emotion (Murphy, Nordin, & Cumming, 2008). Therefore, the theory suggests that the more similar the imagery is to reality, the more effective it will be for improving performance. The model is called PETTLEP, which is an acronym derived from the seven areas that the creators suggest are important for mimicking in developing effective imagery (Holmes & Collins, 2001). In this way, the model is essentially a seven-point checklist including the following elements: physical (active involvement in the imagery process, by holding implements or actually moving), environment (as accurate as possible in imagination or in perceptual experiences), task (focus on same thoughts, feelings, and actions as when physically performing the skill), timing (corresponds to actual movement time, especially when timing is important for the task), learning (imagery content should evolve to accommodate learning that has taken place), emotion, and perspective (internal or external). According to the model, effective images contain important stimulus, response, and meaning propositions from as many of the seven elements as possible. Stimulus propositions provide

information about the environment where the behavior will take place, response propositions provide information about what is felt in response to the behavior, and meaning propositions include information about the perceived importance of the behavior to the individual.Although it is useful as a practical guide for developing detailed imagery, one major limitation of the PETTLEP model is that it focuses almost solely on explaining imagery as part of motor skill development and improvement. It does not address imagery use for other purposes, such as motivation, confidence, and arousal (Murphy, Nordin, & Cumming, 2008).

Whereas the PETTLEP model emphasizes the content of imagery, the applied model of imagery use focuses on the function of imagery. Martin, Moritz, and Hall (1999) propose that different types of imagery are used for different athletic goals. They outlined five types of imagery associated with five different objectives. Cognitive Specific (CS) imagery, the most commonly studied type of imagery, involves rehearsal of specific athletic skills, such as penalty shots or balance beam dismounts. Cognitive General (CG) imagery focuses on strategies related to a competitive event, such as imaging using full-court pressure in basketball. Motivational Specific (MS) imagery involves imaging specific goals and goal-oriented behaviors such as imagining oneself winning an event or standing on a podium receiving a medal. Motivational General-Mastery (MG-M) imagery focuses on effective coping and mastery of challenging situations, such as imagining being mentally tough and focused curing competition. Motivational General-Arousal (MG-A) imagery represents emotional and somatic experiences in sport, such as feelings of relaxation, stress, anxiety in conjunction with competition.

One limitation of the applied model is that it is extremely difficult to test. The model predicts that athletes would be more effective if they use the type of imagery that will be most useful in achieving their desired outcomes. Research evidence has been inconsistent, which is

probably due to the fact that any given image can serve multiple functions, depending on the meaning it holds for the person. Although people can be told to imagine specific content, that same content may be related to different functional goals for different people (Short, Monsma, & Short, 2004). Most likely, because individuals have complex sets of motivations, most imagery falls into more than one of the five categories at any one time, making it even more difficult to cleanly compare the different types of imagery.

The examination of the application of mental imagery to the improvement of performance in sport has in some ways demonstrated that mental imagery can be an effective intervention. It is used frequently by elite athletes who tend to believe strongly in its effectiveness. What the literature lacks, however, are testable models of the processes by which mental imagery techniques lead to improved performance. The literature on covert modeling in clinical psychology provides one avenue for generating more testable models of process.

Covert modeling in clinical psychology. Covert modeling is a therapeutic intervention in which an individual imagines a model successfully performing desirable behavior. Depending on the specific intervention, the individual either imagines performing the behavior or imagines a model performing the behavior. Covert modeling has been used as a successful intervention to help treat anxiety and phobias, among other issues.

In experiments comparing covert modeling with other therapeutic interventions, researchers have demonstrated that covert modeling is at least as effective as similar interventions such as behavior rehearsal and cognitive restructuring. Zielinski and Williams (1979) compared the relative efficacy of a covert modeling intervention in which the participants imagined various models behaving and behavior rehearsal intervention in which participants practiced responding to scenarios for training assertive behaviors. They argued that covert

modeling was a more cost-effective intervention because behavior rehearsal required the presence of a therapist or the use of an audio-tape whereas patients could practice covert modeling on their own. They found evidence that the two interventions were equally effective. Bistline, Jaremko, and Sobleman (1980) found that a covert modeling intervention in which participants imagined themselves coping effectively was more effective for reducing test anxiety than a cognitive restructuring intervention in which the participants imagined themselves replacing negative thoughts with positive ones.

There is consistent evidence that covert modeling is an effective therapeutic intervention andresearchers have posited a number of reasons why covert modeling might be effective.Kazdin (1973, 1974a, 1974b, 1975, 1976) found that the factors that make live modeling effective are also important for covert modeling. For example, the similarity of the age and sex of the model with that of the patient, the number of models, the coping skills of the model, and whether the model is reinforced for desirable behavior enhance covert modeling in the same manner demonstrated in research on live modeling. The benefits of live modeling are often explained in terms of Bandura's (1991) social cognitive theory. Uhlemann and Koehn (1989) pointed out that Bandura's argument for the benefits of live modeling referred to the cognitive and representational processes that guide behavior rather than to the mode through which the behavior is observed. Therefore, they argued that covert modeling should be as effective as overt modeling if the important processes are as Bandura described. Uhlemann and Koehn sought to determine whether the benefits of covert modeling were due to the imagery component. They suggested that in many studies of covert modeling, the imagery component (i.e., imagining oneself or a model performing the desirable behavior) has been confounded with an overt modeling intervention because participants in the covert modeling condition are told exactly

what to imagine the model doing and saying. Uhlemann and Koehn told participants in all experimental conditions what the proper behavior should be, but only asked participants in the covert modeling condition to imagine themselves and a model performing the behavior. They didnot find any differences between the experimental conditions, which they argued indicated that the imagery component (or rehearsal) is not what makes covert modeling effective. There were limitations to their design which preclude the interpretation that the imagery or rehearsal component of covert modeling is irrelevant. However, the study does suggest that any advantages of covert modeling over overt modeling may not be due to the imagery or rehearsal component alone.

Vallis and Bucher (1986) evaluated whether individual differences in natural coping styles impacted the effectiveness of covert modeling versus a verbal coping strategy for reducing fear in phobic individuals. They randomly assigned participants to participate in the two interventions, but measured the natural coping styles of all of the participants. They found that both interventions were equally effective in the reduction of fear and that participants in both groups significantly increased their approach of the phobic object. However, they also found that participants who had been assigned to the intervention that aligned with their natural coping style had even better outcomes than other participants. In other words, participants who naturally used visual imagery to cope with their phobia and anxiety had even more positive effects from the covert modeling intervention than participants who naturally used verbal strategies to talk themselves through their anxiety. Vallis and Bucher's finding suggests that, although covert modeling may be an effective intervention for most individuals, it may be especially effective for people who naturally use imagery or mental rehearsal as a coping mechanism.

The effects of covert modeling interventions in therapeutic contexts have been demonstrated to be maintained over time and to generalize beyond the trained behaviors. Kazdin (1979) found that gains in assertive skills obtained aftercovert modelingtreatment transferred to novel role-playing situations and were maintained at a 6 month follow-up. Hersen et al. (1979) also found evidence that treatment effects from both covert and live modeling of social behaviors generalized to novel stimuli in a clinical population. Harris and Johnson (1980) compared covert modeling and desensitization in the treatment of test anxiety. They also gave study skills training to both experimental groups and the control group. Although all three treatment groups reported less test anxiety, the covert modeling group was the only one that demonstrated significant improvements in academic performance in the subsequent academic quarter. Kazdin (1982) found that covert modeling, overt rehearsal, and a combination of the two interventions were equally effective in improving assertive skills. In addition, the gains generalized to novel role-playing exercises and were maintained 8 months after the intervention.

Summary. As noted previously, the most effective transfer interventions shared two characteristics; the training environment was as similaras possible to the transfer environment and the individual's sense of competence for performing the desired behavior was enhanced. Based on the study of imagery use by athletes and of covert modeling used for clinical purposes, it appears that imagery rehearsal shares both characteristics with the effective transfer interventions.The evidence from the study of athletes suggests that it is possible to substitute some physical practice with imagery practice without detracting from the learning and performance of motor skills. The theory of functional equivalence suggests that imagery is more effective the more similar it is to the transfer environment. Covert modeling is essentially equivalent to behavioral modeling except that all of the models are self-generated. Given that

behavioral modeling is more effective when the participants generate their own scenarios, it is likely that effective covert modeling operates similarly to effective behavioral modeling by increasing self efficacy for the desired behavior.

Although imagery-based interventions are uncommon in organizational settings, they share many characteristics with effective self-management transfer interventions and probably operate in similar ways. The purpose of this study is to examine whether the processes involved in imagery-based rehearsal are similar to those involved in more commonly used verbal rehearsal and whether either technique is more effective for certain populations.

Individual Differences in Preference for Verbal versus Imagery-Based Interventions

Most of the research described so far compares the effectiveness of verbal or imagery-based interventions to no intervention or to one another. The evidence suggests that both verbal and imagery-based interventions can be effective at changing behavior and that neither is necessarily better or worse than the other. One possible moderator in the relationship between the type of intervention and its effectiveness is the preference or natural inclination of the individual. Vallis and Bucher (1986) found that the effectiveness of both a covert modeling strategy and a verbal coping strategy for dealing with phobia were enhanced when they were aligned with the participants' natural coping styles. Just as individuals have different natural coping styles, they may have different natural ways of rehearsing behavior change. Whereas one person who learns a new skill may, without prompting, imagine himselfperforming it correctly or rehearse it using imagery, another person may practice talking herself through performing it and may rely on words rather than images in the process. There is evidence that there are individual differences in the way people process and remember information with some people being more oriented towards imagery and others towards words.

Riding and colleagues have proposed and found evidence to support individual differences in cognitive style. One dimension they have identified is the verbal-imagery dimension (Sadler-Smith & Smith, 2004). Cognitive style refers to an individual's general approach to organizing and processing information (Riding & Sadler-Smith, 1997). Verbalizers think in terms of words and word associations whereas imagers think in terms of pictorial mental pictures. Cognitive style is not related to intelligence, but instead is related to preferences for learning. Riding and colleagues have mainly studied the verbal-imagery dimension in terms of its relation to preferences in mode of presentation in instructional settings. Not surprisingly, verbalizers prefer textual presentation and imagers prefer pictorial or diagrammatic presentation.Kirschoff and Buckner (2006) found support for the idea that there are individual differences in tendencies for verbal versus imageryprocessing using neuro-imaging. They found that self-reported tendencies to process information visually were correlated with fMRI indices of activity in the occipital temporal lobes of the brain whereas tendencies to process information verbally were associated with activation of prefrontal regions.

Although both verbal transfer interventions and imagery-based techniques for behavior change have been shown to be effective in general, Riding and colleagues' work demonstrating a relationship between cognitive style and preference for mode of presentation and Vallis and Bucher's (1986) work demonstrating a relationship between natural tendency and the effectiveness of verbal and imagery-based interventions suggest that it may be beneficial to match transfer interventions to individuals' natural tendencies and preferences. Therefore, the purpose of this study is to examine the effects of verbal and imagery-based transfer interventions in combination with participants' inclinations.

Model and Hypotheses

The overall model to be tested in this study can be found in Figure 1. In the model, use of trained strategies is seen as the immediate precursor to a change in test performance. Use of trained strategies is seen as a function of self-efficacy for the trained skills, perceptions of the personal relevance of the trained skills, and motivation to use the trained skills. Transfer interventions are seen as a method for increasing self-efficacy, perceptions of relevance, and motivation to transfer. However, transfer interventions aligned with an individual's natural processing style (verbal versus visually-based) are seen as more effective at increasing these factors.

A number of hypotheses are generated from this model that will be tested in this study. Training transfer has been defined as the extent to which the learning that results from a training experience transfers to the job and leads to meaningful changes in work performance (Baldwin, Ford, &Blume, 2009; Goldstein & Ford, 2002). Self-management strategies are training interventions that occur during or soon after training and are specifically designed to enhance transfer. Verbal self-management strategies, such as goal-setting and self talk, have been linked to self-reported changes in behavior (Wexley& Baldwin, 1986) as well as to ratings of job performance (Brown, 2003). In addition, athletes and clinicians have successfully utilized imagery-based interventions to change behavior (Kazdin, 1979, 1982; Vallis& Bucher, 1986) and improve performance (Harris & Johnson; 1980; Savoy &Beitel, 1996). The test of the first hypothesis is consistent with findings in these literatures.

Hypothesis 1a: Individuals who receive the verbal self management intervention of goal setting will use more trained skills and will demonstrate greater improvement in performance than individuals who do not receive a transfer intervention.

Hypothesis 1b: Individuals who receive the imagery based intervention will use more of the trained skills than those who do not receive a transfer interventionand

will demonstrate greater improvement in performance than individuals who do not receive a transfer intervention.

Both verbal and imagery-based interventions have been linked to increased use of trained skills and improvements in performance in previous studies, but the relationship between use and performance is generally not tested empirically. The second hypothesis seeks to examine this link directly.

Hypothesis 2a: The relationship between the verbal self managementintervention and improvements in performance subsequent to training will be mediated by use of trained skills.

Hypothesis 2b: The relationship between the imagery based intervention and improvements in performance subsequent to training will be mediated by the use of trained skills.

The evidence discussed above suggests that both verbal and imagery-based interventions can be effective at changing behavior and that neither is necessarily better or worse than the other. One possible moderator in the relationship between the type of intervention and its effectiveness is the preference or natural inclination of the individual. The work demonstrating a relationship between cognitive style and preference for mode of presentation (Riding & Sadler-Smith, 1997; Sadler-Smith & Smith, 2004) and Vallis and Bucher's (1986) work demonstrating a relationship between natural tendency and the effectiveness of verbal and imagery-based interventions suggest that it may be beneficial to match transfer interventions to individuals' natural tendencies and preferences. This hypothesis is that there is an aptitude-treatment interaction between intervention-type and processing style (Cronbach, 1957).

Hypothesis 3: The relationship between the type of intervention (verbal or imagery-based) and use of trained skills is moderated by preference for processing style (verbal or visual) such that individuals who receive an intervention aligned with their preferred processing style will use more trained skills than individuals who receive an intervention not aligned with their preferred processing style.

There are two main explanations proposed for why both verbal and imagery-based interventions are effective at enhancing transfer. The explanations are the same for both types of interventions. The first explanation is that the interventions enhance individuals' perceptions of the relevance of the trained skills to their personal situation. One type of verbal intervention, implementation intentions, leads to increased accessibility of critical cues associated with the desired behavior (Gollwitzer&Sheeran, 2006). In addition, goal-setting is most effective when the goals are short-term and specific. The theory of functional equivalence (Murphy et al., 2008) argues that imagery-based interventions are more effective the more closely the imagery mimics the future performance event. The second explanation is that the interventions enhance individuals' feelings of competence and motivation for using the trained skills. Goal-setting has been linked to increases in self-efficacy (Bandura, 1986; 1997). Uhlemann and Koehn (1989) suggested that, based on Bandura's theory, covert modeling, an imagery intervention, should operate in much the same way that behavioral modeling does. In their meta-analysis of studies of behavioral modeling, Taylor et al. (2005) found that transfer was greater when trainees practiced work-related scenarios that they developed themselves due to the personal relevance of the scenarios. In addition, they also suggested that modeling increases motivation to transfer when the models are reinforced for effective performance.

Hypothesis 4: The relationship between the intervention and use of trained skills subsequent to training will be explained by perceptions of the personal relevance of the trained skills, self-efficacy for using the skills, and motivation to use the skills.

One proposed moderator in the relationship between the type of intervention and its effectiveness is the individual's preference for processing style. Given the work demonstrating a relationship between cognitive style and the effectiveness of verbal and imagery-based interventions (Riding & Sadler-Smith, 1997; Sadler-Smith & Smith, 2004; Vallis and Bucher,

1986), it is likely that matching transfer interventions to individuals' natural tendencies enhances the mechanisms by which transfer is enhanced by intervention.

Hypothesis 5: The relationship between the type of intervention (verbal or imagery-based) and the proposed process variables is moderated by preference for processing style (verbal or visual) such that individuals who receive an intervention aligned with their preferred processing style will have stronger perceptions of the personal relevance of the trained skills, higher self-efficacy for using the skills, and higher motivation to use the skills than individuals who receive an intervention not aligned with their preferred processing style.

Method

Participants

The participants were undergraduate students at Michigan State University who registered with the Psychology Human Subject Pool and were also enrolled in at least one of six courses that each included at least three multiple-choice tests during the Spring 2011 semester. Three hundred students participated in the Time 1 data collection. One hundred students were assigned to each of the three groups in the experiment (verbal intervention, imagery-based intervention, and no intervention). Assignment was based on the online session chosen by the student. All three sessions were posted simultaneously and contained identical descriptions of the study. Each was capped at 100 participants. The participants received course credit for participating in both the initial training and the follow-up session. As an incentive for participating in the follow-up approximately one month after the initial session, participants were entered into a raffle to win one of five $20 gift cards in addition to receiving course credit. Two hundred and twenty-two students (74%) participated in the Time 2 session. The demographic composition of the participants who participated in both sessions is shown in Table 1.

Procedure

All of the participants self-selected to participate in the study via the online portal for the Human Subject Pool.After completing informed consent (see Appendix A) and reading through instructions (see Appendix B), participants responded to a measure about test anxiety and then received online training about effective strategies for improving scores on multiple choice exams (see Appendix D for script). The training was a video in which ten strategies for improving test scores were presented with rationales for why each strategy is effective. For example, one of the strategies is to circle or underline key trigger words in a question that may change the meaning of the question, such as “not” or “always.” The subject matter for the training was selected because it is relevant to the participants, all of whom are undergraduate students, and because all participants had an opportunity to use the trained skills on at least one multiple-choice exam within the month following training. Following the online training, all participants were assessed on how often they currently use the trained strategies as well as their inclination for verbal or visual processing.

Following the assessment, participants participated in one of three conditions to which they were randomly assigned. One group of participants was trained to develop implementation intentions for using the test-taking strategies (see Appendix G). As part of this intervention, participants were introduced to the main components of an implementation intention (or if-then statement). They were then walked through the steps of writing an implementation intention or specific goal for using five of the ten trained strategies. A second group of participants was trained to develop personal imagery-based scenarios in which they used the test-taking strategies (see Appendix G). In the imagery-based intervention, participants were prompted to describe different aspects of the physical and emotional experience of taking an exam in their specific

class. They then imagined themselves using five of the trained strategies while taking their next exam. Both experimental groups were counseled that the likelihood that they would succeed in using the desired techniques would be improved if they practiced the rehearsal techniques. A third group served as a control. Theydid not receive any guidance about how to improve the likelihood of transfer.

Following the intervention, participants were assessed abouthow seriously they took the intervention, how personally relevant they found the test-taking strategies, their self-efficacy for using the strategies, and their motivation to use the strategies.

Within several weeks of initial participation (after participants had taken their next class exam and had received their scores), participants were contacted via email and asked to participate in a follow-up online survey. Participants were asked to self-report transfer (their use of the trained test-taking skills during an in-class exam) and to report their scores on the multiple-choice exams taken before and after the training.

Measures

Test anxiety. Test anxiety was assessed using the 10-item Westside Test Anxiety Scale (Driscoll, 2007; see Appendix C), which has a 5-point response scale ranging from “always true” to “never true.”The test is designed to measure whether anxiety impairs the individual during a test; for example, “I finally remember the answer to exam questions after the exam is already over.” Cronbach’s alpha for the scale was .84.

Processing style. Processing style was assessed prior to the intervention. First, participants completed the Style of Processing Scale (Childers, Houston, & Heckler, 1985; see Appendix F), which consists of 22 items and has a 4-point response scale ranging from “always

true" to "always false". Higher scores indicate a verbal processing style whereas lower scores indicate a preference for imagery-based processing. Coefficient alpha reliability was .72.

Use. Use of the trained material was assessed twice, once as a baseline immediately after training and again as an outcome measure on the follow-up survey. At Time 1, participants responded to 18 items about the extent to which they used each of the trained test-taking strategies when they took multiple-choice tests in the past. The measure was scored on a 5-point scale ranging from "Never" to "Always" (see Appendix E). Coefficient alpha reliability was .75. In the follow-up survey, use was assessed using the same items, but with a 5-point scale ranging from "Strongly Disagree" to "Strongly Agree" (see Appendix K). At Time 2, participants were instructed to respond to the items in reference to how they behaved at their most recent multiple choice test. Coefficient alpha was .84.

Manipulation checks. Immediately after the intervention, participants in the experimental groups responded to four items asking about how much effort they put forth in completing the intervention (see Appendix H). For example, "I concentrated fully on the goal-writing exercise." The items had a 5-point response scale ranging from "strongly disagree" to "strongly agree." Coefficient alpha reliability was .87 for both conditions. Eleven participants (5%) provided an average response of 3 or below and were eliminated from further analyses.

An alternative manipulation check was conducted to determine whether participants in each of the conditions used more trained skills after training than they used prior to training. For this manipulation check, the baseline and follow-up use scales were recoded to compare use before and after training. Responses of 4 ("often" or "agree") and 5 ("always" or "strongly agree") were assigned a value of "1" and all other responses were assigned a value of "0." Each participant received a baseline score of how many skills they used prior to training and a follow-

up score of how many trained skills they used after training by summing the converted scores. Paired sample t-tests were conducted to determine whether participants in each condition utilized more trained skills after training than before. There was a significant increase in the number of strategies used by participants in all three conditions after training (see Table 2), indicating that the interventions were no more effective at increasing strategy use than the control condition.

Personal relevance. After the manipulation check, participants rated each of the ten trained strategies as to how helpful it would be for improving their score on future multiple-choice tests (see Appendix I). The scale was modeled after Lim and Morris's (2006) Applicability scale and was scored on a 4-point scale ranging from "Not helpful at all" to "Very helpful". Coefficient alpha reliability was .77.

Self-efficacy. After rating personal relevance, participants ratedtheir confidence in their capability to employ each of the ten trained strategies. The scale was modeled after Stevens and Gist's (1997) Self-Efficacy scale and wasscored on a 4-point scale ranging from "Not at all confident" to "Very confident" (see Appendix I). Coefficient alpha reliability was .83.

Motivation to Transfer. After rating self-efficacy, participants rated how motivated they were to use each of the ten trained strategies. The scale was modeled after Stevens and Gist's (1997) Self-Efficacy scale and was scored on a 4-point scale ranging from "Not at all motivated" to 'Very motivated" (see Appendix I). Coefficient alpha reliability was .81.

Demographics. Participants were asked to report in which of six specific psychology courses they were enrolled (see Appendix B) as well as their sex, age, and race (see Appendix J). The participants were asked about course enrollment so that they could be re-contacted for the follow-up survey within a week after their next multiple-choice exam. The purpose of asking for sex, age, and race was to provide a general idea of the demographic composition of the sample.

Test scores. Participants reported the scores they received on multiple-choice tests in one of the six designated Psychology coursesduring the current semester both prior to and after the training (see Appendix L).The professors for the courses provided the class means and standard deviations for each course exam. The class data was used to transform each score into a z-score to control for differences in exam difficulty both within and between classes. The standardized scores each participant received on exams prior to participating in the study were averaged to create a "pre-training" score to compare to the score received on the exam following the training.

Results

Descriptive Statistics

Descriptive statistics and correlations of all of the measures can be found in Table 3. The correlations indicate that participants who naturally tend to be visual processors had more test anxiety (r = -0.34) and had lower levels of self-efficacy after training (r = 0.17) than participants who tend to be verbal processors. Participants with higher levels of test anxiety performed lower on multiple-choice exams both prior to the intervention (r = -.35) and after the intervention (r = -.28). Participants who received the verbal intervention were motivated to transfer (r = 0.22). In addition, participants who had used more of the test-taking strategies prior to the training saw the trained strategies as more relevant (r = 0.31), felt more efficacious of performing the strategies (r = 0.36), and felt more motivated to use the strategies (r = .35) after training. They were also more likely to use the strategies on their next exam (r = .44).Use of the strategies at Time 2 was related to higher ratings of personal relevance (r = .28), self-efficacy (r = .29), and motivation to transfer (r = .37) at Time 1.

Evaluation of Hypotheses

Hypotheses 1a and 1b. Hypotheses 1a and 1b suggested that individuals who received the verbal self-management or imagery based interventions would use more trained skills and demonstrate greater improvement in performance than individuals who did not receive an intervention. Hypotheses 1a and 1b were assessed using analysis of covariance.

An ANCOVA [between-subjects factor: condition (verbal, imagery, control); covariate: use of the trained skills prior to training] revealed no main effect of condition, $F(2, 205) = 1.22$, $p = .30$, $\eta_p^2 = .01$, on use of the trained skills after the intervention. There was a significant main effect of prior use, $F(1, 205) = 49.74$, $p < .001$, $\eta_p^2 = .20$. An ANCOVA [between-subjects factor: condition (verbal, imagery, control); covariate: grades prior to intervention] revealed no main effect of condition, $F(2, 192) = .12$, $p = .89$, $\eta_p^2 = .00$, on post-intervention grades. There was a significant main effect of prior grade, $F(1, 192) = 160.97$, $p < .001$, $\eta_p^2 = .46$.

Therefore, Hypotheses 1a and 1b were not supported. There was no effect of condition on either use of trained skills or on grades at Time 2 after taking into account use of trained skills prior to training. Neither the verbal nor the imagery-based intervention was more effective than the control condition at increasing use of the trained skills or improving exam scores.

Hypotheses 2a and 2b. Hypothesis 2 suggested that the relationship between the interventions and improvements in performance would be explained by use of the trained skills. Because there was no effect of condition on either use of trained skills or on grades at Time 2, the preconditions necessary to find the hypothesized mediation were not present.

Despite this finding, planned analyses were conducted for exploratory purposes. An ANCOVA [between subjects factor: condition (verbal, imagery, control); covariates: grades prior

to intervention and use of the trained skills after training] revealed no main effect of condition, $F(2, 191) = .09$, $p = .91$, $\eta_p^2 = .00$, on post-intervention grades. There was a significant main effect of grades prior to intervention, $F(1, 191) = 168.28$, $p < .001$, $\eta_p^2 = .47$, as well as a significant main effect of the use of trained skills after training, $F(1, 191) = 5.22$, $p = .02$, $\eta_p^2 = .03$.

Hypothesis 2 was not supported. Although there was no significant relationship between the interventions and improvements in exam scores, use of the trained skills was related to improvements in exam scores.

Hypothesis 3. Hypothesis 3 suggested that matching the transfer intervention to the individuals' preferential processing style would lead individuals to use more trained skills. In an assessment of hypothesis 3, an ANCOVA [between subjects factor: condition (verbal, imagery, control); covariates: use of trained skills prior to training and style of processing] revealed no main effect of condition, $F(2, 201) = 1.00$, $p = .37$, $\eta_p^2 = .01$, on use the of the trained skills after the intervention. There was a significant main effect of use of the trained skills prior to training, $F(1, 201) = 51.32$, $p < .001$, $\eta_p^2 = .20$, but there was no main effect of style of processing, $F(1, 201) = 1.26$, $p = .26$, $\eta_p^2 = .01$.

Hypothesis 3 was not supported. Neither the type of intervention nor the individual's preferred style of processing was related to the use of trained skills after the intervention after taking into account the covariates.

Hypothesis 4. Hypothesis 4 suggested three process variables (personal relevance of the trained skills, self-efficacy for using the trained skills, and motivation to transfer the

skills)to explain why the interventions might lead to transfer.Because there was no effect of condition on use of trained skills at Time 2, the preconditions necessary to find the hypothesized mediation were not present.

Despite this finding, planned analyses were conducted to explore whether the process variables impacted use over and above use at Time 1. An ANCOVA [between-subjects factor: condition (verbal, imagery, control); covariates: use of the trained skills prior to training, relevance, self-efficacy, and motivation] revealed no main effect of condition, $F(2, 199) = 1.41$, $p = .25$, $\eta_p^2 = .01$, on use of the trained skills after the intervention. There were significant main effects of use of the skills prior to training, $F(1, 199) = 26.52$, $p < .001$, $\eta_p^2 = .12$, and motivation to transfer, $F(1, 199) = 7.09$, $p = .01$, $\eta_p^2 = .03$, but no main effects of relevance, $F(1, 199) = .01$, $p = .94$, $\eta_p^2 = .001$, or self-efficacy, $F(1, 199) = .20$, $p = .66$, $\eta_p^2 = .00$.

Hypothesis 4 was not supported. Although there was no relationship between the interventions and transfer, the process variable motivation to transfer was a predictor of transfer even when use prior to training was taken into account. The more motivated they were to use the trained skills, the more skills the participants used on their next exam.

Hypothesis 5. Hypothesis 5 suggested that processing style would impact the relationship between the interventions and the process variables predicted to influence transfer. An ANCOVA [between subjects factor: condition (verbal, imagery, control); covariates: relevance, self-efficacy, style of processing] revealed no main effect of condition, $F(2, 197) = .36$, $p = .70$, $\eta_p^2 = .00$, on motivation to transfer. There were significant main effects of relevance, $F(1, 197) = 79.14$, $p < .001$, $\eta_p^2 = .29$, and self-efficacy, $F(1, 197) = 32.67$, $p < .001$, $\eta_p^2 = .14$, but no main

effect for style of processing, $F(1, 197) = .23$, $p = .63$, $\eta_p^2 = .00$. The interaction between condition and style of processing was also not significant, $F(2, 197) = .59$, $p = .56$, $\eta_p^2 = .01$.

Hypothesis 5 was not supported. Processing style had no moderating effect on the relationship between condition and motivation to transfer.

Follow-up Analyses

Despite the fact that the main variables of interest (condition and style of processing) did not demonstrate meaningful relationships with the main outcomes of interest (increased use of the trained strategies and improvement in grades), there were other variables measured that did demonstrate predictive value in relation to the outcomes. In order to explore these relationships further, additional analyses were conducted.

An ANCOVA [between subjects factor: condition (verbal, imagery, control); covariates: sex, test anxiety, grades at Time 1, and use at Time 2] revealed no main effect of condition, $F(2, 188) = .10$, $p = .91$, $\eta_p^2 = .00$, on grades at Time 2. There were significant main effects of sex, $F(1, 188) = 6.90$, $p = .01$, $\eta_p^2 = .04$, grades at Time 1, $F(1, 188) = 140.86$, $p < .001$, $\eta_p^2 = .43$, and use at Time 2, $F(1, 188) = 4.80$, $p = .03$, $\eta_p^2 = .03$, but no main effect for test anxiety, $F(1, 188) = 2.38$, $p = .13$, $\eta_p^2 = .01$. An ANCOVA [between subjects factor: condition (verbal, imagery, control); covariates: baseline use and motivation to transfer] revealed no main effect of condition, $F(2, 202) = 1.50$, $p = .23$, $\eta_p^2 = .02$, on use at Time 2. There were significant main effects of baseline use, $F(1, 202) = 29.35$, $p < .001$, $\eta_p^2 = .13$, and motivation to transfer, $F(1, 202) = 15.49$, $p < .001$, $\eta_p^2 = .07$.

A model demonstrating the relationships described above can be found in Figure 2. Female students who received higher grades prior to training and used more of the trained skills after training had the highest grades after training. Although test anxiety was significantly related to grades at Time 2, the effect disappeared after the other variables were included in the analysis. The best predictors of use of the trained skills at Time 2 were use prior to training and motivation to transfer.

Discussion

The main goal of this study was to further explore what types of training design interventions impact subsequent transfer and why. Because one of the only training variables that trainers can directly control is design, arming trainers with knowledge about how to maximize transfer should be an effective way to empower them to provide a lasting effect on the behavior of trainees. The purpose of the study was twofold: to explore an imagery-based alternative to verbally based transfer interventions and to examine whether individual differences in preferred processing style impact transfer.

In reviewing the literature on self-management transfer interventions, it became apparent that the effective strategies in the literature all involve verbal rehearsal. For example, Gollwitzer and Sheeran (2006) meta-analyzed the effect of the use of implementation intentions on goal achievement and found a fairly stable moderate positive effect. In addition, a small group of studies has found positive evidence to suggest that self talk is related to improvements in performance following training (Brown, 2003; Brown & Morrissey, 2004; Millman& Latham, 2001). As an alternative to the verbal techniques, Marlatt (1988) proposed the use of visual imagery rehearsal in his model of relapse prevention, but never elaborated on it. In sport and therapeutic settings, however, imagery-based rehearsal has been found to be very effective at

changing behavior. There is evidence to suggest that mental practice is a sufficient substitute for some physical practice of athletic motor skills (Durand, Hall, &Haslam, 1997) and the effects of covert modeling interventions in clinical settings have been found to be as effective as other interventions (Bistline, Jaremko, &Sobleman, 1980; Zielinski & Williams, 1979) and to have lasting effects (Harris & Johnson, 1980; Hersen et al,, 1979; Kazdin, 1979, 1982). Despite the widespread use of techniques related to future-oriented mental rehearsal in other fields, there has been very little exploration into the possibility of its use in workplace or classroom training.

For this study, a verbally based transfer intervention (the development of implementation intentions) was compared to an imagery-based intervention (based on a combination of covert modeling and the PETTLEP model). Undergraduate students were presented with training on strategies to improve their scores on multiple-choice exams followed by a verbally based intervention, an imagery based intervention, or no intervention. Within the month following training, all of the students completed at least one multiple-choice exam in a psychology course. After the exam, the students reported whether they had used the strategies they learned in training and whether their exam grade had improved.

The evidence showed that the training had a positive effect on transfer, but that the interventions were no more effective than the control. It was expected that the participants in both the verbal and imagery based intervention groups would use more of the trained skills and show more improvements in their exam scores than the participants in the control group. However, there were no differences between the participants in the three groups, indicating that the interventions were not effective at promoting transfer. Although the interventions were not effective, the training was. The use of trained skills was positively related to improvements in exam scores.

There are several plausible explanations for why the interventions were not more effective than the control. Both interventions were conducted immediately following the training video and a brief questionnaire. It is possible that participants had lost interest in the study by the time they reached the intervention or that they did not take the procedures seriously. Because the study was conducted online, the interventions were conducted at the participants' own pace and under their own control. There were several features included in the design of the study to allow for the evaluation of how seriously the participants took the interventions. First, participants were asked to complete open-ended responses at each step in the intervention process, but they were not required to provide responses in order to advance the survey. The vast majority of students provided responses relevant to the questions, indicating that they were reading and considering each item as they completed it. Second, each participant completed a brief survey following the intervention that asked about how much effort he or she had put into completing the intervention. The mean score for that survey was 4.08 out of 5 points, indicating that the average participant reported that they had put forth a positive effort as they completed the intervention. Previous studies that reported positive effects related to transfer interventions have allowed participants a similar amount of autonomy in completing the intervention. For example, in his 1993 study using implementation intentions, Gollwitzer asked students to specify in writing when they planned to write a report and then waited to follow up with them until after their Christmas vacation. The evidence available suggests that the participants in the study were fairly engaged during the interventions.

An additional explanation for why the interventions were not more effective than the control is that the participants in all three groups were sufficiently motivated to utilize the trained skills prior to the intervention. This explanation is essentially that there was a "ceiling effect"

such that participants were so motivated to use the skills prior to the interventions that the interventions could not add any additional meaningful amount of motivation.Because motivation was only measured after the interventions, it is not possible to evaluate whether such an effect may have occurred.

In this study, there were in effect two interventions, the training and the transfer intervention. All participants received the training and two of the three groups of participants received a transfer intervention. In previous studies of transfer interventions such as goal-setting and implementation intentions, this design is somewhat unusual. For example, in Gollwitzer's 1993 implementation intentions study, the only intervention was the development of implementation intentions. Participants were not also presented with training on new skills prior to developing the intentions. One notable exception is Wexley and Baldwin's 1986 goal-setting study. Their design included extensive training in new skills followed by goal-setting interventions. Both their training and transfer interventions were much more intensive in time and resources than the scope of this study, however. In their review of the goal-setting literature, Brown and McCracken (2010) pointed out that most studies in this area have involved simulated tasks with short-term measures of transfer, which makes it difficult to estimate how powerful a goal-setting intervention must be to have an effect on behavior in an naturalistic setting, like in this study where the desired behavior occurred weeks after training and while taking a real classroom exam.

In addition to comparing the outcomes of the two interventions, three process variables were also included in the study to examine whether the processes involved in imagery-based rehearsal are similar to those involved in verbal rehearsal. The three process variables, perceptions of the personal relevance of the trained material, self-efficacy for use of the material,

and motivation to transfer the material, were related to the use of the trained skills. The effects of relevance and self-efficacy, however, disappeared when the other predictor variables were included in the analyses. There were no differences found between participants in the different conditions for perceptions of the personal relevance of the trained material and for self-efficacy for using the trained skills. However, participants who received the verbal intervention reported higher levels of motivation to use the trained skills than did participants in the other two conditions. Again, the relationship disappeared when the other predictor variables were included in the analyses.

Natural processing style was proposed as a moderator in the relationship between the type of intervention and its effectiveness. Because the interventions were not differentially effective, it was not possible to evaluate this hypothesis directly. Instead, the relationships between processing style and the outcomes and process variables were evaluated. Individuals who preferred verbal processing had less test anxiety than individuals who preferred visual processing, most likely because the tests that the participants take are generally in verbal or written form. Processing style was not related to the use of the trained skills after training, but individuals who preferred verbal processing used more of the skills prior to training. Perhaps because the skills are all related to taking written tests, verbal processors are at an advantage for figuring out strategies for success on those tests. Verbal processors also had higher levels of self-efficacy for performing the trained skills than individuals who prefer visual processing, perhaps because they already used more of the strategies to begin with and because the strategies were related to their strengths to begin with. In the predictive models that included the other variables, all of the advantages for verbal processors disappeared.

Limitations

There were several limitations to the methodology of the study; causality was not definitive, the interventions may not have been powerful enough, the transfer measured a snapshot of behavior rather than change in behavior, and the Style of Processing scale may not be valid.Participants reported how many skills they used on their exam after they had already received their exam grades. Therefore, it is possible that their grades may have impacted their responses, such that if their exam scores improved, they may have attributed the improvement to the use of the trained skills. It is also possible that that the positive effect of the transfer on improvements in grades may have been a misleading finding since students' grades may have improved throughout the semester regardless of their participation in the study or that students who participated in the study improved their grades because they believed they would (a Hawthorne effect; Landsberger, 1958).

One method for strengthening the effect of the interventions would be to provide more time between the initial training and the subsequent intervention. It is possible that participants were overwhelmed by the amount of information they absorbed from the training and had not had time to absorb it and make realistic training goals or mental practice sessions. Perhaps with more time to absorb the material, they would have benefitted more from the interventions. Unfortunately, however, it may not be possible for trainers to expect to have access to their students at more than one point in time.

The initial intent was to measure transfer as participants' self-reported change in test-taking behavior subsequent to training. For this reason, directly after training, participants were asked to report how often they utilized each of the trained strategies. However, the survey asked participants to report how often they had used each strategy in the past whereas it should have

asked them whether they had used each strategy on the previous exams in the specific targeted class. In addition, the response scale for the baseline and time 2 surveys was different. For this reason, the two surveys could not be combined to create a measure of behavior change.

The Style of Processing Scale (Childers et al., 1985) was used to evaluate each participant's natural preference for verbal or visual processing style. Although the scale has been widely cited and used, there are concerns that the scale may not assess valid distinctions between preferences in processing style (Bagozzi, 2008). Future research should examine the validity of the scale.

Conclusion and Future Research

Although the original experimental hypotheses could not be addressed, the study contributed to the literature by providing evidence that processing style may be an important characteristic to consider for training design. Participants who naturally process information visually had more test anxiety and felt less efficacious about performing the trained skills. In addition, the study provided more evidence that trainees' motivation to transfer the trained material is a key predictor of whether they use the trained skills. Future research should examine better methods for measuring natural preferences in processing style. In addition, it would be worthwhile to examine whether there are other contexts in which processing style is a moderating effect for the effect of training interventions as well as whether there are other individual difference characteristics that may moderate the effectiveness of training design interventions.

Appendices

Figure 1

Hypothesized Model

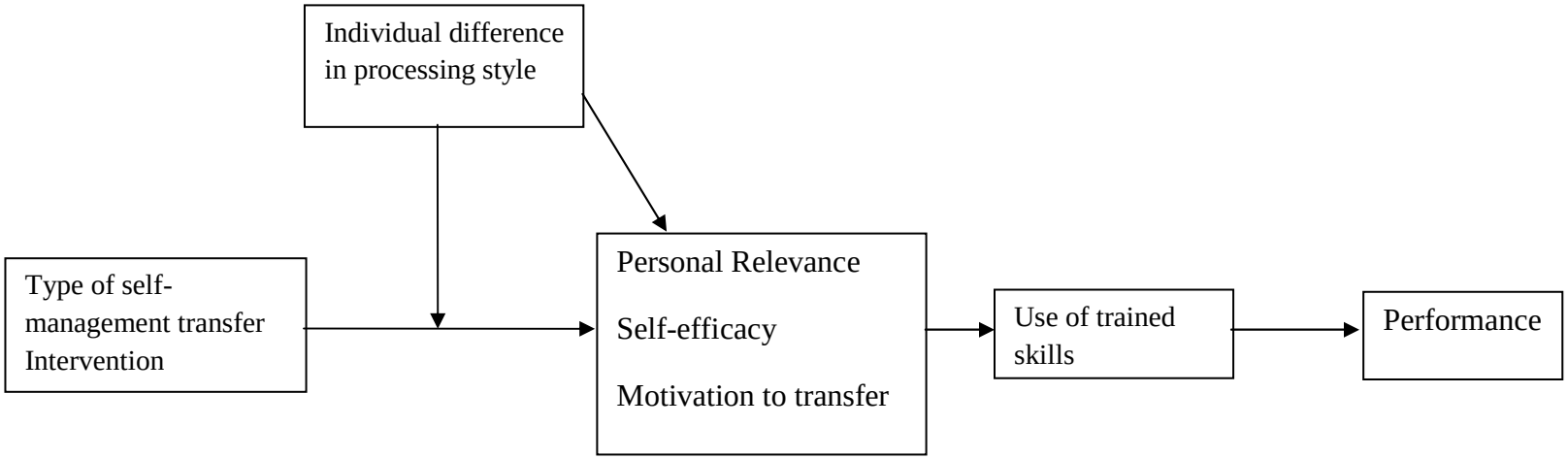


Table 1

Demographic Characteristics of Participant Sample

Characteristic	N (% of total N)
Condition	
Verbal	76 (34.23%)
Imagery	75 (33.78%)
Control	71 (31.98%)
Sex	
Female	156 (70.27%)
Male	62 (27.93%)
Age	
18	61 (27.48%)
19	68 (30.63%)
20	39 (17.57%)
21 or older	49 (22.07%)
Ethnicity	
Hispanic	7 (3.15%)
American Indian or Alaska Native	1 (0.45%)
Asian	11 (4.95%)
Black or African American	12 (5.41%)
Native Hawaiian or Other Pacific Islander	1 (0.45%)
White	199 (89.64%)

Note. Total N was 222. Participants were asked to mark all ethnicities with which they identified.

Table 2

Paired Comparisons of Number of Strategies Used Before and After Interventions

Intervention	Use Before Training		Use After Interventions		t-test		
	M	SD	M	SD	t	df	p
Verbal	9.87	3.03	12.44	3.41	-5.50	69	< .001
Imagery	9.93	2.50	12.73	3.01	-9.18	69	< .001
Control	10.11	2.95	12.07	3.04	-5.18	69	< .001

Table 3

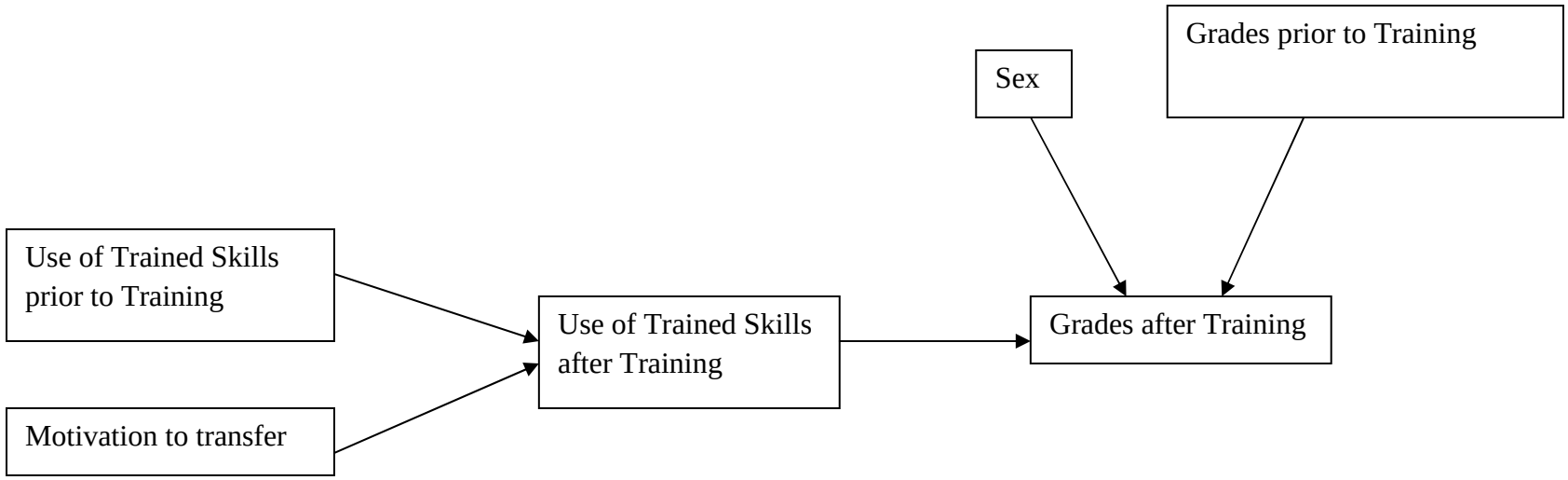
Descriptive Statistics and Correlations of All Variables

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex														
2. Age	3.46	1.37	**-.31**											
3. Verbal Intervention			.00	.02										
4. Imagery Intervention			.00	.01	**-.50**									
5. Test Anxiety	2.79	0.62	**.22**	-.11	-.05	-.02	*0.84*							
6. Baseline Use	3.56	0.42	**.16**	-.04	-.01	-.02	-.02	*0.75*						
7. Style of Processing	3.00	0.27	-.05	**.14**	.01	-.07	**-.34**	**.16**	*0.72*					
8. Personal Relevance	3.38	0.40	**.29**	-.10	.10	.00	.05	**.31**	-.02	*0.77*				
9. Self Efficacy	3.51	0.41	.11	.02	.09	-.02	-.07	**.36**	**.17**	**.47**	*0.83*			
10. Motivation to Transfer	3.36	0.46	**.17**	.01	**.22**	-.06	-.02	**.35**	.07	**.66**	**.57**	*0.81*		
11. Time 2 Use	3.75	0.54	.03	.02	-.03	.08	.02	**.44**	-.01	**.28**	**.29**	**.37**	*0.84*	
12. Grade Pre-Intervention	0.24	0.86	-.08	-.11	-.01	.01	**-.35**	.01	.10	**-.15**	-.06	-.13	-.08	
13. Grade Post-Intervention	0.31	0.79	.06	**-.16**	-.00	.01	**-.28**	.10	.04	-.05	-.05	-.03	.06	**.68**

Note. Bolded correlations are significant at .05 level. Sex is a dummy coded variable. 1 = Female and 0 = Male.
Verbal and Imagery Intervention are also dummy coded variables. 1 = Intervention, 0 = No intervention.

Figure 2

Model Based on Follow-up Analyses



Appendix A: Consent Form

Multiple-Choice Test Taking Strategies Training Study

The purpose of this research study is to explore what variables affect whether and why individuals use what they learn in a training session.

What does participation in this research study involve?

In this research study, you will be asked to complete a training session about strategies for scoring well on a multiple-choice exam. You will also be asked to complete a questionnaire about your reactions to the training and about your cognitive style. Your participation today may take up to an hour. In several weeks, after you've taken another class exam, you will receive an email invitation to participate in a second questionnaire about whether or not you used what you learned in the training session. The second questionnaire may take up to 30 minutes to complete.

Your Rights and Benefits as a Participant in this Research study

You will receive up to 3 research credits for participating in this study. You will receive 2 credits for your participation today and an additional 1 credit when you complete the second questionnaire in a few weeks. As an incentive to participate in the second questionnaire, all participants will also be entered into a lottery to win a $50 gift certificate to Amazon.com.

Your participation in this research study is voluntary. You are free to refuse to participate in this project or any part of the project. You may refuse to answer some of the questions and may discontinue your participation at any time without penalty. Your confidentiality will be protected to the maximum extent allowable by law. Your responses will be stored in a locked filing cabinet for four years. Your responses will be stored separately from your identifying information and it will not be possible for them to be linked, except by the principal investigators. Only the principal investigators will have access to your responses. Your participation in this research study may contribute to the understanding of how to make training in the workplace more effective and may also help you to perform better on future multiple-choice exams.

If you have concerns or questions about this study, such as scientific issues or how to do any part of it, please contact the researcher, Abigail Billington: (813) 777-9812 or email: billinga@msu.edu. You may also contact Dr. Kevin Ford, Professor, Department of Psychology at Michigan State University: (517) 353-5006, email: fordjk@msu.edu, or regular mail: 315 Psychology Building, East Lansing, MI 48824.

If you have any questions or concerns about your role and rights as a research participant, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Director of MSU's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824. You indicate your voluntary agreement to participate in this research and have your answers included in the data set by completing and returning the attached survey.

By continuing to the following page of the survey, you indicate your voluntary agreement to participate in the research study.

Thank you for your participation!

Appendix B: Instructions

The following training session and related questionnaires may take you about an hour to complete. You will need to complete the entire session in one sitting to receive the 2 credits for your participation. If something unexpected occurs that interrupts your session and you would like to continue, you may contact me by email at billinga@msu.edu so that I can instruct you about how to finish your session. Do NOT press the BACK or RELOAD buttons on your browser if there is a problem. Your data may be lost and I may not be able to give you credit for your participation.

The point of this study is to examine how a variety of factors influence whether individuals use what they learn in a training session. For that reason, it is really important to find out whether or not you use what you learn today the next time you take a multiple-choice exam. I will contact you by email within the next month to find out whether you used you learned today. Although I hope you'll find the training valuable, I want you to be honest about whether or not you used the material so I can evaluate the effectiveness of the training. I need to collect your email address so that I can contact you again, but I will store your email address separately from the data you provide to protect your privacy. If you participate in the 2nd questionnaire, you will receive 1 more research credit and will be entered into a lottery to win a $50 Amazon.com gift certificate.

Please provide your email address below so that I can contact you in the next month: ____

Please verify your email address: ____

This study is limited to students enrolled in specific courses because of the schedule of multiple-choice exams in those courses. Which of the following courses are you enrolled in? Select all that apply:

a. PSY 101 with Professor Jackson
b. PSY 101 with Professor Sakai
c. PSY 101 with Professor Lucas
d. PSY 209 with Professor Nunez
e. PSY 236 with Professor Donnellan
f. PSY 255 with Professor Ryan

Appendix C: Westside Test Anxiety Scale

Rate how true each of the following is of you.

Scoring: 1 = Never true; 2 = Seldom true; 3 = Sometimes true; 4 = Usually true, 5 = Always true

1. The closer I am to a major exam, the harder it is for me to concentrate on the material.
2. When I study for my exams, I worry that I will not remember the material on the exam.
3. During important exams, I think that I am doing awful or that I may fail.
4. I lose focus on important exams, and I cannot remember material that I knew before the exam.
5. I finally remember the answer to exam questions after the exam is already over.
6. I worry so much before a major exam that I am too worn out to do my best on the exam.
7. I feel out of sorts or not really myself when I take important exams.
8. I find that my mind sometimes wanders when I am taking important exams.
9. After an exam, I worry about whether I did well enough.
10. I struggle with written assignments, or avoid doing them, because I feel that whatever I do will not be good enough. I want it to be perfect.

Appendix D: Multiple-Choice Test-Taking Training Script (Time Point 1)

The following is a script of the narration for the PowerPoint presentation. Where [CLICK] appears, the arrow key or mouse should be used to advance the presentation. The narration will be recorded and added to the presentation. The entire presentation will be uploaded as a video on YouTube for the participants to watch online.

Slide 1:

I'm going to present you with 10 strategies to help you improve your score on multiple-choice exams. If you'd like to take notes, please feel free to pause the video and grab a pen.

Many students report that even though they study hard and feel like they really know the material, when they sit down to take the exam, they aren't able to demonstrate that knowledge.

Although multiple choice exams are intended to test your knowledge of the course material, there are certain tricks to scoring well that have less to do with your knowledge of the material and more to do with your competence with the multiple choice test format. [CLICK]

Slide 2:

In this presentation, all of the strategies have to do with success *on the day of the test.* [CLICK]

I want to emphasize that using these strategies is NOT a substitute for studying well for the exam. These strategies will be the most helpful if you really know the material on the test. [CLICK]

If you need or want help improving your study skills, I recommend contacting the Learning Resource Center at MSU. You can also find links to websites with good study tips on their website. [CLICK]

Slide 3:

The first strategy is to arrive early for the exam. You should decide how early makes the most sense for you, but I would recommend arriving at least 10-15 minutes before the exam is scheduled to begin. [CLICK]

Bring all of the materials you'll need for your exam, such as [CLICK]

Number 2 pencils [CLICK]

A calculator [CLICK]

A watch [CLICK]

Or your ID. Whatever makes the most sense for your specific class. [CLICK]

Pick a good seat where you'll feel comfortable during the exam. Maybe you like to sit in the front during exams so you won't be distracted by others or maybe you like to sit by the window where there's natural light. Whatever will help you feel comfortable and stay relaxed is best. [CLICK]

While you're waiting for class to start, don't talk about the exam with your classmates. First of all, anxiety is contagious and other students can get you riled up. Second of all, even if they mean well, they might tell you wrong information about the test material. [CLICK]

Don't cram. You won't be able to learn enough in the last few minutes to help you on the exam. If you studied well, you already know the information. Put your notes away and think about something other than the exam. Staying relaxed and calm is your main goal at this point. [CLICK]

Do keep your ears open in case other students ask the professor questions. By answering their questions, the professor may give out useful information or clarification that can help you, too. [CLICK]

Slide 4:

Once the exam begins, do a brain dump in the margins of the test or on scrap paper. [CLICK]

Write down any key information you're holding in your memory [CLICK]

Such as formulas or mnemonic devices that you might need to remember later on during the test. Mnemonic devices are memory aids such as acronyms. You're essentially creating a cheat sheet for yourself, except it's not cheating because the test has begun. [CLICK]

For example, if you knew that the test might include a question about the colors of the rainbow, you could write down your mnemonic device: [CLICK]

ROY G BIV and later, if you saw a question about the colors of the rainbow, you could flip back to your brain dump and remember that the colors are [CLICK]

Red, Orange, Yellow, Green, Blue, Indigo, Violet. [CLICK]

Slide 5:

The third strategy is to preview the test before you start filling out the answers. Take a few minutes or so to [CLICK]

Carefully read all of the instructions. It's easy to overlook an important direction if you quickly jump into answering the questions. [CLICK]

As you look over the test, note the number of questions and the number of points each question is worth so you can [CLICK]

Budget your time and give every question the amount of attention it deserves. [CLICK]

Slide 6:

The fourth strategy is to anticipate the answer to each question before reading the answer choices. For example, if you had the following question, you would first [CLICK]

Cover the answers with your hand or a piece of paper [CLICK]

Then, answer the question in your own words [CLICK]

Look for the answer choice like yours. And you're done! Remember that some of the answer choices were designed to distract you from the correct answer. If you answer in your own words first, you're less likely to fall for the distracters. [CLICK]

Slide 7:

The fifth strategy is to watch for trigger words. [CLICK]

Trigger words are negative or absolute words like [CLICK]

All, except, most, least, not, never, always, or only. Trigger words change the meaning of the question or answer choice. [CLICK]

Underline or circle them so you won't forget to take them into account when you select your answer. For the following example, the word NOT [CLICK]

Signifies that only one of the following answer choices is wrong. First, I would underline it before reading eh answer choices. [CLICK]

And then select my answer accordingly [CLICK]

Slide 8:

The sixth strategy is to read all the answer choices before selecting one. [CLICK]

As you read each answer choice, mark it with a plus sign if it is correct, a minus sign if it is definitely not correct, and a question mark if you're not sure. [CLICK]

Doing this will help you avoid selecting an answer choice too soon. [CLICK]

Like in the following example. Which of the following states borders Michigan? I know Pennsylvania is wrong. [CLICK]

But Ohio is correct. [CLICK]

So is Indiana [CLICK]

It’s a good thing that I read all of the choices because choice D is the correct answer. [CLICK]

If I had chosen b as soon as I saw it was correct, I would have missed the real correct answer. [CLICK]

Slide 9:

The seventh strategy is to answer the easy questions first. [CLICK]

Easy questions are the ones you know the answer to right away. [CLICK]

Answering them first will help you build confidence [CLICK]

And warm up. Plus, it may help jog your memory for the more difficult material. [CLICK]

Slide 10:

The eighth strategy is to save the hard questions. [CLICK]

Mark the questions you can’t answer right away and [CLICK]

Come back to them at the end. [CLICK]

You might find that questions later in the test will provide cues to help you answer the earlier questions that stumped you. [CLICK]

Slide 11:

The ninth strategy is to answer ALL the questions on the test. Even if you’re not completely sure that your answer is correct, [CLICK]

Use the process of elimination to [CLICK]

Make your best guess [CLICK]

It is very unusual to lose points more points for wrong answers than for blanks. Usually, a wrong answer is worth the same as a blank answer – nothing. If you guess, you at least have a chance of getting the points. If you leave it blank, you’ll definitely lose the points. [CLICK]

Slide 12:

The final strategy is to use all of the time allotted for the test. [CLICK]

If you finish early, [CLICK]

Check your answers. [CLICK]

Re-read all of the instructions and make sure that you followed them correctly [CLICK]

And make sure you caught all of the trigger words. [CLICK]

Slide 13:

Okay, let's review. The 10 strategies that can help you improve your score on multiple choice tests are: [CLICK]

Arrive early to get a good seat and settle in. [CLICK]

Do a brain dump of all the material you're holding in short-term memory. [CLICK]

Preview the test and read all the instructions before you start. [CLICK]

Anticipate the answer by covering the answer choices and answering in your own words first. [CLICK]

Watch for and circle or underline the trigger words. [CLICK]

Read all the answer choices before selecting one. [CLICK]

Answer all the easy questions you can first. [CLICK]

Mark the hard questions and go back to them later. [CLICK]

Answer all the questions. A guess is better than a blank. [CLICK]

Use all the time available. [CLICK]

Take a minute to think about which strategies might help you on your next exam.

Thanks for watching the presentation. I hope that these strategies help you!

Appendix E: Baseline Measure of Use

Please rate how often you usually use the following strategies when you take multiple choice tests.

Scoring: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always

1. I arrive early for the exam.
2. I bring all of the materials I need for the exam.
3. I pick a comfortable seat for the exam.
4. I don't talk with other students about the exam before it starts.
5. Once the test begins, I do a "brain dump" in which I write down important formulas or key terms I was holding in my memory.
6. I look over the entire test before I start to respond.
7. I carefully read all of the instructions on the test.
8. When I read each question, I try to come up with the correct answer in my own words before I read the response choices.
9. I watch for and mark trigger words like "never" or "always."
10. I read all of the answer choices for each question.
11. I mark each answer choice with a symbol like +, -, or ?to help me with the process of elimination.
12. I answer all of the questions I know first.
13. I go back at the end to respond to questions I skipped because they were too hard.
14. I answer all of the questions on the test.
15. I use all of the time provided for the test.
16. I go back and check my answers when I finish the test.
17. After I finish, I go back and re-read the instructions to make sure I followed them correctly.
18. After I finish, I go back to make sure I caught all of the trigger words in the test.

Appendix F: Style of Processing Scale

Instructions: The aim of this exercise is to determine the style or manner you use when carrying out different mental tasks. Your answers to the questions should reflect the manner in which you typically engage in each of the tasks mentioned. There are no right or wrong answers, I only ask that you provide honest and accurate answers. Please answer each question by selecting one of the four possible responses. For example, if I provided the statement, "I seldom read books," and this was your *typical* behavior, even though you might read say one book a year, you would select the "ALWAYS TRUE" response.

Answer choices: 1 = ALWAYS TRUE; 2 = USUALLY TRUE; 3 = USUALLY FALSE; 4 = ALWAYS FALSE

1. I enjoy doing work that requires the use of words
2. There are some special times in my life that I like to relive by mentally "picturing" just how everything worked (Reverse-scored)
3. I can never seem to find the right word when I need it (Reverse-scored)
4. I do a lot of reading
5. When I'm trying to learn something new, I'd rather watch a demonstration than read how to do it (Reverse-scored)
6. I think I often use words in the wrong way (Reverse-scored)
7. I enjoy learning new words
8. I like to picture how I could fix up my apartment or a room if I could buy anything I wanted (Reverse-scored)
9. I often make written notes to myself
10. I like to daydream (Reverse-scored)
11. I generally prefer to use a diagram rather than a written set of instructions (Reverse-scored)
12. I like to "doodle" (Reverse-scored)
13. I find it helps to think in terms of mental pictures when doing many things (Reverse-scored)
14. After I meet someone for the first time, I usually remember what they look like, but not much about them (Reverse-scored)
15. I like to think of synonyms for words
16. When I have forgotten something I frequently try to form a mental "picture" to remember it (Reverse-scored)
17. I like learning new words
18. I prefer to read instructions about how to do something rather than have someone show me
19. I prefer activities that don't require a lot of reading (Reverse-scored)
20. I seldom day-dream

21. I spend very little time attempting to increase my vocabulary (Reverse-scored)
22. My thinking often consists of mental “pictures” or images (Reverse scored)

Appendix G: Interventions

Verbal Intervention

You are more likely to use what you learned today if you make a decision about where and when you will do so. People are more likely to achieve their goals the more specific the goals are. Coming up with a specific goal is a three-step process.

1. First, think of your general goal. For this exercise, your general goal is to use one of the 10 strategies from the training video. Which of the ten strategies do you think would help you the most when you take multiple choice tests? _____ (if you want to refer back to the video, here's the link/ also provide the list of ten strategies)
2. Second, think about when you will achieve your goal. For this exercise, you will want to achieve your goal when you take your next multiple-choice exam in your psych class. Here is a list of the class dates from the syllabi for the courses. What's the date of your next exam? _____
3. Third, think about how you will know it is time to achieve your goal (use the strategy). We call this a cue. For example, will you use the strategy right after the test starts? Will you use it when you see a hard item? Write your cue: _____

Now, put the three pieces of information into the following form (like MadLibs):

When I take my next exam in (class) on (date), I will (strategy) when (cue). Here are some examples:

When I take my next exam in PSY 101 on April 4, I will brain dump (write down the key mnemonic devices) as soon as the exam begins.

When I take my next exam in PSY 236 on April 8, I will watch for and circle trigger words when I read each of the questions.

When I take my next exam in PSY 101 on March 31, I will make sure to read all of the answer choices when I get to each question on the test.

Write your full goal below using this format:

When I take my next exam in PSY ____ on _____, I will
_____ when
_____.

Great! Now, go back and write a goal for how you plan to use 5 of the 10 strategies using this same format. Choose the 5 strategies that would be most useful to you:(*there will be five blanks for them to fill out)*

Take a few minutes to commit the goals to memory or write them down. If you take them seriously and remember them, you are more likely to use these strategies at your next exam, which may help improve your score!

Visual Intervention

Many famous athletes and performers use visualization exercises to help improve their skills. To successfully use imagery, an individual imagines themselves performing successfully.

For example, in his mind, a baseball player might see the ball being released from the pitcher, feel his muscles in his upper arm as he gets ready to swing, and then hear the "crack of the bat" when he makes contact with the ball.

Here's a quote from the famous retired baseball player, Hank Aaron, about how he used imagery before a game:

"*. . .I would start visualizing—like I'm standing at the plate with, say, runners at first and second, or second and third —how he's (the pitcher) going to pitch me in that given situation. Then, I would start visualizing, for example, if the bases were loaded, how he would try to get me out…I would put myself in all these different positions and put him in the same positions and try to figure out what is best for him and what I am going to be looking for."*

You can use the same type of imagery exercise to help yourself improve your score on your next multiple choice exam. I'll walk you through the steps.

- Here is a list of the class dates from the syllabi for the courses. When is your next exam? _____
- Now, pick five strategies from the training video that you want to use next time you take an exam. (give link to video/ also provide the list of ten strategies) _____
- Based on your experiences with other exams in this class, imagine what it will be like when you are taking the test.
    - What does your classroom look like? _____
    - Is the room warm or cold? _____
    - Where will you sit when you take the test? _____
    - What will you be able to see from where you're sitting? _____
    - What type of desk or table will you have? _____
    - What will the test booklet look like? _____
    - How will you be feeling when you arrive for the test? _____
    - How will you feel during the test? _____
    - What will other students be doing around you before and during the test? _____

    - Can you think of any other details about your experience that will make your mental picture more detailed? _____
- Now, imagine yourself taking the test in those conditions and using the five strategies as you complete your exam. Walk through it in your mind step by step and imagine what it will be like to successfully use the strategy. Think about what you will see and hear, think about what you will do, think about how you will feel.
    - Picture yourself arriving in the classroom. What will you do first?
    - Now imagine the start of the exam. How will you feel? What will you do? Imagine yourself using each of the strategies, one by one.

Great! You have successfully used a visualization technique to help yourself prepare for the exam. If you take this exercise seriously and carefully imagine yourself using the strategies as you take your exam, you may improve your score on your next exam!

Control Intervention

Just as a reminder, these were the 10 strategies presented in the video (provide list and link). Feel free to refer back to the video to remind yourself of the strategies if you would like to.

Appendix H: Manipulation Check

Please answer the following questions as honestly as possible.

Scoring: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree

Verbal Intervention

1. As I went through the goal-setting exercise, I thought carefully about setting goals to help myself succeed on my next exam.
2. I really thought through the goals I was writing.
3. I concentrated fully on the goals I was writing.
4. I made an effort to complete the goal-writing exercise carefully.

Imagery Intervention

1. As I went through the visualization exercise, I clearly imagined the strategies taught.
2. As I imagined myself using the strategies on the next exam, the scene was vivid in my mind.
3. I concentrated fully on the visualization exercise.
4. I made an effort to complete the visualization exercise carefully.

Appendix I: Process Variables

Personal Relevance

Please rate how helpful you think each of the strategies would be for improving your score if you used it on future multiple choice tests.

Scoring: 1 = Not helpful at all; 2 = A little bit helpful; 3 = Fairly helpful; 4 = Very helpful

1. Arrive early to get a good seat and settle in.
2. Do a brain dump of all the material you're holding in short-term memory.
3. Preview the test and read all the instructions before you start.
4. Anticipate the answer by covering the answer choices and answering in your own words first.
5. Watch for and circle or underline the trigger words.
6. Read all the answer choices before selecting one.
7. Answer all the easy questions you can first.
8. Mark the hard questions and go back to them later.
9. Answer all of the questions.
10. Use all of the available time.

Self Efficacy

Please rate how confident you feel in your capability to use each of the following strategies to improve your score on future multiple choice tests.

Scoring: 1 = Not at all confident; 2 = A little bit confident; 3 = Fairly confident; 4 = Very confident

1. Arrive early to get a good seat and settle in.
2. Do a brain dump of all the material you're holding in short-term memory.
3. Preview the test and read all the instructions before you start.
4. Anticipate the answer by covering the answer choices and answering in your own words first.
5. Watch for and circle or underline the trigger words.
6. Read all the answer choices before selecting one.
7. Answer all the easy questions you can first.
8. Mark the hard questions and go back to them later.
9. Answer all of the questions.
10. Use all of the available time.

Motivation to Transfer

Please rate how motivated you are to use each of the following strategies on future multiple choice tests.

Scoring: 1 = Not at all motivated; 2 = A little bit motivated; 3 = Fairly motivated; 4 = Very motivated

1. Arrive early to get a good seat and settle in.
2. Do a brain dump of all the material you're holding in short-term memory.
3. Preview the test and read all the instructions before you start.
4. Anticipate the answer by covering the answer choices and answering in your own words first.
5. Watch for and circle or underline the trigger words.
6. Read all the answer choices before selecting one.
7. Answer all the easy questions you can first.
8. Mark the hard questions and go back to them later.
9. Answer all of the questions.
10. Use all of the available time.

Appendix J: Demographics

1. What is your sex?
    a. Female
    b. Male
2. How old are you?
    a. Under 18
    b. 18
    c. 19
    d. 20
    e. 21
    f. 22
    g. Over 22
3. Are you Hispanic/Latino?
    a. Yes
    b. No
4. What is your race/ethnicity? (Select all that apply)
    a. American Indian or Alaska Native
    b. Asian
    c. Black or African American
    d. Native Hawaiian or Other Pacific Islander
    e. White

Appendix K: Use of Trained Content

Scale:1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree

Please answer the following questions about how you behaved during your multiple choice exam in PSY ____ on (date):

1. I arrived early for the exam.
2. I brought all of the materials I needed for the exam.
3. I picked a comfortable seat for the exam.
4. I didn't talk with other students about the exam before it started.
5. Once the test began, I did a "brain dump" in which I wrote down important formulas or key terms I was holding in my memory.
6. I looked over the entire test before I started to respond.
7. I carefully read all of the instructions on the test.
8. When I read each question, I tried to come up with the correct answer in my own words before I read the response choices.
9. I watched for and marked trigger words like "never" or "always."
10. I read all of the answer choices for each question.
11. I marked each answer choice with a symbol like +, -, or ?to help me with the process of elimination.
12. I answered all of the questions I knew first.
13. I went back at the end to respond to questions I skipped because they were too hard.
14. I answered all of the questions on the test.
15. I used all of the time provided for the test.
16. I went back and checked my answers when I finished the test.
17. After I finished, I went back and re-read the instructions to make sure I had followed them correctly.
18. After I finished, I went back to make sure I caught all of the trigger words in the test.

Appendix L: Test Scores

In PSY _____, you have had ___ exams so far this semester. Please provide your scores below. Please provide how many points you earned and how many points the test was worth.*Please be honest so that my data will be as accurate is possible. I promise to keep your scores confidential.*

1. Exam 1 on ____ (date): _____ points out of _____ points
2. Exam 2 on ____ (date): _____ points out of _____ points
3. Exam 3 on ____(date): _____ points out of _____ points

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