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# Does Person And Process Praise Influence Success Of Transferring Knowledge?

Leah Mae Wilson

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**DOES PERSON AND PROCESS PRAISE INFLUENCE SUCCESS OF  
TRANSFERRING KNOWLEDGE?**

A Masters Thesis

Presented to

The Graduate College of  
Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree  
Master of Science, Psychology

By

Leah Mae Wilson

December 2016

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# DOES PERSON AND PROCESS PRAISE INFLUENCE SUCCESS OF TRANSFERRING KNOWLEDGE?

Psychology

Missouri State University, December 2016

Master of Science

Leah Mae Wilson

## ABSTRACT

The effects of person, process, and neutral praise were examined to assess differences in the types of praise used to frame participant motivation and subsequent transfer success. A sample of undergraduate psychology students ( $N = 66$ ) were tested using the Tower of Hanoi puzzle to assess transfer success based on the number of trials and average time per trials necessary to solve the transfer task. Participants also reported levels of existing achievement goal orientations and task-specific intrinsic motivation. Exploratory analyses indicated that the number of trials, average time per trial across conditions, as well intrinsic motivation did not differ by condition. However, analyses revealed that participants who received person praise were less likely to successfully transfer knowledge compared to those who received neutral praise. Participants' level of performance-approach goal orientation (PAGO) predicted the number of trials required to solve the transfer task for those in the process praise condition, but not those in the neutral praise condition. Participants who received process praise required more trials to solve the transfer task if they scored high in PAGO than if they scored low in PAGO. One possible explanation for this finding is that when students high in performance orientation hear feedback about the strategies that are being used, they become more conscientious about their performance. More research is needed to understand how types of praise interact with students' existing goal orientations to affect transfer of knowledge.

**KEYWORDS:** praise, transfer of knowledge, achievement goals, framing, Tower of Hanoi, intrinsic motivation

This abstract is approved as to form and content

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Melissa Duncan-Fallone, PhD  
Chairperson, Advisory Committee  
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Approved:

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## INTRODUCTION

Transfer of knowledge is a widespread topic of interest in the field of educational psychology. It is of great value to instructors for their students to be able to recognize similarities between problems and apply what was taught previously to a problem or situation that differs on some level from the original problem. The ability to take information taught and practiced in a classroom environment and transfer the information into a more complex and applied setting can indicate effective learning and problem-solving skills. Defined conceptually, transfer is the ability for an individual to take what was learned previously and apply the knowledge to a similar, yet somewhat different task (Perkins & Salomon, 2012).

There are a number of factors that might influence the success of knowledge transfer. One factor that has been shown to play a role in transfer success involves the characteristics of the transfer task. Participants are taught or required to solve a base problem and then are asked to apply that knowledge to solve a transfer problem. Various types of problems or tasks have been utilized by researchers to examine knowledge transfer. These problems differ based on the nature of the task and to what degree the baseline, or learning problem differs from the transfer problem and thereby may aid or hinder the success of transfer. For example, Nokes and Belenky (2011) discuss the concept of near and far transfer. Near transfer requires less processing because the same rules are applied from what was learned previously in the baseline task to the more challenging transfer task, whereas far transfer requires more thought and effort because the transfer problem is not related directly to the base problem (Nokes & Belenky, 2011).

Transfer problems can also be described as being isomorphic or nonisomorphic as discussed by Pierce and Gholson (1994). Isomorphic problems involve similarities in the requirements and goals to solve the transfer problem because the specific outcome is the same from the baseline to transfer problem, whereas nonisomorphic problems often have different requirements and goals to solve the transfer problems (Pierce & Gholson, 1994). A second factor that plays a role in transfer success is the instructional context. The way the task is explained may encourage metacognitive processes when the participant is solving the problem (Brand, Reimer, & Opwis, 2003). For example, prompts to encourage individuals to think about the processes that are being utilized to complete a task have been investigated. Berardi-Coletta, Buyer, Dominowski, and Rellinger (1995) found that prompts ultimately enhance metacognitive thinking and promote more effective transfer, as evidenced by fewer trials and less time to completion

Lastly, learner motivation is another factor that influences transfer success. Studies show that mastery-based achievement goal orientations enhance the likelihood of an individual engaging in strategies that increase metacognitive processing, which in turn would increase transfer (Pugh & Bergin, 2006). Although much research has been conducted to understand how characteristics of a task affect the transfer of knowledge (Atkinson, Catrambone, & Merrill, 2003; Brand, et al., 2003; Chi, Bassok, Lewis, Reimann, & Glaser, 1989; Harpaz-Itay, Kaniel, & Ben-Amram, 2006), less is known about how the instructional context and learner motivation affect transfer.

## **Instructional Context**

Researchers have been interested in assessing components of the environment, such as framing of instructions (Belenky & Nokes-Malach, 2013) and other aspects of the instructional context that promote metacognitive processes (Atkinson, et al., 2003; Brand, et al., 2003; Engle, Lam, Meyer, & Nix, 2012; Harpaz-Itay, et al., 2006) to evaluate differences in the context that might impact the likelihood of transfer occurring.

Behavior has been found to be influenced by the way messages are given, or framed. Engle, Nguyen, and Mendelson (2011), conducted an experiment to assess how the presentation of information affects the success of transferring knowledge across contexts. The researchers utilized a group of high school students assigned to either the expansive framing condition or the bounded framing conditions. For the expansive framing condition, the material was presented as having applications in the future and other settings that the students might encounter. For the bounded framing condition, the information was presented as having implications for the current class discussion and upcoming test. Participants were tutored on the basics of the cardiovascular system on the first day and transfer of the knowledge as it related to the respiratory system was assessed the next day. Consistent with the hypothesis, the researchers found that students transferred more successfully when material was framed expansively to benefit students outside of the classroom setting.

The use of framing has been examined further in its application to educational settings in order to gain a better understanding of how educators can tailor the presentation of materials to increase student motivation, and thus enhance learning outcomes. Goldsmith and Dhar (2013) focused on possible implications of extrinsic

rewards in the classroom and workplace. The researchers gave participants a series of anagrams and gave one of two prompts involving the reward that would be given. In one prompt the individual would have the opportunity to gain money for each successfully solved anagram. The second prompt involved the participant getting a set amount of money and losing an incremental amount for each anagram that was not solved. Findings from this study supported the hypothesis that students would be more motivated to solve the anagrams if the incentive was framed so that something would be taken away than if framed as though something would be gained (Goldsmith & Dhar, 2013).

Researchers have also examined specific aspects of the instructional context that promote metacognitive processes. Brand et al. (2003) conducted a study with the intent of understanding if stimulating metacognitive thinking and having participants work in group settings would promote learning and subsequent transfer on various tasks. Findings from the study confirmed, people who were asked questions involving the strategies they were using in order to enhance metacognitive processing had better outcomes on the transfer and learning tasks than those who did not receive metacognitive stimulation (Brand, et al., 2003). Another study assessed how various formations of instruction and structure of statistics problems could aid in successful transfer. The researchers designed the instructions for calculating a *t*-test to either include information about the conceptual component, or simply calculating the score based on a formula (Atkinson, et al., 2003). The researchers found that individuals that received instructions emphasizing the conceptual foundation of the solution had better success at transferring to similar, but more complex problems, specifically a three-group analysis of variance (Atkinson, et al., 2003).

## **Learner Motivation**

Learner motivation also plays a role in the transfer of knowledge. An individual's existing achievement goal orientation determines how efforts will be focused (Pugh & Bergin, 2006) and high level of intrinsic motivation is associated with persistent efforts to complete a difficult task (Kamins & Dweck, 1999). The use of person and process praise has been studied to examine the effects the two forms of praise have on an individual's motivation to take on a challenge or persist in the face of a setback. Person praise is defined as feedback that is focused on the person's characteristics or abilities, while process praise is feedback based on strategies utilized to solve a problem (Pomerantz & Kempner, 2013). Praise appears to be seemingly harmless because it is commonly utilized in various setting with the hopes of raising an individual's motivation and self-esteem. However, the attributions individuals experience as a result of praise, especially praise that is focused on the person, or characteristics out of their control, have been found to decrease an individual's motivation for a task (Kamins & Dweck, 1999). Praising an individual for their characteristics or abilities might lead the person to place emphasis on qualities about themselves that cannot be changed (Haimovitz & Henderlong-Corpus, 2011). The individual may adopt a helpless pattern by thinking their success or failure comes from the fact that they either have the right skill or they do not (Kamins & Dweck, 1999). However, people who hear praise for the effort or procedures they used tend to make attributions based on aspects of the task that they are able to control by applying a different strategy or putting more thought into completing the problem (Haimovitz & Henderlong-Corpus, 2011). When compared to process praise, person praise has been found to lead to a greater decrease in intrinsic motivation for a

task and higher likelihood that the individual will not persist when met with a setback or failure (Skipper & Douglas, 2012).

A series of studies conducted by Kamins and Dweck (1999) revealed that children that were exposed to person related praise or criticism were found to evaluate themselves more harshly and report a more negative mood than those that had received a process related form of praise or criticism. In a different study, children that received person praise about school performance from their parents were more likely to have a fixed idea of intelligence and were not as likely as their counterparts to explore more challenging work, which could have detrimental effects long-term (Pomerantz & Kempner, 2013).

Haimovitz and Henderlong-Corpus (2011) found similar outcomes in motivation as a result of person and process praise in college students. In the study, participants were asked to solve three puzzles and then received either person or process praise. After each puzzle, the participants completed measures to assess intrinsic motivation, self-worth, competence, and performance attributions. The researchers found that after the third trial that was designed to end in failure, participants reported higher levels of intrinsic motivation in the process praise condition and lower levels of intrinsic motivation in the person praise condition (Haimovitz & Henderlong-Corpus, 2011).

Individual differences in achievement goal motivation have also been shown to influence knowledge transfer (Belenky & Nokes-Malach, 2013; Perkins & Salomon, 2012; Pugh & Bergin, 2006). Achievement goals are based on cognitive self-regulation which indicates the role one plays in monitoring and taking initiative in one's own learning (Covington, 2000). The expressed motivation is thought to be a contributing

factor to the success of the student in the learning environment. Perkins and Salomon (2012) proposed the model for motivation to transfer as detect, elect, and connect. In this model, motivation is thought to have a role in each of the three steps. Individuals in an everyday situation can detect that connections between related components can be connected and then the individual elects to delve into their existing knowledge to make the appropriate transfer connection. (Perkins & Salomon, 2012).

Past studies have been conducted to assess the interaction of existing achievement goals and the instructional context on the success of transfer. These studies have shown that framing an individual with outcome statements of the task as either performance goals or mastery goals can impact the adaptation of achievement goals through the use of these different types of instruction (Belenky & Nokes-Malach, 2013; Elliot & Harackiewicz, 1996). A recent study (Belenky & Nokes-Malach, 2013) utilized framing to manipulate achievement goals. The study expanded upon the research on the motivational aspect involved in knowledge transfer with the addition of framing and task structure. The study involved the use of different task structures (invent and tell-and-practice) and instructions in the form of mastery goal framing, emphasizing a learning outcome, and performance goal framing, emphasizing the goal of succeeding at the puzzle (Belenky & Nokes-Malach, 2013). In accord with past findings, participants with existing high levels of mastery-approach motivation were most likely to show success on the transfer tasks, while the other three goals did not indicate an individual's likelihood to transfer knowledge (Belenky & Nokes-Malach, 2013). Research also indicates that individuals with higher levels of mastery goal orientation are likely to employ a host of



techniques that aid in the ability for successful transfer, such as metacognitive processing, challenge seeking, and persistence (Pugh & Bergin, 2006).

### **Current Study**

Because individual factors, such as motivation have been shown to influence transfer success (Perkins & Salomon, 2012; Pugh & Bergin, 2006; Nokes & Belenky, 2011), it is important to consider and conduct more research on aspects of the environment that affect motivation, such as the way information is framed in the form of praise. The purpose of the current study is to expand the research on framing effects on transfer by examining the effects of person versus process praise. Participants received feedback to frame motivation that consisted of either person praise, process praise, or neutral praise after training to criteria on a simple Tower of Hanoi problem. To test transfer, time to completion and number of trials were assessed as participants solved a second Tower of Hanoi problem. It was predicted that individuals who received process feedback would have higher success in the transfer task than those who received person praise or neutral feedback. Because an individual's motivation has been shown to play a role in the success of transfer, measures of participants' achievement goal orientation and intrinsic motivation for the task were also examined.

## METHOD

### Participants

Prior approval for this project was obtained from the Missouri State University IRB (April 4, 2016; approval #16-0405). Participants consisted of 66 undergraduate students (31 males and 35 females) with an average age of 21.52 years. Participants were recruited from psychology courses at a mid-sized Midwestern university for the purpose of fulfilling a research requirement or gaining extra-credit for their participation. The participants were assigned randomly into three conditions: person praise ( $n = 19$ ), process praise ( $n = 21$ ), and neutral praise ( $n = 26$ ). All of the participants included in the analyses solved the transfer task successfully.

### Materials and Procedures

The experimenter assigned participants to one of three framing conditions using a block randomization technique that was established prior to the experiment. Participants began by giving their informed consent (Appendix A) to participate in the experiment and were made aware of the video camera that would be recording their hands throughout the task for later coding of the amount of time it took for the participant to complete each trial. Then, participants completed a demographic questionnaire and the 12 item 2 x 2 Achievement Goal Questionnaire (Elliot & McGregor, 2001) through Qualtrics online survey system.

After the first portion of the experiment, the participant completed the Tower of Hanoi puzzle where they experienced one of three experimental manipulations. The first

two conditions consisted of different types of feedback, person or process praise. The third condition served as the control in which the participant received neutral feedback.

Finally, after completing the transfer task, participants were seated in front of the computer to respond to a series of questionnaires presented on Qualtrics online survey system. The participants completed the 22 item Task Evaluation Questionnaire from the Intrinsic Motivation Inventory (Ryan, 1982), which required them to reflect on the strategies they used to solve the puzzle. Also, participants responded to four questions assessing task specific mastery goals that were utilized by Belenky and Nokes-Malach (2013).

### **Tower of Hanoi Problem**

Participants were tested individually using the Tower of Hanoi puzzle task. The puzzle consisted of three pegs of equal height and a set of stacked rings arranged with the largest disk on bottom and the smallest disk on top. The objective of the puzzle is to move the rings one at a time from the far left peg to the far right peg in as little time as possible with the least number of moves. Additionally, smaller rings must always be moved so that they are on top of larger rings and smaller rings should never be underneath larger rings. Participants were instructed on how to complete the task and were told that they would be asked to start over after they had reached the maximum number of moves or made an illegal move. Individuals were given the first problem with three rings, which served as the training task. Participants were allowed to start over to the beginning of the puzzle if they felt that they did not have any moves left to make to advance to the solution.

The participant was required to solve the training task successfully for two consecutive trials. Criterion was met when the individual solved the problem with the appropriate number of moves with no illegal moves being made (larger rings stacked on top of smaller rings or moving more than one ring at a time). The number of trials required to complete the first problem successfully and the number of moves per trial were recorded. During the testing phase, a minimum of three trials were required for both the baseline and transfer problem; two of which were solved consecutively. After solving two consecutive baseline problems consecutively, participants moved on to the transfer task which consisted of the four ring Tower of Hanoi problem.

### **Scales**

The 2 X 2 Achievement Goal Questionnaire (Appendix B) was utilized to measure participants' existing levels of goal orientation. The questions were altered to inquire about courses in the participants major, as those are more likely to be courses that hold an invested interest and be of importance to the student's future. In addition, the scale was inadvertently anchored from 1 to 5 instead of from 1 to 7. The questionnaire measures achievement goal orientation using four subscales, including: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. Questions measuring mastery-approach assess participant desires to understand the content of the courses within their major and the extent to which the effort lies in seeking the information (Elliot & McGregor, 2001). The mastery-avoidance subscale assesses the extent to which the participant is fearful that they will not comprehend the content of the courses within their major (Elliot & McGregor, 2001). The third subscale,

performance-approach included questions asking about the degree to which the participant prioritizes outperforming other students in their classes (Elliot & McGregor, 2001). Finally, the performance-avoidance subscale is marked by the participant's desire to do what it takes to keep from performing poorly in their classes (Elliot & McGregor, 2001).

The four-item, task-based mastery goal adoption questionnaire was given at the conclusion of the testing phase has been previously utilized by Belenky and Nokes-Malach (2013). See Appendix C. The questions were designed to assess the extent to which the participants were concerned with the quality of the strategy they were using and how much they were seeking to understand why or why not their strategy was effective (Belenky & Nokes-Malach (2013).

Lastly, the 22-item Task Evaluation Questionnaire from the Intrinsic Motivation Inventory (Ryan, 1982) was given to assess the individual's task-specific intrinsic motivation. See Appendix D. This scale also consisted of four subscales in which the participant rated: interest and enjoyment, perceived competence, perceived choice, and pressure and tension that was felt while solving the puzzle. Questions assessing the interest and enjoyment for the puzzle consisted of the level to which the task held their interest, how enjoyable or fun they thought the task was (Ryan, 1982). Items included in the perceived competence subscale involved items inquiring about how well they feel they did on the task, if the participant felt like they are competent at the conclusion, and if they believe they did well in comparison to other individuals (Ryan, 1982). The perceived choice subscale included items regarding if the participant felt that they were completing the problem by their own choice or if they felt like they were required to

complete the problem (Ryan, 1982). The fourth subscale in the Intrinsic Motivation Inventory was used to assess the participant's level of pressure and tension that was felt while completing the task by inquiring about how nervous, tense, or relaxed they felt while completing the puzzle (Ryan, 1982).

### **Experimental Manipulation**

After the participants completed the first problem one time successfully using three rings, the experimenter provided feedback based on the condition the individual was assigned to. In the person praise condition, the experimenter used phrases such as, "Great! You are really good at this!" In the process praise condition, they were told, "Great! You are using some really effective strategies!" In the neutral praise condition, the participant was told, "You have solved the problem." After the training task had been completed for a minimum of three trials with two trials solved successfully in a row, the experimenter commented, in the person praise condition, "Research has shown that people who are good at solving puzzles like you are can usually solve the four ring puzzle in relatively few trials." In the process praise condition, the experimenter told the participants, "Research has shown that people who use effective strategies to complete the problem like you have will be able to complete the problem in relatively few trials." Participants in the control condition were told, "We will now move on to the four ring problem."

The praise scripts that were used are an adaptation of the prompts used by Haimovitz and Henderlong-Corpus (2011) and Latham, Erez, and Locke (1988). Additionally, the experimenter provided feedback in each condition when the participant

made a mistake to remind the participant of the constraints of the puzzle, i.e. a larger ring must not be stacked on a smaller. Also, feedback consistent with the condition was given after the first four ring puzzle trial ended unsuccessfully, or if the participant went three or more trials without a success. Participants in the person praise condition were told after several unsuccessful trials, “That’s okay. It takes some time to develop the skill to solve this problem.” Participants in the process praise condition were told, “That’s okay. It takes some time to figure out the right strategy to use for this problem.” Participants in the neutral feedback condition were only told, “That’s okay. Try again.

## RESULTS

### Data Reduction

Data from 14 of the 80 participants were not included in the primary analyses. These cases were excluded due to the participant not completing the transfer task ( $n = 11$ ), incomplete videos that prevented proper analysis ( $n = 2$ ), and experimenter error during the testing phase ( $n = 1$ ). More cases were excluded from the person praise framing condition ( $n = 7$ ) and process praise framing condition ( $n = 6$ ) than control condition ( $n = 1$ ). Screening of data from the remaining 66 participants for assumption violations indicated that the assumptions were met for accuracy, linearity, homogeneity, and homoscedasticity, but the data did not meet the assumption for normality, as evidenced by high values for skew and kurtosis. A log transformation was completed for both the number of trials and average time per trial variables to reduce the positive skew of the original data (Field, 2009). The results of analyses conducted with both the original and the transformed variables did not differ. Therefore, the original, non-transformed variables were used to allow for direct interpretation of the means.

### Primary Analyses

The variables used in the primary analyses consisted of the number of trials and average time per trial necessary to solve the task on two consecutive trials. Means and standard deviations for each framing condition on the baseline task and transfer task are shown in Table 1.



To assess the differences in the number of trials required to complete the baseline and transfer task between the person praise, process praise, and neutral praise framing conditions, a 3 (Condition) X 2 (Task) mixed factorial analysis of variance with repeated measures on the last factor was conducted. As expected, the main effect for Task was significant,  $F(1, 63) = 55.63, p < 0.001, \eta^2 = 0.47$ . The more difficult transfer problem required more trials ( $M = 8.85, SD = 5.70$ ) than the baseline problem ( $M = 3.61, SD = 0.67$ ). However, there was not a statistically significant main effect of Condition,  $F(2, 63) = 0.50, p = 0.61, \eta^2 = 0.02$ . There was no difference in the number of trials required for participants in the person praise ( $M = 6.08, SD = 3.72$ ), process praise ( $M = 5.81, SD = 2.26$ ), and neutral praise ( $M = 6.67, SD = 3.05$ ) conditions. The interaction between the Task and Condition was also found to be non-significant,  $F(2, 63) = 0.94, p = 0.40, \eta^2 = 0.03$  (See Figure 1).

A second mixed factorial analysis of variance was completed to assess the effects of framing condition and task on the average amount of time spent per trial. The design that was implemented was a 3 (Condition) X 2 (Task) design with repeated measures on the last factor. Again, a significant main effect for Task was found,  $F(1, 63) = 176.48, p < 0.001, \eta^2 = 0.74$ . The baseline task required less time per trial ( $M = 24.05, SD = 8.65$ ) than the transfer task ( $M = 63.89, SD = 25.14$ ). However, there was not a significant main effect of Condition, ( $F(2, 63) = 0.56, p = 0.58, \eta^2 = 0.02$ ); indicating no difference between the person praise ( $M = 46.50, SD = 13.09$ ), process praise ( $M = 41.61, SD = 11.42$ ), and neutral praise ( $M = 44.02, SD = 17.70$ ) conditions. As shown in Figure 2, the interaction between Task and Condition was found to be non-significant for the average time per trial variable ( $F(2, 63) = 0.32, p = 0.73, \eta^2 = 0.01$ ).

## Goal Orientation and Intrinsic Motivation

Correlations were assessed to examine the relationships between the dependent variables (number of trials and average time per trial) and the self-reported, task-specific intrinsic motivation and existing achievement goals. A correlation between the baseline number of trials and the pre-existing level of the mastery approach achievement goal orientation, ( $r(64) = -0.31, p = 0.01$ ), indicates that higher levels of mastery-approach goal orientation are associated with fewer trials to solve the baseline task. The correlation between perceived competence and the number of trials necessary to complete the transfer task was also significant, ( $r(64) = -0.33, p = 0.01$ ), which indicates that as more trials are required to complete the transfer task, perception of competence decreases.

To assess the effect of the framing condition on the participants' levels of intrinsic motivation specific to the Tower of Hanoi task, a univariate analysis of variance was conducted for each of four subscales (perceived competence, choice, pressure, and interest) from the Intrinsic Motivation Inventory (Ryan, 1982). The IMI interest subscale was found to be similar across all of the framing conditions: person praise ( $M = 5.58, SD = 1.19$ ), process praise ( $M = 6.08, SD = 0.89$ ), and neutral ( $M = 5.38, SD = 1.40$ ),  $F(2, 63) = 2.06, p = 0.14, \eta^2 = 0.06$ . The perceived competence subscale was also found not to differ across the framing conditions: person ( $M = 5.35, SD = 1.18$ ), process ( $M = 5.16, SD = 1.51$ ), and neutral ( $M = 4.67, SD = 1.34$ ),  $F(2, 63) = 1.53, p = 0.22, \eta^2 = 0.05$ . The perceived choice subscale was found to be similar for all three of the framing conditions: person ( $M = 5.87, SD = 1.13$ ), process ( $M = 5.56, SD = 1.22$ ), and neutral ( $M = 5.28, SD = 1.18$ ),  $F(2, 63) = 1.40, p = 0.25, \eta^2 = 0.04$ . Lastly, the subscale that measured the

participant's perceived pressure for the task was found to be the same between the conditions: person ( $M = 4.41, SD = 1.27$ ), process ( $M = 3.70, SD = 1.49$ ), and neutral ( $M = 4.27, SD = 1.59$ ),  $F(2, 63) = 1.34, p = 0.27, \eta^2 = 0.04$ .

The participant's task-based mastery goal adoption (Belenky & Nokes-Malach, 2013) for the Tower of Hanoi task was also examined. A One-Way analysis of variance comparing the three framing conditions was conducted with the average score of the four items used as the dependent measure. Framing condition did not influence the adoption of mastery goals for the task significantly,  $F(2, 60) = 0.91, p = 0.41, \eta^2 = 0.03$ . Mastery goal adoption was similar for participants in the person praise ( $M = 3.96, SD = 0.72$ ), process praise ( $M = 4.16, SD = 0.73$ ), and neutral praise ( $M = 3.84, SD = 0.92$ ) conditions.

Because previous literature has shown an interaction between mastery-approach goals and the type of framing condition on transfer success (Belenky & Nokes-Malach, 2013), a hierarchical regression analysis was conducted to assess the possibility that goal orientation (mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance) moderates the effects of praise on transfer success. The variables for the regression analyses consisted of the number of trials for the transfer task as the dependent variable and the interaction term for each individual subscale and the participant's condition as predictor variables. The outcome of number of trials for the three framing conditions and participants' existing levels of mastery-approach, mastery-avoidance, and performance-avoidance goal orientations were not significant ( $p > .05$ ). However, compared to participants in the neutral praise framing condition, participants in the process praise condition had an increase in number of trials as performance-approach

goal orientation increased, ( $\beta = 1.69$ ),  $t(5) = 2.51$ ,  $p = 0.02$ . As shown in Figure 3, participants in the process condition performed better if they were low in performance-approach goal orientation than if they were high in the performance-approach goal orientation.

### **Failure to Transfer**

Data from participants who failed to complete the transfer task were excluded necessarily from the primary analyses. However, these participants were included in a Chi-Square analysis conducted to determine if successfully solving the transfer task was a function of framing condition. Seventy-nine of the 80 original participants were included in this analysis. One participant was excluded for inconsistent praise used in the testing phase. Six (23.1%), of the 26 participants in the person praise condition, 4 (15.4%) of the 26 participants in the process praise condition, and 1(3.7%) of the 27 participants in the neutral praise condition did not complete the transfer task. A Chi-Square test of independence was conducted to evaluate the number of participants who solved and did not solve the four-ring transfer problem in each of the three framing conditions. The results were not significant, suggesting that equal numbers of participants in each of the three framing conditions solved and failed to solve the transfer problem,  $\chi^2(2) = 4.22$ ,  $p = 0.12$ , *Cramer's V* = 0.23. A second Chi-Square analysis was conducted to evaluate the frequency of unsuccessful transfer problem solvers for each of the three conditions. For this analysis, participants who were three or more standard deviations above the mean for number of trials or time to solution were categorized as unsuccessful in the transfer task along with participants who did not solve the transfer problem at all. A significant

difference was found comparing the person praise and neutral praise condition,  $\chi^2(2) = 8.23, p = 0.02, Cramer's V = 0.32$ . Inspection of the standardized residuals indicate that a higher percentage of participants in the person condition (34.6%) did not successfully solve the transfer problem than in the neutral condition (3.7%). See Figure 4 for a graph of the percentages.

## DISCUSSION

As expected, the results indicate that the transfer task was more challenging than the baseline task, evidenced by the greater number of trials and average time per trial necessary to complete the transfer task. The results of the current study indicate that framing participants with either person, process, or neutral praise does not influence the number of trials or average amount of time per trial required to successfully solve the transfer task. Findings from this study differ from the hypothesis that participants framed with person praise would have less success than the process and neutral praise conditions on the transfer task and have lower levels of task-specific intrinsic motivation, measured by the Intrinsic Motivation Inventory (Ryan, 1982).

Though not significant, the scores for the number of trials and average time per trial are in the direction of the hypothesis, meaning that participants who received person praise framing did not perform as well as those who received process or neutral feedback. Because the effect size for number of trials ( $\eta^2 = .03$ ) and average time per trial ( $\eta^2 = .01$ ) are small, the lack of significance could be due to a lack of power.

Consistent with prior evidence (Pugh & Bergin, 2006), there was a relationship found between the performance on the baseline task and the mastery-approach achievement goal orientation, suggesting that the individual's emphasis on understanding the strategy that was being used to solve the problem influenced the ease in which the baseline task was solved, but was unrelated to their performance on the transfer task. Along the same lines, the Intrinsic Motivation Inventory subscales measuring perceived competence were significantly related to the transfer task, but unrelated to the baseline

task. This finding indicates that solving the more difficult transfer task quickly is associated with increased feelings of competence in solving the problem. However, solving the less difficult baseline task quickly was not associated with feelings of competence. Unlike findings made by Haimovitz and Henderlong-Corpus (2011) indicating that intrinsic motivation is negatively impacted by person praise more than the control condition and the process praise group the findings from the current did not support the hypothesis that the intrinsic motivation for the task would differ based on the type of praise the participant received from participants' ratings on the Intrinsic Motivation Inventory (Ryan, 1982).

The hypothesis was not supported that the type of frame would interact with the individual's existing level of mastery-approach orientation and influence transfer success, as found in previous research (Belenky & Nokes-Malach, 2013). The experiment conducted by Belenky and Nokes-Malach (2013) found an interaction between the mastery and performance frame condition and higher levels of existing mastery-approach goal orientation. Accordingly, performance framing for individuals high in mastery-approach goal orientation increased the likelihood of transfer success. The framing conditions in the current study differed from the previous study by using praise scripts that were not directly implemented to be related to the types of achievement goal orientations like Belenky and Nokes-Malach (2013), which might be a reason for the discrepant findings. Another distinction between the current study and the previous study is that different types of tasks were used. The task used by Belenky & Nokes-Malach (2013) consisted of increasingly difficult statistics problems. While the current study utilized two levels of the Tower of Hanoi puzzle. The contrasting tasks could have

differed in the amount of cognitive processes necessary to complete the tasks, which could mean that achievement goal orientation would not notably influence the ease of solving for a task requiring near transfer. Additionally, for the primary analyses, the current study operationally defined transfer success with the continuous variables of number of trials and time per trial instead of a categorical pass or fail on the transfer task, thus the type of analysis differed between the studies which could change the way data are interpreted.

In the current study, there was not a relationship between the mastery-approach goal orientation and the type of praise an individual received on the influence of the number of transfer problem trials. Instead, transfer was achieved in fewer trials when participants low in performance-approach goal orientation received positive feedback related to the strategies that were being used. This finding suggests that individuals holding goals involving the concern for the way they are performing would solve the transfer problem with more trials than those with little concern for their performance when receiving the process praise. An individual concerned with doing better compared to others or focused on how they are performing, might be more discouraged and question their performance when struggling with a task, yet receiving praise amidst unsuccessful strategies. Individuals low in performance-approach orientation may be less concerned with how they are performing and may not be as conscientious of the way their performance appears when they are doing poorly, but be encouraged when they hear praise about the strategies they are using and complete the problem in fewer trials.

Lastly, the comparison between the number of individuals who were not successful at the transfer task (did not solve or took significantly more time or trials to



complete) and those who were successful revealed that a larger proportion of people who were not successful at the transfer task were in the person praise condition than the neutral praise condition. However, it is not clear whether people were taking more time because they were discovering strategies and utilizing deeper metacognitive processes, or if they were using faulty methods requiring them to need more trials to find success. Further investigation would be necessary to examine the reasons participants may have needed a greater number of trials and more time on each trial to complete the transfer task.

There are several possible reasons that the findings did not support the hypothesis for the current study. One might be that the overall amount of praise received by participants varied as a function of their performance. Participants with a larger number of unsuccessful trials experienced more condition specific prompts than those who required fewer trials. Because individuals who required less trials received fewer prompts the praise may not have been salient enough to influence performance or task-specific intrinsic motivation. Conversely, receiving praise for strategies that are not successful may have had a detrimental effect on motivation and performance (Skipper & Douglas, 2012). Additionally, much research for person and process praise has been conducted with children, but less has focused on praise in adult populations. While the results have been replicated across populations (Haimovitz & Henderlong-Corpus, 2011; Lessard, Grossman, & Syme, 2015; Skipper & Douglas, 2012), more research is needed to determine whether or not and under which conditions college-age students respond similarly to younger children when given different forms of praise. College students may have developed more effective ways to monitor their thoughts about performance or

understanding, and might differ in the attributions that praise has been thought to create compared to children.

The current study had several limitations that could have been improved to create a stronger effect. One consideration would be to make the amount of the feedback more standard across participants to eliminate differences between participants who solve the problem in few trials compared to people who required a larger number of trials to solve the problem. Adding in the more difficult five-ring problem and providing a set number of trials to complete the transfer task would promote a clearer operationalization of effective transfer. One way to assess the success would be to give each participant a set number of trials to complete the five-ring problem, such that if completed within the allotted trials successful transfer would be attained. Also, participants could be offered additional trials after meeting the limit without solving to test for persistence and motivation for the task. Based on prior research, it would make sense in this case that individuals receiving process praise will be more likely to accept the opportunity to complete additional trials than the person praise condition (Kamins & Dweck, 1999).

Individuals from different cultures may not make the same attributions after hearing praise as individuals in the United States who have been most commonly assessed. Future research could investigate the possible language and cultural differences in the use of praise which might provide further insight into the influences of praise across cultures. This could be implicated in diverse classroom settings with teachers who work with populations of students from different backgrounds. Findings could aid teachers in making decisions on the best way to encourage higher achievement in their unique classroom environment.

Studying the effects of praise and feedback are important to the field of Educational Psychology. It is beneficial for teachers to understand differences among their students in order to be more equipped to address students in a way that will promote positivity and achievement in the classroom. The current study expands the existing research on motivation that has been shown to be a factor in the success of knowledge transfer (Belenky & Nokes-Malach, 2013) by incorporating the aspect of person and process praise which has been shown to influence motivation and persistence to complete a task (Kamins & Dweck, 1999).

## REFERENCES

- Atkinson, R.K., Catrambone, R., & Merrill, M.M. (2003). Aiding in transfer in statistics: Examining the use of conceptually oriented equations and elaborations during subgoal learning. *Journal of Educational Psychology, 95*(4), 762-773. doi: 10.1037/0022-0663.95.4.762.
- Belenky, D.M. & Nokes-Malach, T.J. (2013). Mastery-approach goals and knowledge transfer: An investigation into the effects of task structure and framing instructions. *Learning and Individual Differences, 25*, 21-34. doi: 10.1016/j.lindif.2013.02.004.
- Berardi-Coletta, B., Buyer, L.S., Dominowski, R.L., & Rellinger, E.R. (1995). Metacognition and problem solving: A process-oriented approach. *Journal of Experimental Psychology Learning, Memory, and Cognition, 21*(1), 205-223. doi: 10.1037/0278-7393.21.1.205.
- Brand, S., Reimer, T., & Opwis, K. (2003). Effects of metacognitive thinking and knowledge acquisition in dyads on individual problem solving and transfer performance. *Swiss Journal of Psychology, 62*(4), 251-261. doi: 10.1024/1421-0185.62.4.251.
- Chi, M.T., Bassok, M., Lewis, M.W., Reimann, P., & Glaser, R. (1989). Self-explanations: How students study and use examples in learning to solve problems. *Cognitive Science, 13*(2), 145-182. doi: 10.1207/s15516709cog1302\_1
- Covington, M.V. (2000). Goal theory, motivation and school achievement: An integrative review. *Annual Review of Psychology, 51*, 171-200. doi: 10.1146/annurev.psych.51.1.171.
- Elliot, A.J. & Harackiewicz, J.M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70*(3), 461-475. doi: 10.1037/0022-3514.70.3.461.
- Elliot, A.J. & McGregor, H.A. (2001). A 2 X 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501-519. doi: 10.1037//0022-3514.80.3.501.
- Engle, R.A., Lam, D.P., Meyer, X.S., Nix, S.E. (2012). How does expansive framing promote transfer? Several proposed explanations and a research agenda for investigating them. *Educational Psychologist, 47*(3), 215-231. Doi: 10.1080/00461520.2012.695678.

- Engle, R.A., Nguyen, P.D., & Mendelson, A. (2011). The influence of framing on transfer: Initial evidence from a tutoring experiment. *Instructional Science, 39*(5), 603-628. Doi: 10.1007/s11251-010-9145-2.
- Field, A. (2009). *Discovering Statistics Using SPSS* (3<sup>rd</sup> Edition). Los Angeles: Sage Publications.
- Goldsmith, K. & Dhar, R. (2013). Negativity bias and task motivation: Testing the effectiveness of positively versus negatively framed incentives. *Journal of Experimental Psychology: Applied, 19*(4), 358-366.
- Haimovitz, K. & Henderlong-Corpus, J.H. (2011). Effects of person versus process praise on student motivation: Stability and change in emerging adulthood. *Educational Psychology, 31*(5), 595-609. doi: 10.1080/01443410.2011.585950.
- Harpaz-Itay, Y., Kaniel, S., & Ben-Amram, E., (2006). Analogy construction versus analogy solution, and their influence on transfer. *Learning and Instruction, 16*, 583-591. doi: 10.1016/j.learninstruc.2006.10.007.
- Kamins, M.L. & Dweck, C.S. (1999). Person versus process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology, 35*(3), 835-847. doi: 10.1037/0012-1649.35.3.835.
- Latham, G.P., Erez, M., & Locke, E.A. (1988). Resolving scientific disputes by joint design of crucial experiments by the antagonists: Application to the Erez-Latham dispute regarding participation in goal setting. *Journal of Applied Psychology, 73*(4), 753-772. doi: 10.1037/0021-9010.73.4.753.
- Lessard, L., Grossman, A., & Syme, M.L. (2015). Effects of gender and type of praise on task performance among undergraduates. *Psi Chi Journal of Psychological Research, 20*(1), 11-17.
- Nokes, T.J. & Belenky, D.M. (2011). Incorporating motivation into a theoretical framework for knowledge transfer. In J.P. Mestre & B.H. Ross (Eds.), *The psychology of learning and motivation (Vol 55): Cognition in education* (pp. 109-135). Sand Diego, CA, US: Elsevier Academic Press. doi: 10.1016/B978-0-12-387691-1.00004-1.
- Perkins, D.N. & Salomon, G. (2012). Knowledge to go: A motivational and dispositional view of transfer. *Educational Psychologist, 47*(3), 248-258. doi: 10.1080/00461520.693354.
- Pierce, K.A. & Gholson, B. (1994). Surface similarity and relational similarity in the development of analogical problem solving: Isomorphic and nonisomorphic transfer. *Developmental Psychology, 30*(5), 724-737.

- Pomerantz, E.M. & Kempner, S.G. (2013). Mothers' daily person and process praise: Implications for children's theory of intelligence and motivation. *Developmental Psychology*, 49(11), 2040-2046. doi: 10.1037a0031840.z.
- Pugh, K.J. & Bergin, D.A. (2006). Motivational influences on transfer. *Educational Psychologist*. 41(3), 147-160. doi: 10/1207/s15326985ep4103\_2.
- Ryan, R.M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43(3), 450-461. doi: 10.1037/0022-3514.43.3.45
- Skipper Y. & Douglas, K. (2012). Is not praise good praise? Effects of positive feedback on children's and university students' responses to subsequent failures. *British Journal of Educational Psychology*, 82, 327-339. doi: 10.1111/j.2044-8279.2011.02028.x

Table 1.

Group Differences in Average Number of Trials and Average Time per Trial for the Tasks.

Task	Person Praise ( <i>n</i> = 19)		Process Praise ( <i>n</i> = 21)		Neutral Praise ( <i>n</i> = 26)	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Baseline Trials	3.32	0.67	3.86	1.49	3.62	1.19
Transfer Trials	8.84	7.47	7.76	3.77	9.73	5.57
Baseline Time per Trial (seconds)	26.19	10.08	23.39	9.73	23.03	6.39
Transfer Time per Trial (seconds)	66.82	20.60	59.83	17.09	65.02	32.91

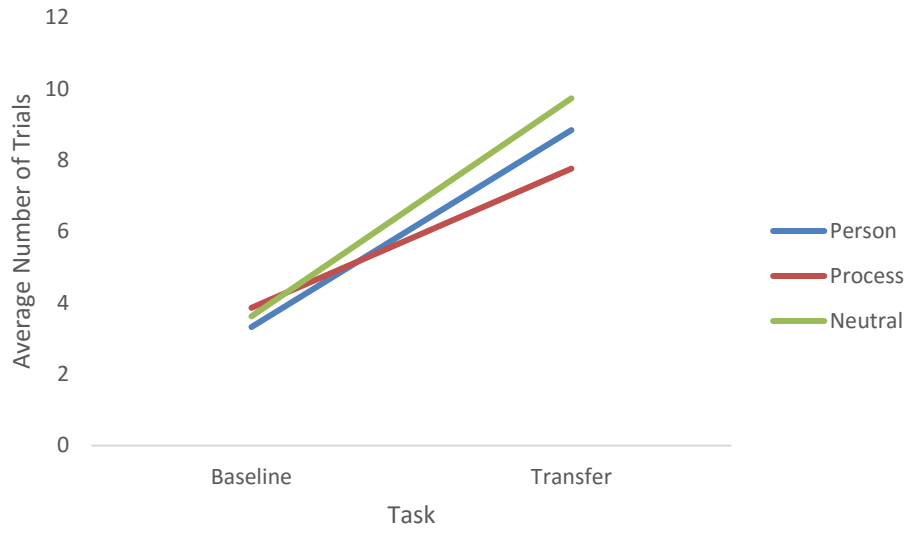


Figure 1. Interaction between task and framing condition on average number of trials.



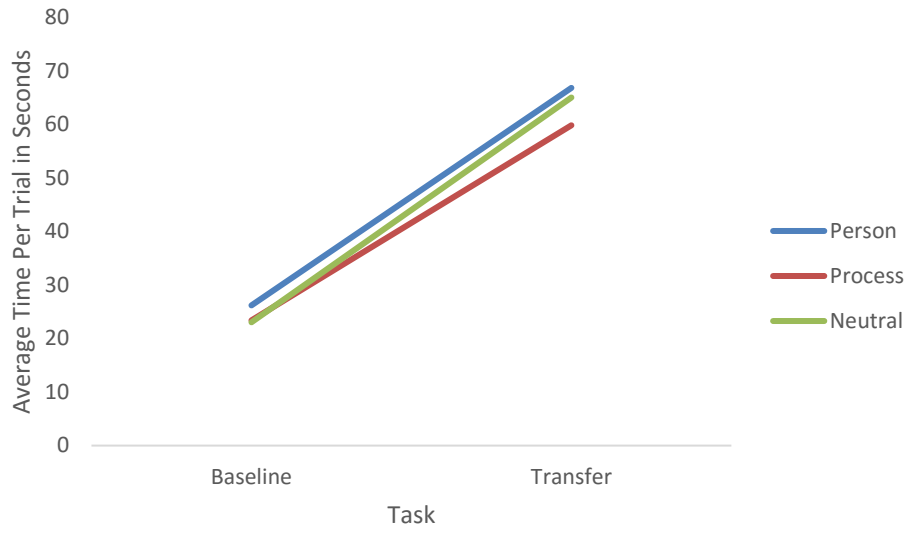


Figure 2. Interaction between task and framing condition on average time per trial.

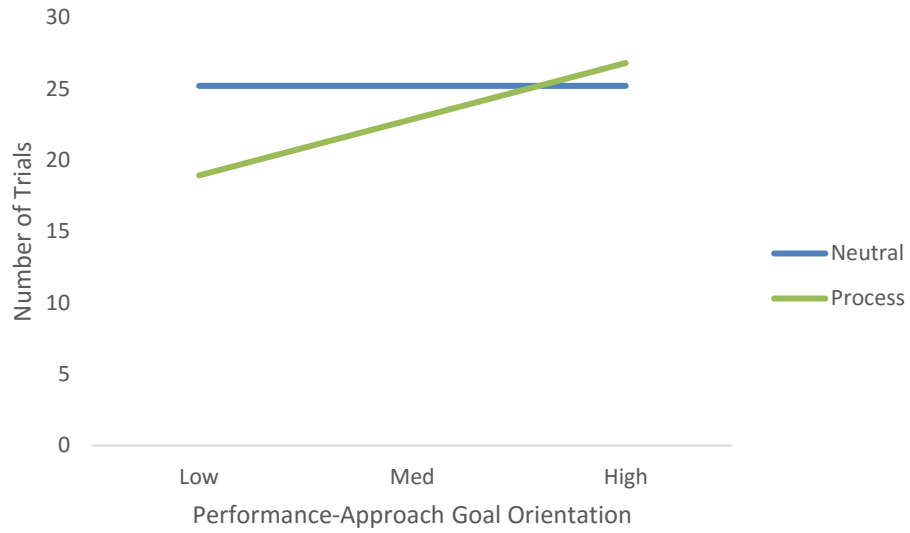


Figure 3. Number of trials predicted by the interaction of the neutral and process praise framing conditions by the performance-approach achievement goal subscale. Lines represent the simple slopes using one *SD* below the mean, mean, and one *SD* above the mean as points for graphing purposes.

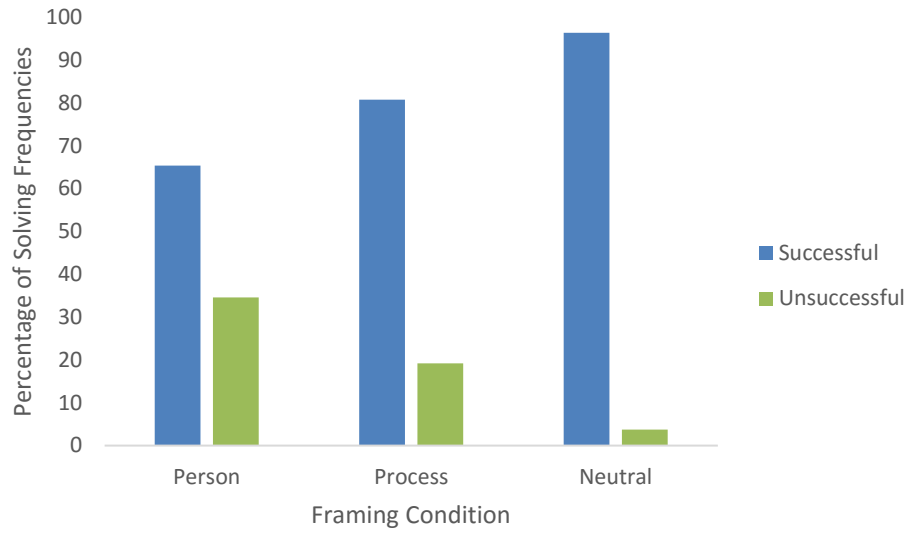


Figure 4. Percentage of successful and unsuccessful transfer by framing condition.

## APPENDICES

### Appendix A.

**Goals in School and Puzzle Solutions**  
**Principal Investigator: Dr. Melissa Fallone**  
**Co-Investigator: Leah Wilson**

#### Introduction

You have been asked to participate in a research study. Before you agree to participate in this study, it is important that you read about and understand the study and the procedures it involves. The investigator will also explain the project to you in detail. If you have any questions about the study or your role in it, be sure to ask the investigator. If you have more questions at a later time, Dr. Melissa Fallone and Leah Wilson will be happy to answer them for you. You may contact the investigator(s) at:

Dr. Fallone: 417-836-6528  
Mfallone@missouristate.edu  
Leah Wilson: 806-231-7270  
Wilson71350@live.missouristate.edu

You will need to type in your name on this form giving us your permission to be involved in the study. Taking part in this experiment is voluntary and there will be no consequences for ending the experiment. If you decide to take part but later change your mind, you may stop at any time.

#### Purpose of this Study

The reason for this study is to investigate students' goals for their coursework and learning processes. The study will include students enrolled in courses at Missouri State University in the Spring and Summer semesters of 2016.

#### Description of Procedures

If you agree to participate in this study, you will be given a 12-item survey to assess some of your goals when taking classes for your major. You will also be asked to provide some demographic information such as; name, age, and gender. Next, you will be given directions to complete two puzzle tasks for two rounds. While completing the puzzle, a video camera will be directed only toward your hands during the entire experiment. After the puzzle, there will be an additional questionnaire about your thoughts while completing the puzzle.

#### What are the risks?

The puzzle is a challenging task, but as mentioned before, you can stop at anytime.

#### What are the benefits?

Your professor may provide research credit or extra credit for your participation. Although participation may not be a direct benefit to you, your participation will further understanding on learning processes.

**How will my privacy be protected?**

The results of this study are confidential and only the investigators will have access to the information which will be kept in a locked facility at the University. Your professors will not see any identifying information that would connect you to the survey you complete. Your personal identifying information will not be used in any published reports of this research. All information gathered during this study will be destroyed five years after the publication of the study.

**Consent to Participate**

If you want to participate in this study, you will be asked to type in your name below in the space provided:

I have read and understand the information in this form. I have been encouraged to ask questions and all of my questions have been answered to my satisfaction. I have also been informed that I can withdraw from the study at any time.

By typing my name in this form, I voluntarily agree to participate in this study and acknowledge that I have been offered a copy of this form for my own records.

## Appendix B.

Elliot, A.J. & McGregor, H.A. (2001). A 2 X 2 achievement goal framework. *Journal of Personality and Social Psychology*, 80(3), 501-519. doi: 10.1037//0022-3514.80.3.501. Copyrighted by American Psychological Association.

**Instructions:** *The following statements represent types of goals that you may or may not have for a class in your major. Circle a number to indicate how true each statement is of you. All of your responses will be kept anonymous and confidential. There are no right or wrong responses, so please be open and honest.*

- | 1   | 2 | 3 | 4 | 5              |
|---|---|---|---|----------------|
| Strongly Disagree   |   |   |   | Strongly Agree |
| 1. It is important for me to do better than other students.   |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 2. It is important for me to do well compared to other students in classes for my major.                        |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 3. My goal in classes for my major is to get a better grade than most of the other students.                    |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 4. I worry that I may not learn all that I possibly could in classes for my major.                              |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 5. Sometimes I'm afraid that I may not understand the content of classes in my major as thoroughly as I'd like. |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 6. I am often concerned that I may not learn all that there is to learn in classes for my major.                |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 7. I want to learn as much as possible in classes for my major.   |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |
| 8. It is important for me to understand the content of classes for my major as thoroughly as possible.          |   |   |   |                |
| 1   | 2 | 3 | 4 | 5              |

9. I desire to completely master the material presented in classes for my major.  
1                      2                      3                      4                      5

10. I just want to avoid doing poorly in classes for my major.  
1                      2                      3                      4                      5

11. My goal in classes for my major is to avoid performing poorly.  
1                      2                      3                      4                      5

12. My fear of performing poorly in classes for my major is often what motivates me.  
1                      2                      3                      4                      5

## Appendix C.

Belenky, D.M. & Nokes-Malach, T.J. (2013). Mastery-approach goals and knowledge transfer: An investigation into the effects of task structure and framing instructions. *Learning and Individual Differences*, 25, 21-34. doi: 10.1016/j.lindif.2013.02.004. Copyrighted by Elsevier Inc, 2013.

Please answer the following questions based on the strategies used for the task.

1	2	3	4	5
Strongly Disagree		Unsure		Strongly Agree

1. I was concerned with the quality of the strategies I was using.

1	2	3	4	5
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2. I was concerned with how well I understood the strategy I was using.

1	2	3	4	5
---	---	---	---	---

3. I tried to understand why the strategy I was using worked.

1	2	3	4	5
---	---	---	---	---

4. I was concerned that the strategy I was using was not correct.

1	2	3	4	5
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## Appendix D.

Ryan, R.M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43(3), 450-461. doi: 10.1037/0022-3514.43.3.45.

For each of the following statements, please indicate how true it is for you, using the following scale.

1	2	3	4	5	6	7
Not at all true			Somewhat true			Very true

1. While I was working on the task I was thinking about how much I enjoyed it.
2. I did not feel at all nervous about doing the task.
3. I felt that it was my choice to do the task.
4. I think I am pretty good at this task.
5. I found the task very interesting.
6. I felt tense while doing the task.
7. I think I did pretty well at this activity, compared to other students.
8. Doing the task was fun.
9. I felt relaxed while doing the task.
10. I enjoyed doing the task.
11. I didn't really have a choice about doing the task.
12. I am satisfied with my performance at this task.
13. I was anxious while doing the task.
14. I thought the task was very boring.
15. I felt like I was doing what I wanted to do while I was working on the task.
16. I felt pretty skilled at this task.
17. I thought the task was very interesting.
18. I felt pressured while doing the task.
19. I felt like I had to do the task.
20. I would describe the task as very enjoyable.
21. I did the task because I had no choice.
22. After working at this task for a while, I felt pretty competent.