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**The Effects of Expectations on Performance:
Generalizing Galatea**

A Thesis Presented for
the Master of Science
Degree

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Brittany Day

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Dedication

To my Savior, Jesus Christ,
who always pleads on my behalf before the Creator.

To my Daddy,
who lives on forever.

Acknowledgements

I would like to express gratitude to Dr. Brian O'Leary for his guidance throughout this work. Also, I would like to thank Dr. Michael Biderman and Dr. Bart Weathington for serving on my thesis committee. Thanks also to Dr. Lecretia Buckley for her sincere support. Special thanks to my mother for her encouragement and prayers. Finally, I would like to express my appreciation for the rest of my family and community in Mississippi, during this special time in my life.

Abstract

The Galatea effect occurs when self-efficacy is intentionally raised yielding an increase in performance. The study focused on generalizing the Galatea effect to the historically under researched populations of Blacks in the workforce. To raise self-efficacy, the participants in the experimental condition were presented with a scenario designed to increase specific self-efficacy through verbal persuasion. This study used a diverse sample of male and female college students. The dependent variable was performance on Sudoku – a cognition puzzle. The Sudoku puzzle is a test of deductive reasoning which can be related to cognitive performance. Cognitive ability is often used in business settings. The Sudoku puzzle is a logical reasoning puzzle that can be investigated using mathematics. Participants were asked to complete a scale expected to measure specific self-efficacy (Mathematics Self-Efficacy Scale). The study's lack of significant findings suggests that the Galatea effect is more complex than has been perceived.

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Introduction

The Effects of Expectations on Performance:

Generalizing Galatea

A self-fulfilling prophecy (SFP) occurs when consistent self-beliefs are made reality (McNatt, 2000; Merton, 1948). Throughout history, people have presented stories, ideas, speculations, and theories related to SFPs. SFPs are also integral to research in a number of fields including education (e.g., Babad & Inbar, 1982; Rubovitis & Maher, 1973; Sutton & Woodman, 1989), the military (e.g., Davidson & Eden, 2000; Eden & Ravid, 1982; Eden, 1990; Eden & Shani, 1982), and the work place (Sutton & Woodman, 1989). Experimental research in organizations on SFPs suggests that increasing a leader's expectations increases a subordinate's performance (Eden, 1990).

Two of the most popular SFPs, the Pygmalion effect and the Galatea effect, have origins in Greek mythology (Goddard, 1985). SFPs cover both negative and positive cases. The Golem effect, for example, is a negative SFP which occurs when a leader's low expectations negatively affect a subordinate's performance. The Golem effect is rarely studied because of ethical concerns. Nevertheless, studies have tried to prevent the Golem effect from occurring by producing a de-Golemization effect, synonymous with the Pygmalion effect (Natanovich & Eden, 2008).

The Pygmalion effect is the most widely studied positive SFP (Sutton & Woodman, 1989).

The Pygmalion effect begins when one individual develops expectations about the behavior of another person. Those expectations are communicated, perhaps unconsciously, to the target individual, who receives and internalizes the expectations and ultimately modifies his or her behavior toward those expectations (Sutton & Woodman, 1989, p. 943).

The Galatea effect, another positive SFP, occurs when personal self-efficacy is raised yielding an increase in performance (Eden & Zuk, 1995).

The Pygmalion and Galatea effects often are created together, leaving the two effects difficult to differentiate. The Pygmalion effect raises a leader's expectations, thus raising the subordinate's performance; the Galatea effect, on the other hand, raises the subordinate's performance directly without the mediating leader. Because of the overlap

between the Pygmalion effect and the Galatea effect, some experimental studies have focused on both (Eden & Ravid, 1982).

Research on the Pygmalion Effect

The Pygmalion effect has been more firmly established in research than the Galatea effect. The Pygmalion effect is primarily studied in educational psychology and, to a lesser degree, in managerial fields, while research on the Galatea effect in either school or work settings is rare (Eden & Kinnar, 1991).

Rosenthal and Jacobson (as cited in Eden & Shani, 1982) first attempted to produce the Pygmalion effect in the classroom by raising instructors' expectations of their students' performance. Since that first study, a number of Pygmalion effect models have been established. Developed by Eden (2003), the Pygmalion-at-work model proposes two main mediators that link leader expectations to subordinate performance: leadership skills and self-efficacy. According to the model, high expectations produce an increase in a supervisor's leadership skills. This increase in leadership skills causes an increase in the subordinate's self-efficacy, improving the subordinate's performance (Natanovich & Eden, 2008). Although there are models to explain the Pygmalion effect, research is inconsistent in explaining the processes through which the Pygmalion effect occurs. Researchers disagree on how self-expectations are affected (Sutton & Woodman, 1989).

An array of research focuses on the Pygmalion effect (Eden & Zuk, 1995). Most of the research on the Pygmalion effect is conducted in an educational setting. Rubovits and Maher (1973) examined the Pygmalion effect using teachers and students as participants. Rubovits and Maher sought to replicate a previous study (Rubovits & Maehr, 1971) while focusing on racial biases in teachers. In the study, the teacher participants were expected to have expectations prior to the study based on their racial biases related to performance by Black and White children. This is a special case of the Pygmalion effect in that biases were not manipulated or measured. In this experiment, the leaders were not persuaded to have certain expectations about students as most leaders are in the Pygmalion effect experiments. In the study, teachers' racial biases were not measured directly. Instead, the researchers assumed that teacher expectations for

students' ability would be based upon societal racial stereotypes (i.e. lesser presumed achievement ability among Black students), thus eliminating the need to create racial expectations in the leaders. The results confirmed the Pygmalion effect hypothesis that expectations lead to different leadership styles. Black students were praised less, given less attention, and ignored more than the White students. However, Rubovits and Maher failed to examine the actual performance of the student. According to the Pygmalion effect, a difference in expectations leads to a difference in leadership style/treatment which produces a difference in performance. In support of the theory, the Black students were expected to perform at a lower level than their White counterparts due to a negative leadership style. Thus, Rubovitis and Maher's study hints at one cause for the large achievement gap between Black and White students: a difference in leadership style/treatment.

Substantial research on the Pygmalion effect has also been conducted in the military, usually focusing on training. Eden and Shani (1982) used 105 trainees involved in a 15 week combat command course as participants. Their study tested the classic Pygmalion hypothesis that instructor expectancy influences trainee performance scores. The participants were matched on aptitude and randomly assigned to high, regular, and unspecified instructor expectancy conditions. The training instructors were told the predicted command potential of each trainee soldier. Measures included learning performance, attitudinal effects, and instructor performance. The performance scores of those trainees randomly assigned to the high expectancy condition were significantly higher than the other trainees. Their results supported the Pygmalion hypothesis. Unlike their counterparts in the low expectations condition, trainees in the high expectations condition scored higher on objective achievement tests, showed more positive attitudes, and had a favorable perception of the instructor's leadership style. Eden and Shani's results suggest that the expectations of leaders are positively correlated with subordinate performance.

Despite much evidence that confirms the Pygmalion effect, there is still a need for research on the Pygmalion effect in the workplace (McNatt, 2000). Sutton and Woodman (1989) failed to produce the Pygmalion effect in the workplace. However,

training provides an obvious application of Pygmalion. Increasing a training instructor's expectations could increase trainee performance – a less expensive method for improving training effectiveness in the workplace (Eden & Shani, 1982).

The Galatea Effect

Although the Galatea effect appears to involve a less complicated process than the Pygmalion effect, it has been studied significantly less than the Pygmalion effect (Eden & Kinnar, 1991). The Galatea effect involves raising an individual's self-efficacy which results in an increase in performance. The Galatea effect only occurs if there is an actual increase in self-efficacy, as well as an increase in performance. The Galatea effect also reaches the performer directly, while the Pygmalion effect reaches the performer indirectly through the teacher or supervisor (Eden & Kinnar).

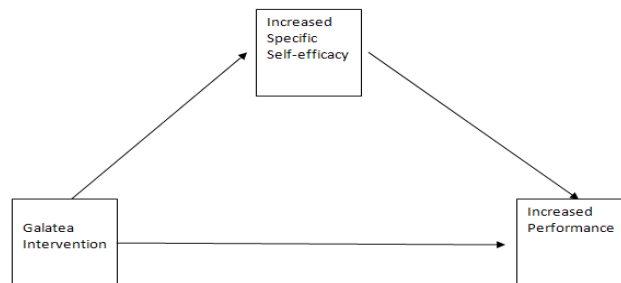


Figure 1. The Galatea effect.

Only a few studies have focused on the Galatea effect. Eden and Zuk (1995) attempted to produce the Galatea effect in an experiment seeking to increase self-efficacy for avoiding sea-sickness to improve cadet performance at sea. Effective performance involved carrying out duties, maintaining social contacts, and showing interest in the ship's technical systems. Twenty-five male cadets who had never been to sea participated in the study. The participants were randomly assigned to the experimental or control conditions. In the experimental condition, Eden and Zuk used verbal persuasion in short personal interviews to boost the self-efficacy of the cadets. After the cadets completed a questionnaire concerning coping with sea-sickness, the training course psychologist said to each of the cadets in the experimental group, "Based on your questionnaire responses, as well as other information, you have the qualifications to

overcome seasickness very well, and to outperform others at sea” (p. 630). The results showed evidence of reduced seasickness and increased performance at sea for those participants assigned to the experimental condition, thus supporting the Galatea Effect.

Eden and Kinnar (1991) also focused on the Galatea effect by boosting self-efficacy to increase volunteering in special-forces services in the Israeli Defense Force. Five hundred and fifty-six qualified candidate participants were randomly assigned to the routine information program or to the experimental condition. In the experimental condition, self-efficacy was increased through verbal persuasion by having an officer make the following statement to the cadets:

In the regional conscription offices you underwent a series of tests and examinations. You have been summoned here because you achieved greater success in those tests than most others. Each of you has what it takes to do well in our volunteer program. Previous research has shown the relationship between the scores on these tests and examinations and likelihood of success in the especially difficult volunteer units (p. 775).

Their results indicated that participants in the experimental condition had higher specific self-efficacy and were more willing to volunteer than those in the control group. The results support the Galatea effect hypothesis.

Eden and Ravid (1982) conducted a study that examined both the Galatea and Pygmalion effects. Sixty male trainees in the military were divided into five groups, each instructed by one instructor. Both the trainees and the instructors were the subjects of analysis. The experimenter used verbal persuasion as a tool for increasing self-efficacy within the trainees. The military psychologist addressed each experimental subject in a 5-min personal interview. The psychologist ended the address by saying, “To conclude, I wanted to tell you that, in light of prior information we’ve gathered about trainees with the aid of the military psychology unit, you have high potential for success” (p. 355). The trainees in the control group were told, “you have regular potential for success” (p.355). The results of the experiment confirmed both the Galatea and the Pygmalion effects. The learning performance of the high-expectancy group was significantly higher than the learning performance of the regular-expectancy group.

McNatt and Judge (2004) conducted a longitudinal field experiment, focusing on the Galatea effect in the workplace while also addressing boundary conditions.

According to McNatt and Judge, despite the evidence of SFPs, there has been a lack of actual application in the workplace. This hesitation to make use of the SFPs is due to several boundary conditions and limitations of previous SFPs research. McNatt and Judge address boundary conditions such as the long term effects of SFPs and the experience level of the employees.

The participants included 72 auditors of a large accounting firm. The measures included a task-specific self-efficacy measure of the dimensions of a staff-level financial auditor's position, Sherer et al.'s (1982) General Self-efficacy scale, a motivation scale derived from Davidson's and Eden's (2000) 16 – item scale, tenure to determine level of experience, and performance appraisals and weekly supervisor surveys of subordinates to determine task performance. McNatt and Judge used scripted verbal persuasion along with modeling as interventions to boost self-efficacy. Unlike previous research the verbal persuasion was based upon accurate information found in past appraisal performance of the employees, rather than fictitious information. Several hypotheses were tested in the study. (H1) Boosting specific self-efficacy improves performance. (H2) Boosting specific self-efficacy improves motivation. (H3) Motivation mediates the effect of specific self-efficacy on performance. (H4) Generalized Self-efficacy moderates the effectiveness of specific self-efficacy treatments in that they are more effective among people low in generalized self-efficacy. (H5) Tenure in an organization moderates the effectiveness of specific self-efficacy treatments in that they are more effective among people with less tenure. The results supported the existence of the Galatea effect (H1), as well as boost in motivation (H2). None of the other hypotheses were fully supported (McNatt & Judge, 2004).

As mentioned previously, the Galatea effect has received less attention than the Pygmalion effect in research. Even more research is needed on the Galatea effect because directly increasing a trainee's expectations via verbal persuasion may also be a less expensive way to improving training effectiveness and performance in the

workplace. This leads to hypothesis 1.

Hypothesis 1. Verbal Persuasion will increase performance.

The Role of Self-efficacy

Self-efficacy plays an important role in SFPs (Eden & Kinnar, 1991). The earliest research concerning self-efficacy involved raising self-efficacy to produce better performance (Eden & Ravid, 1982). According to Bandura (as cited in Eden & Aviram, 1993), “A key to the willingness to commit oneself to a highly demanding undertaking is one’s belief in one’s capacity to mobilize the physical, intellectual, and emotional resources needed to succeed, that is self-efficacy” (p. 352).

The present study is concerned with specific self-efficacy (SSE). SSE is one’s belief in his/her capability to perform a specific task (Eden & Aviram, 1993). According to Bandura (1986), individuals use four sources for ideas about SSE: (1) enactive attainment (previous successful performance), (2) vicarious experience (a similar person’s successful performance), (3) verbal persuasion, and (4) physiological state. According to Bandura (1997) the two most easily manipulated sources of SSE in interventions are verbal persuasion and vicarious experience. Although it is not the strongest method for increasing SSE (Bandura, 1986), many researchers have used verbal persuasion as a source, sometimes along with other sources, simply because it was the most feasible method for their study (Dvir, Eden, & Banjo, 1995; Eden & Kinnar, 1991; Eden & Ravid, 1982; Eden & Zuk, 1985). The present study used verbal persuasion as the only source for increasing SSE.

SSE is a mediator in the Galatea effect (Eden & Aviram, 1993). SSE also works as a mediator of the Pygmalion effect. In their unsuccessful attempt to produce the Pygmalion effect, Sutton and Woodman (1989) suggested that the result was due to the failure to raise SSE. This leads to the final hypotheses.

Hypothesis 2. Verbal Persuasion will increase specific self-efficacy.

Hypothesis 3. Specific self-efficacy will mediate the positive relationship between verbal persuasion and performance.

General self-efficacy (GSE) is an individual’s beliefs about his/her ability to accomplish tasks or reach goals. According to Eden and Kinnar (1991) “GSE is

cognition about general self-competence, *while* SSE is cognition about specific performance” (pp. 771-772). Being that GSE and SSE are similar constructs, GSE may be a controlling variable in creating the Galatea effect. Therefore, in the present study, GSE was tested for controlling effects.

Generalizing SFP Research

Research is focusing on generalizing SFPs to different populations and different settings. There has been a plea for more research on SFPs in the workplace (Sutton & Woodman, 1989). Additionally, SFPs have yet to be studied heavily from various racial group viewpoints. Because racial diversity is typically prevalent in any setting, it may be helpful to examine potential differences related to the Galatea effect in different populations.

Racial Comparisons

Previous SFP research related to race focused on the Pygmalion effect on child participants in a school setting (Rubovitis & Maehr, 1973) However, the researchers measured teacher leadership style instead of the performance of the child participants as the dependent variable. The present study focused on creating the Galatea effect among Black participants. The world is racially diverse and generalizing the Galatea effect to adults of different races may be of importance to the workplace.

Workforce

There has been limited SFP research in the workplace. One such study performed in a retail workplace setting was unsuccessful in creating the Pygmalion effect (Sutton & Woodman, 1995). Sutton and Woodman examined 259 retail sales employees working under 20 recently hired sales managers. Each of the managers was given a list containing the names of randomly selected “exceptional sales potential” salespersons with whom they had not previously worked. These exceptional employees accounted for 30% of the total participant sales employees. To help them remember these “exceptional potential” salespersons, managers were asked to complete monthly performance appraisals on those employees. Performance was measured by individual sales. The results showed no significant difference in the performance of the “exceptional sales potential” participants

and the control group participants. Sutton and Woodman speculated that self-efficacy may have not been raised by their manipulation.

The present study attempted to produce the Galatea effect in training settings for the workplace, such as junior colleges. These settings are often used by businesses as places for recruitment and selection. Many junior college students are in track programs which lead directly into the workforce. Also, many active employees attend college courses to receive training in areas that may improve their current work performance. In the present study, an attempt was made to extend the findings on the Galatea effect to the workplace, by creating the Galatea effect in a simulated workplace training setting.

Methods

Participants

The study used an original convenience sample of 96 student participants. Because the experiment was carried out over a three-day period, some of the original participants did not complete all of the measures due to absenteeism. The final analyzed sample size was 78, with 52 participants in the control group and 26 in the experimental group. The participants were 78 junior college students enrolled at a historically black community college in the Southeast of the United States. All participants were Black. Of the participants 50% were male and 50% were female. The mean sample age was 21.9 with a standard deviation of 6.498. The participants studied various majors including Criminal Justice, Psychology, Computer Service Technology, Health, Social Work, Nursing, Business Administration, Physical Education, Culinary Art, and Math Education.

Design

The study involved assigning participants to a control or an experimental group. Participants in the experimental group were provided verbal persuasion to boost specific self-efficacy, to create the Galatea effect. No verbal persuasion was provided to the control group.

Mediator

Specific self-efficacy was measured after the verbal persuasion was presented in the experimental condition and before the participants completed the Sudoku puzzle. Specific self-efficacy was measured in the control group before participants began the Sudoku puzzle.

Measures

Specific self-efficacy was measured using the Mathematics Specific Self-efficacy Scale (Appendix C), created by Betz and Hackett (2001). The efficacy scale seeks to measure one's beliefs concerning his/her ability to perform math-related tasks and behaviors. Participants rated their degree of confidence in their ability to perform the math task in each item on a scale ranging from "Not at all Difficult"(0) to "Extremely Difficult" (9). An example of a scale item is "How much confidence do you have that you could successfully add two large numbers (e.g., $5379 + 62543$) in your head".

GSE was measured using the General Self-Efficacy Scale (Appendix B), developed and validated by personality researchers (Sherer & Adams, 1983; Sherer et al., 1982; Tipton & Worthington, 1984). The General Self-Efficacy Scale uses a 5 point Likert scale ranging from strongly agree to strongly disagree. Sherer et al. calculated a Cronbach's coefficient alpha of .86. An example of a scale item is "When I make plans, I am certain I can make them work" (Eden & Kinnar, 1991, p.773).

Performance was measured by success on the cognition puzzle – Sudoku (Appendix D). The objective of the game is to fill a 9x9 grid, so that each column, row, and 3x3 bold boxed in grid contains the numbers 1 to 9 only once. Each participant earned 1 point per correct column, row, and 3x3 bolded box; therefore, a total of 27 points could be earned. Participants in the control group and the experimental group were asked to perform a Sudoku puzzle. Participants had about 20 minutes to complete the puzzle. The Sudoku puzzle performance measure was used to examine whether boosting one's belief concerning his/her ability to accomplish a task, via verbal persuasion, yields an increase in performance. The Sudoku puzzle is a test of deductive reasoning which can be related to cognitive performance. Cognitive ability is often used

in business settings. The Sudoku puzzle is a logical reasoning puzzle that has been solved using mathematics (Hayes, 2006).

Procedure

The experiment was carried out at a historically black community college in the southeastern region of the United States of America. First, the participants were informed about the general purpose of the research, and asked to fill out an informed consent form (Appendix A). Participants were informed that they could cease participation in the research at any time.

Participants were assigned to either the experimental condition or the control condition. In the experimental condition the participants completed a simple math test (Appendix E), to add face validity to the verbal persuasion to follow. Two days later participants in the experimental group were told by the experimenter

Today, I would like for you all to complete this Sudoku puzzle. Sudoku is a puzzle that can be solved using Mathematics and/or Logic. The goal of Sudoku is to complete the grid by filling in a digit in every box in such a way that each row, column, and each 3x3 box contains each of the digits 1-9 exactly. I have given you an example of a completed Sudoku puzzle. Based on the results of the Math questions that you completed, you have *very high* potential to complete this Sudoku puzzle. Before starting the Sudoku puzzle please fill out this survey.

The verbal persuasion lies in the sentence, “Based on the results of the Math questions that you completed, you have very high potential to complete this Sudoku puzzle.” The experimental group participants then completed the survey, which included the specific self-efficacy scale, then they completed the Sudoku puzzle.

Participants in the control condition completed a survey that included the specific self-efficacy scale followed by the Sudoku puzzle. Those in the control condition did not receive verbal persuasion. Participants in the control group were told by the experimenter

Today, I would like for you all to complete this Sudoku puzzle. Sudoku is a puzzle that can be solved using Mathematics and/or Logic. The goal of Sudoku is to complete the grid by filling in a digit in every box in such a way that each row, column, and each 3x3 box contains each of the digits 1-9 exactly. I have given you an example of a completed Sudoku puzzle. Before starting the Sudoku puzzle please fill out this survey.

Unlike in the experimental condition, the experimenter did not say “Based on the results of the Math questions that you completed, you have very high potential to complete this Sudoku puzzle.”

Analysis

Collectively, the three hypotheses suggest that the relationship between the independent variable (verbal persuasion) and the dependent variable (performance) is explained by the presence of the third variable (Specific Self-efficacy). This theory is defined as mediation. To test for mediation, Preacher and Hayes (2004) method was used. The dominant approach for testing mediation has been Barron and Kenny’s (1986) method. Barron and Kenny’s method is described as a causal steps approach to mediation testing. Despite its popularity, Barron and Kenny’s method contains statistical limitations. These limitations include an inability to compare effects of multiple mediators, inconsistency in testing indirect effects, and necessary large sample sizes to maintain appropriate statistical power (Preacher & Hayes, 2008).

Preacher and Hayes (2004) address some of the issues that accompany the Barron and Kenny’s (1986) method of testing mediation. This method directly tests the significance of indirect effects in mediation hypotheses testing. The testing is done through SPSS/PASW macros that also create estimations of the indirect effect. This method uses a normal theory approach, a bootstrap approach to get confidence intervals, and a traditional approach by referring to Barron and Kenney’s (1986) method.

Results

A reliability analysis was conducted on the General Self-efficacy scale. The value for the Cronbach’s coefficient alpha was .783. A reliability analysis was also conducted on the Mathematics Self-efficacy scale. The value for the Cronbach’s coefficient alpha was .935. For both of the scales, the reliability analyses indicate satisfactory reliability according to Cohen (1988). Table 1 provides descriptive statistics and correlations among the primary study variables.

Table 1

Descriptive Statistics, and Correlations					
Variables	Mean	s.d.	1	2	3
1. Sudoku experience					
2. Sudoku puzzle score	3.76	7.375	0.477**		
3. General self-efficacy	48.4872	51.24023	-0.004	0.171	
4. Specific self-efficacy	199.237	6.75498	0.271*	0.220	0.407**

n = 78

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 2 presents the results of the Preacher and Hayes (2004, 2008) mediation analysis. The total effect of the independent variable (condition) on the dependent variable (Sudoku performance) was not significant ($t = .6989, n. s.$). Hypothesis 1, verbal persuasion increases performance, was not supported.

The effect of the independent variable (experimental condition) on the mediator (specific self-efficacy) was not significant ($t = 1.3968, n. s.$). Hypothesis 2, verbal persuasion increases specific self-efficacy, was also not supported.

The effect of the mediator on the dependent variable (performance) was not significant ($t = .1197, n. s.$). Therefore, hypothesis 3 was not supported. Specific self-efficacy did not mediate the direct relationship between verbal persuasion and performance.

Also, there was not a significant direct relationship between verbal persuasion and performance while controlling for general self-efficacy ($t = 1.5110, n. s.$). However, the results of the mediation analysis show that Sudoku experience, which was entered as a control variable, was significantly related to Sudoku performance score ($t = 4.4430, p < .01$). This positive relationship is also reflected in the correlations matrix ($r = .477, p < .01$).

Table 2

Mediation Analysis of Full Sample				
<i>n</i> = 78				
Effect	<i>Coeff</i>	<i>se</i>	<i>t</i>	<i>p</i>
IV on Mediator	15.1562	10.8503	1.3968	0.1666
Mediator on DV	0.0020	0.0168	0.1197	0.9050
IV on DV	1.0891	1.5581	0.6989	0.4868
Sudoku Exp. On DV	7.0094	1.5776	4.4430	0.0000
GSE on DV	0.1836	0.1215	1.5110	0.1351

These results suggest the need to split the sample based on Sudoku experience and perform the Preacher and Hayes (2004, 2008) mediation analysis again on the separate samples. Tables 3 and 4 present the results which indicate that there are no significant relationships between verbal persuasion (IV), SSE (Mediator), and performance (DV) for participants with Sudoku experience. However, as can be seen in Table 4, there was a significant relationship between the independent variable (experimental condition) and the dependent variable (Sudoku performance) ($t = 2.3778$, $p < .05$) for participants without Sudoku experience. However, there was not a significant relationship between the independent variable and the mediator (SSE) ($t = .2797$, *n. s.*), nor was there a significant relationship between the mediator and the dependent variable ($t = .3773$, *n. s.*).

Table 3

Mediation Analysis of Participants with Sudoku Experience				
<i>n</i> = 31				
Effect	<i>Coeff</i>	<i>se</i>	<i>t</i>	<i>p</i>
IV on Mediator	30.9018	16.4328	1.8805	0.0705
Mediator on DV	-0.0009	0.0436	-0.0198	0.9843
IV on DV	1.5939	3.7219	0.4282	0.6717
GSE on DV	0.3997	0.2868	1.3936	0.1748

Table 4

Mediation Analysis of Participants with NO Sudoku Experience				
<i>n</i> = 47				
Effect	<i>Coeff</i>	<i>se</i>	<i>t</i>	<i>P</i>
IV on Mediator	4.1501	14.8399	0.2797	0.781
Mediator on DV	0.0026	0.0068	0.3773	0.7078
IV on DV	1.5841	0.6662	2.3778	0.0218
GSE on DV	-0.0271	0.0547	-0.4951	0.6231

Discussion

There has been little previous research on the Galatea effect (e.g. Eden & Zuk, 1995; Eden & Kinnar, 1991; Eden & Ravid, 1982; McNatt & Judge, 1982). The failure to create the Galatea effect in the present study could have been due to a variety of factors.

While none of the hypotheses were supported, Sudoku experience was found to be significantly and positively related to Sudoku performance in a post hoc analysis. After splitting the sample on experience, we found that verbal persuasion did affect Sudoku performance for those participants who had no Sudoku experience. This result supports an important relationship in creating the Galatea effect. What remains to be determined is the mechanism through which the manipulation improved performance.

There has been little previous research on the variable, experience, as it relates to the Galatea effect. One field study, by McNatt and Judge (2004), did examine experience in creating the Galatea effect by considering the variable *tenure with firm*. Tenure with firm was calculated by the starting dates of the participating auditors at the Big Four accounting firm. McNatt and Judge examined tenure with firm because previous research on the effects of expectations (Eden & Zuk, 1995) suggested that the effect only occurs in situations where the task is novel; experienced participants already have pass information to base their specific self-efficacy on, causing their specific self-efficacy to be more firm and less likely to increase. The Galatea effect was created in the study; however, tenure had no significant effect on performance.

Unlike the McNatt and Judge (2004) study, experience did affect performance in the present study. Experience may have been a significant variable in the present research because the performance measure, the Sudoku puzzle, was novel to some of the participants. However, participants in McNatt and Judge may have had experience attempting the job tasks evaluated in the performance evaluations. Thus, the auditors' performance was measured on tasks that may not have been novel. Experience was merely measured by calculating the tenure with the firm and not the actual attempt of the specific tasks measured.

The results of the present study in a controlled environment suggest that it may be possible to create the Galatea effect. Participants' performance was affected by verbal persuasion in situations where they had no experience with the puzzle. However, verbal persuasion did not affect SSE in the study. According to McNatt and Judge (2004), SSE is not the only important factor in creating the Galatea effect. Although, the classic Galatea hypothesis proposes using a Galatea intervention (such as verbal persuasion) to increase SSE, to increase performance, McNatt and Judge also examined the effect of motivation which they found to have a significant affect on performance. Motivation is defined as "the amount of effort and persistence individuals are willing to expend" (McNatt & Judge, p. 352). Boosting specific self-efficacy improved motivation. In the present study, the verbal persuasion may have motivated the participants to complete the Sudoku puzzle. The SFPs assume that increasing one's expectations affects the amount of effort that they put toward completing the task. Examining motivation in the future may shed light on the SSE variable in the context of the Galatea effect.

Although, we found no support for our hypothesized impact of verbal persuasion on SSE, or SSE on performance, the effect of verbal persuasion on performance among participants with no Sudoku experience is still an important finding. Verbally stating that a person has very high potential to perform well affected his/her performance, although we failed to identify the specific mechanism through which performance was improved. The ultimate goal of the Galatea effect, increasing performance, was achieved. Therefore, simply saying that one has very high potential to perform well may improve training effectiveness and performance in the workplace.

Managers could verbally communicate to subordinates their high potential to boost their performance. For ethical reasons, however, verbal persuasion should be based on true information. This information can be obtained from resumes, performance appraisals, and observable personality characteristics (McNatt & Judge, 2004). For example, instead of saying, “based upon the math questions that you completed, you have very high potential to perform well on the Sudoku puzzle,” a manager could say, “based upon the talent management project that you completed, you have very high potential to perform well on the succession planning efforts for the firm”.

Limitations

First, the use of the Mathematics Self-efficacy by Betz and Hackett (2001) may have been an inappropriate measure for SSE, which may explain the increase in performance without the increase in SSE among those participants who had no experience. Although the Sudoku puzzle involves the use of some mathematics, it is not necessarily needed to complete the puzzle. The SSE measure may need to be more related to performance of a Sudoku puzzle.

Second, the sample size of only 78 participants may have hindered a successful Galatea effect. The small sample size also limited the power of the study. Sample size is one of the most important factors affecting power. Larger sample sizes are much more likely to discover effects in the population than smaller sample sizes (Minium, Clarke, & Coladarci, 1999). It is possible that the sample size in this study was much too small to uncover the hypothesized effects.

Third, the reliability of the dependent variable, Sudoku performance puzzle, was not calculated. The reliability could be assessed by providing two puzzles to the participants and comparing the results.

Fourth, the strength of the manipulation may have been too weak to affect the mediator, and dependent variable. Simply saying that one has high potential to perform well based upon a previous test may not have been enough verbal persuasion. The verbal persuasion lacked an abundance of evidence of the participants having high potential. It is possible that this lack of evidence in the verbal persuasion failed to influence SSE.

Finally, the use of a convenience sample in the study is subject to yielding results that may not be representative or generalizable to other samples.

Future Research

The results and limitations of the present study suggest that future research should pay close attention to the match between the SSE measure and the performance measure. The SSE measure should closely measure one's belief in his/her ability to accomplish the task required for the actual performance measure. Researchers should also consider the experience level of the participants in regards to the task at hand. Because the verbal persuasion manipulation proved to be too weak for those who were familiar with the Sudoku puzzle, this implies that under circumstances where there is familiarity about the task, the Galatea effect may not be applicable.

Thus, although the hypotheses were not supported the results still provide insight into improving performance in the workplace. It is interesting that a fairly weak manipulation resulted in improved performance. What remains to be identified is the specific mechanism that caused the improvement.

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Appendices

Appendix A

THE EFFECTS OF EXPECTATIONS ON PERFORMANCE: GENERALIZING GALATEA

THE UNIVERSITY OF TENNESSEE AT CHATTANOOGA

INFORMED CONSENT FORM

Please read this consent document carefully before you decide to participate in this study. This research has been approved by the University Institutional Review Board.

Purpose of the research study:

The purpose of this study is to examine the effects of expectations on performance.

What you will be asked to do in the study:

You will be asked to complete two questionnaires. Following the questionnaires you will be asked to complete a Sudoku puzzle.

Time required:

about 20 min.

Risks and Benefits:

There are no risks involved. Benefits include contributing to the relevant research.

Confidentiality:

Your identity will be kept confidential to the extent provided by law. This informed consent form will be kept separate from questionnaires. Research records will be anonymous. Your name will not be used in any report.

Voluntary participation:

Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study:

You have the right to withdraw from the study at anytime without consequence.

Whom to contact if you have questions about the study:

Brittany Day
(601)-966-0628
day.brittany@rocketmail.com

Dr. Brian O'Leary
(423)-425-4285
brian-o'leary@utc.edu

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description. I further certify that I am at least 18 years of age.

Participant: _____

Date: _____

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact Dr. M. D. Roblyer, Chair of the Human Subjects Committee,

Institutional Review Board at 423-425-5567. Additional contact information is available at www.utc.edu/irb

Appendix B

DIRECTIONS: Rate how well you agree with the following statements. (Check the circle above the appropriate box)

1. If something looks too complicated, I will not even bother to try it.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

2. I avoid trying to learn new things, when they look too difficult.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

3. When trying something new, I soon give up if I am not initially successful.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

4. When I make plans, I am certain I can make them work.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

5. If I can't do a job the first time, I keep trying until I can.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

6. When I have something unpleasant to do, I stick to it until I finish it.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	2	3	4	5
Strongly Disagree			Strongly Agree	

7. When I decide to do something, I go right to work on it.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

8. Failure just makes me try harder.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

9. When I set important goals for myself, I rarely achieve them.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

10. I do not seem to be capable of dealing with most problems that come up in my life.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

11. When unexpected problems occur, I don't handle them very well.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

12. I feel insecure about my ability to do things.

0	0	0	0	0
1	2	3	4	5
Strongly				Strongly
Disagree				Agree

Appendix C

Part I: Everyday Math Tasks

<u>No Confidence at all</u>		<u>Very little Confidence</u>		<u>Some Confidence</u>		<u>Much Confidence</u>		<u>Complete Confidence</u>		
<u>0</u>		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>

How much confidence do you have that you could successfully:

1. Add two large numbers (e.g., 5379 + 62543) in your head..... **0 1 2 3 4 5 6 7 8 9**
2. Determine the amount of sales tax on a clothing purchase..... **0 1 2 3 4 5 6 7 8 9**
3. Figure out how much material to buy in order to make curtains. **0 1 2 3 4 5 6 7 8 9**
4. Determine how much interest you will end up paying on a \$675 loan over 2 years at 14 3/4% interest..... **0 1 2 3 4 5 6 7 8 9**
5. Multiply and divide using a calculator..... **0 1 2 3 4 5 6 7 8 9**
6. Compute your car's gas mileage..... **0 1 2 3 4 5 6 7 8 9**
7. Calculate recipe quantities for a dinner for 3 when the original recipe is for 12 people. **0 1 2 3 4 5 6 7 8 9**
8. Balance your checkbook without a mistake. **0 1 2 3 4 5 6 7 8 9**
9. Understand how much interest you will earn on your savings account in 6 months, and how that interest is computed. **0 1 2 3 4 5 6 7 8 9**
10. Figure out how long it will take to travel from Columbus to Chicago driving at 55 mph..... **0 1 2 3 4 5 6 7 8 9**
11. Set up a monthly budget for yourself taking into account how much money you earn, bills to pay, personal expenses, etc..... **0 1 2 3 4 5 6 7 8 9**

Part I (Continued)

How much confidence do you have that you could successfully:

<u>No Confidence</u> <u>at all</u>			<u>Very little</u> <u>Confidence</u>			<u>Some</u> <u>Confidence</u>			<u>Much</u> <u>Confidence</u>			<u>Complete</u> <u>Confidence</u>
0	1	2	3	4	5	6	7	8	9			

12. Compute your income taxes for the year. 0 1 2 3 4 5 6 7 8 9

13. Understand a graph accompanying an article on business profits. 0 1 2 3 4 5 6 7 8 9

14. Figure out how much you would save if there is a 15% mark-down on an item you wish to buy. 0 1 2 3 4 5 6 7 8 9

15. Estimate your grocery bill in your head as you pick up items. 0 1 2 3 4 5 6 7 8 9

16. Figure out which of 2 summer jobs is the better offer: one with a higher salary but no benefits; the other with a lower salary but with room, board, and travel expenses included. 0 1 2 3 4 5 6 7 8 9

17. Figure out the tip on your part of a dinner bill total split 8 ways. 0 1 2 3 4 5 6 7 8 9

18. Figure out how much lumber you need to buy in order to build a set of bookshelves. 0 1 2 3 4 5 6 7 8 9

Part II: Math Courses

Please rate the following college courses according to how much confidence you have that you could complete the course with a final grade of "A" or "B". Circle your answer according to the 10-point scale below:

<u>No Confidence</u> <u>at all</u>			<u>Very little</u> <u>Confidence</u>			<u>Some</u> <u>Confidence</u>			<u>Much</u> <u>Confidence</u>			<u>Complete</u> <u>Confidence</u>
0	1	2	3	4	5	6	7	8	9			

19. Basic College Math 0 1 2 3 4 5 6 7 8 9

20. Economics..... 0 1 2 3 4 5 6 7 8 9

21. Statistics 0 1 2 3 4 5 6 7 8 9

Part II (Continued)

Please rate the following college courses according to how much confidence you have that you could complete the course with a final grade of "A" or "B". Circle your answer according to the 10-point scale below:

<u>No Confidence</u> <u>at all</u>			<u>Very little</u> <u>Confidence</u>			<u>Some</u> <u>Confidence</u>			<u>Much</u> <u>Confidence</u>			<u>Complete</u> <u>Confidence</u>
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>			
22. Physiology	0	1	2	3	4	5	6	7	8	9		
23. Calculus.....	0	1	2	3	4	5	6	7	8	9		
24. Business Administration.....	0	1	2	3	4	5	6	7	8	9		
25. Algebra II	0	1	2	3	4	5	6	7	8	9		
26. Philosophy.....	0	1	2	3	4	5	6	7	8	9		
27. Geometry.....	0	1	2	3	4	5	6	7	8	9		
28. Computer Science.....	0	1	2	3	4	5	6	7	8	9		
29. Accounting.....	0	1	2	3	4	5	6	7	8	9		
30. Zoology.....	0	1	2	3	4	5	6	7	8	9		
31. Algebra I	0	1	2	3	4	5	6	7	8	9		
32. Trigonometry	0	1	2	3	4	5	6	7	8	9		
33. Advanced Calculus	0	1	2	3	4	5	6	7	8	9		
34. Biochemistry.....	0	1	2	3	4	5	6	7	8	9		

Appendix D

DIRECTIONS: Fill the 9x9 grid, so that each column, row, and 3x3 bold boxed in grid contains the numbers 1 to 9 only once.

An example of a completed grid (the solutions are in red):

5	3	4	6	7	8	9	1	2
6	7	2	1	9	5	3	4	8
1	9	8	3	4	2	5	6	7
8	5	9	7	6	1	4	2	3
4	2	6	8	5	3	7	9	1
7	1	3	9	2	4	8	5	6
9	6	1	5	3	7	2	8	4
2	8	7	4	1	9	6	3	5
3	4	5	2	8	6	1	7	9

6			1		8	2		3
	2			4			9	
8		3			5	4		
5		4	6		7			9
	3						5	
7			8		3	1		2
		1	7			9		6
	8			3			2	
3		2	9		4			5

Appendix E

Fill in each blank appropriately.

3, 6, 9, 12, ___

15, 30, 45, ___

2, ___, 6, 8, 10

1, 5, ___, 15

$83 + 96 = \underline{\hspace{2cm}}$

$45 + 235 = \underline{\hspace{2cm}}$

$16 + 74 = \underline{\hspace{2cm}}$

$(12 * 3)/6 = \underline{\hspace{2cm}}$

$25(2)/10 = \underline{\hspace{2cm}}$

$10 * 5 + 100 = \underline{\hspace{2cm}}$

Vita

Brittany Day is a native of Canton, MS. She is the daughter of Dr. Larry L. and Diane S. Day. She has an older brother, Larry L. Day II. She attended Holy Child Jesus School, and continued on to Saint Andrew's Episcopal School. She graduated from Ridgeland High School in Ridgeland, MS. After graduation, she attended Tuskegee University where she earned a Bachelor of Science degree in Psychology. She now continues her education at The University of Tennessee at Chattanooga, where she plans to earn a Master's of Science degree in Industrial Organizational Psychology.