5-7-2008

The influence of perceived task difficulty on task performance

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THE INFLUENCE OF PERCEIVED TASK DIFFICULTY ON TASK PERFORMANCE

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A Thesis

Submitted in partial fulfillment of the requirements of the
Masters of School Psychology Degree
of
The Graduate School
at
Rowan University
05/07/08

Approved by

Advisor

Date Approved May 7, 2008

ABSTRACT

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2007/08
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Master of Arts in School Psychology

The purpose of this study was to investigate the influence that the perceived difficulty of a task has on task performance. Twenty-one undergraduate college students were asked to complete three anagram worksheets. Each worksheet had a different description of difficulty (easy, medium, hard), although all worksheets were of the same difficulty. Participants self-reported amounts of anxiety, effort, perceived competence, and task difficulty after each worksheet. A repeated measures ANOVA showed a significant linear effect for perceived difficulty on task performance ($F(1) = 10.42$, $p<0.05$) , and paired-samples t-tests showed that participants had significantly more successful responses on the easy ($M = 4.67$, $SD = 1.11$) and medium ($M = 4.48$, $SD = 1.37$) worksheets than on the hard worksheet ($M = 3.43$, $SD = 1.99$), and self reported ratings of perceived competence were higher for the easy difficulty ($M = 4.67$, $SD = 1.65$) than hard ($M = 3.57$, $SD = 2.16$) difficulty. These findings and directions for future research are discussed.

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CHAPTER 1: THE PROBLEM

Need

The task difficulty of assignments in a classroom has far ranging effects. It influences the level of student motivation, by influencing whether or not there is an expectancy of success and also the level of effort put forth (Hom & Maxwell 1983). Also, it can influence self-efficacy – predictions of success or failure are determined in part by the level of difficulty of a task (Li, Lee, & Solmon 2007). Task difficulty also influences the level and amount of information learned, as a higher difficulty level usually corresponds with the use of more highly developed skills and a better understanding of the material. These influences affect all learners, with particular importance for those with learning disabilities or other educational struggles – often times the most important choices educators make for these students is deciding a level at which they should be taught (Margolis & McCabe 2004). Furthermore, many of these devices generalize to situations outside the classroom. For example, an individual that has been confronted with tasks of an appropriate difficulty level for their abilities (and has therefore developed a realistic sense of one's ability) will be more willing and able to take on challenges in social and athletic situations during the developmental/school years, and after school in the form of work situations. Since the main concern of all involved in the educational process is to improve the educational experience and provide students with the basic skills for succeeding in life, it is necessary to study the development and

use of learning and assessment tasks, and especially an important variable such as task difficulty.

Theory/Background

When an educator is developing a task for a student to complete, the difficulty level is generally manipulated in such a way that the task can be completed successfully by a large number of students while at the same time demanding that students use new skills or refine previous skills. The difficulty of a task is determined both by learner factors -characteristics of learners that influence their ability to complete tasks - and task factors - task types or features of tasks that influence their difficulty. (Honeyfield 1993). Factors that are involved with the relationship between a learner and a task's difficulty include confidence, motivation, pacing of learning, relevant world/cultural knowledge, interest, and acting as a participant vs. acting as an observer (Brindley 1987). Robinson (2001) showed that increases in task difficulty (through adjustments in task complexity) corresponded to lower levels of performance and higher levels of stress, but not significant changes in motivation or interest. Contradicting this is a study that shows that one of the greatest influences that the difficulty of a task has is on student's motivation and interest in the assignment. Children who were given a task that they expect to be easy have showed greater amounts of interest and therefore were more motivated to complete the task than children who expected the task to be difficult (Hom and Maxwell 1983).

One study of the relationship between task difficulty perception and actual difficulty that is highly relevant to this study showed that their relationship is weak – students were not highly skilled at predicting which tasks they had to complete were

going to be difficult and which ones would be easy. The authors found that easy tasks perceived to be hard caused intimidation and therefore a subsequent partial or complete reduction in effort and/or time wasting in the form of searching for hidden complexity. Conversely, a difficult task judged to be easy caused students to develop a false sense of security and therefore gives reduced effort and/or makes the assumption that one simple aspect of the task is its key aspect, and when it is solved the entire task is solved. It is important to note however, that task difficulty was measured by performance on the task, not designated by variations in characteristics designed to make it more or less difficult (Nunan & Keobke 1995)

Purpose

The main purpose of this study is to investigate the relationships between task difficulty, perception of task difficulty, and student achievement. Also, some of the mediating effects involved in this relationship will be looked at, such as motivation, anxiety/stress, self-efficacy/expectancy of success, and attribution of success/failure. The findings of a study such as this may have real-world educational implications that may lead to alterations in the way classroom tasks are designed and/or developed. Ideally, findings of this study will lead to adjustments to task difficulty and/or task presentation that lead to higher levels of productivity and therefore learning for a larger number of students.

Hypothesis

First, it is hypothesized that students who are given a task that they are told will be difficult will perform worse on the task than students who are given a task that they will be told will be of easy or medium difficulty, regardless of actual difficulty. Second,

it is hypothesized that students who are given a task that is described as being medium difficulty will perform worse on the task than students who are given a task that is described as being easy, regardless of actual difficulty. Third, it is hypothesized that students who perceive a task as difficult will have lower ratings of self-efficacy on the task, task skills, and effort, with higher ratings of anxiety. Fourth, it is hypothesized that students who are told that a task is difficult will rate the task as being more difficult than those who are told a task is of medium or easy difficulty, regardless of actual difficulty.

Operational Definitions

1) Task difficulty – A description of the characteristics of a task that conveys the likelihood of successfully completing a task (Martin & Manning Jr. 1995)

Limitations

Since there is an extremely complex relationship between task difficulty, perceived task difficulty, and resulting performance, there are some variables that cannot be included in this study because of both time and resource restraints. For one, rewards and punishments resulting from tasks and their completion most likely play a role in levels of motivation and expectancies of success, and these devices may have interaction effects with task difficulty and performance. Also, the classification of an easy vs. difficult task is simplified in this study. Although there are many variables that determine the difficulty of a task, including but not limited to speed/time based characteristics, power-based requirements, prior knowledge, practice effects, and preparation time, they are not included in the development of task difficulty of this study.

Also, while individual differences may play a significant role in this relationship, they are not looked at in this study. It is generally well known that what is motivating for

one student may not be motivating for another, and this applies to task difficulty as well. While individual differences in this regard are most likely due to an interaction of past successes and failures in different educational and developmental tasks and also personality traits, it is too difficult to take individual differences into account with the design used in this study. Similarly, variables such as student ability level, characteristics of family life, socio-economic status, and other individual characteristic may play a role in this relationship but will not be looked at in this study, mainly due to the obtrusive nature of such information.

CHAPTER 2: REVIEW OF THE LITERATURE

Task Difficulty

It is well known that the difficulty of a task has a large impact on an educational program's effectiveness, both in terms of encouraging mastery of material and developing students' academic skills (Lannie & Martens 2004). It is nearly universally agreed upon by those in both applied education and educational research that appropriately challenging tasks produce greater levels of competence in students than material that is either not challenging or too challenging (Piaget & Garcia 1991; Vygotsky 1978). Further, Gickeng & Armstrong (1978) showed that material instructed at an appropriate instructional level for students in a particular classroom resulted in more on-task behavior than material that was either too complex or too simple. Similarly, variations in task difficulty have been shown to be associated with the amounts of problem behaviors exhibited by students in a classroom setting (Cooper et al., 1992; Center, Deitz, & Kaufman 1982).

The best definition of task difficulty states that it is "the degree to which the activity represents a personally demanding situation requiring a considerable amount of cognitive or physical effort in order to develop the learner's knowledge/skill levels", and a learner is challenged when a task requires input that is beyond their current ability levels (Van Velsor & McCauley, 2004). There are many characteristics of a task that can

be modified to alter its difficulty. While the overall difficulty that a task presents to a student depends on three independent groups of factors – learner characteristics, subject/content characteristics, and task characteristics – we are only concerned with what is of direct control to educators, which are task characteristics (Brindley 1987). Brindley also states that task characteristics relevant to task difficulty are complexity, context/information provided prior to the task, processibility of the language/terms of the task, degree of accuracy required, and time restrictions. Others have also included situational variables that are not task characteristics but influence its difficulty, such as preparation time and assistance (Clifford 1972). Further, some argue that there is a reciprocal relationship between learner characteristics and task characteristics in which task characteristics influence and are influenced by learner characteristics. Perhaps the most salient example of this argument is confidence - while it is agreed upon that learners have different confidence levels which influence their ability to complete a task, tasks can also require different amounts of confidence (unrelated to other task characteristics) which directly influences the task difficulty – giving a speech at a 2nd grade level is more difficult for many than writing a paper at a 6th grade level. (Honeyfield 1993).

Task Difficulty and Motivation

There are many mediating factors in the relationship between task difficulty and performance. Task difficulty has been shown to directly influence motivation, expectancies of success, and stress/anxiety, and physiological factors, which all directly influence performance (Britt 2005). Of all these mediating factors, motivation has been

shown to be of the most importance in terms of influencing how task difficulty relates to performance. In describing the general relationship between motivation and performance (independent of task difficulty), it has been shown to be a curvilinear relationship. Similar to the Yerkes-Dodson Law for the relationship between anxiety and performance (Yerkes & Dodson 1908), it is believed that motivation has a curvilinear effect on performance, in which extreme amounts of motivation at either end of the spectrum result in poorer performance than the "optimal" amount of motivation at a point in between the two poles (Atkinson & O'Conner, 1966).

Contrasting with the curvilinear relationship between motivation and performance is the obvious linear relationship between task difficulty and performance, in which an increase in task difficulty results in a decrease in performance. Some research has sought to integrate these two concepts and account for the relationship between task difficulty, motivation, and performance. Perhaps the best model of this relationship comes from Clifford (1972), which suggests a 3-dimensional model in which performance, motivation, and task difficulty are placed on different axes and create a 3-dimensional semi-circle that includes both linear and curvilinear relationships.

Interestingly, the research of Broadhurst (1959) suggested that ideal motivation levels are influenced by task difficulty, with the optimal amount of motivation for an easy task being greater than the optimal amount for a more difficult task. The work of Brehm, Wright, Solomon, Silka, and Greenberg (1983) suggests that the amount of motivation that a student has to complete a given task results from an integration of appraisals of task

difficulty and task value (resulting reward). Also, Belanich et al., (2004) stated that learners are most interested in putting forth effort for challenging tasks that do not imply guaranteed success or failure, but instead imply an intermediate probability of success. This is supported by the core theoretical belief on motivation in the educational literature, which is that the process of gaining competence through the act of exerting a significant amount of effort is intrinsically rewarding, and therefore such behavior is more likely to occur in the future (Stipek & MacIver 1989; Harter 1981). An application of this to the concept of task difficulty leads us to theorize that a task that is too easy results in competence without effort, and a task that is too hard may be more likely to result in effort without competence, both processes that are not intrinsically rewarding.

Task Difficulty and Expectancies of Success

Research in educational settings has also shown that students who expect to succeed academically before commencing a course or task have better performance than those who do not expect to succeed, regardless of ability (Battle, 1966) It has also been shown that expectancies of success are not completely determined by personal characteristics, but rather are open to situational influences as well. Young and Egeland (1976) suggested that perhaps the most important situational variable influencing whether or not a child believes he or she will do well is the task difficulty.

Task Difficulty and Anxiety/Physiological Responses

Anxiety is another mediating factor in the relationship between task difficulty and performance. In addition to the aforementioned curvilinear relationship detailed in the

Yerkes & Dodson Law, Morris and Libert (1970) found that worry and emotionality resulting from test anxiety resulted in poorer test performance. Additionally, variations in task difficulty have been shown to be directly related to variations in physiological arousal, and much of this effect has been attributed to physiological responses to stress, which is influenced by task difficulty. Light and Obrist (1983) used a reaction time task with variable difficulty to show that moderately difficult tasks result in a higher heart rate and greater overall cardiac response than easy or impossibly hard tasks. Similarly, Callister, Suwarno, & Seals (1992) showed that the task difficulty of a Stroop colour word test and mental arithmetic task was associated with greater sympathetic nerve activity, heart rate, and arterial blood pressure. This relationship was explained by the finding that levels of perceived stress were dependent on task difficulty.

Perhaps even more scientifically significant for studying the relationship between task difficulty and task performance are some recent findings from the field of neuropsychology. A recent study by Philiastides, Ratcliff, and Sajda (2006) examined neural activity when making decisions of various difficulties using electroencephalography (EEG). Their results showed evidence of a neural component (they term it D220) that has an intensity that rises with increases in task difficulty. These results shed some light on the complex neural substrates of greater decision making and more general cognitive processes, and suggest that there is a significant variation in neuropsychological responses to tasks of varying difficulties.

Theoretical Background

The educational theory that is most readily and appropriately applied to this relationship between task difficulty and performance is attribution theory, which in a broader developmental sense states that people attempt to determine causes of their behavior and the behavior of others by making "social inferences" - conclusions drawn from behavioral patterns, history, and gestures (Wiener, Frieze, Kikla, Reed, Rest, & Rosenbaum 1971; Kelley 1972). Attribution theory has a direct application to task difficulty, as task difficulty is determined by integrating the results of different attempts (by oneself and others) at various tasks with varying characteristics, with the goal of assessing the relationship between the learner's ability and the requirements of the given task (Shaklee 1976).

The central characteristic of attribution theory is the concept of locus of control, which at its most basic level suggests that events are due to factors that are internal – under our control, or external – not under our control (Rotter 1966). Examples of internal factors include skill and effort, and external factors include chance, luck, and the efforts of others (Wallston, Wallston, & DeVellis, 1978). When primarily applied to education, Weiner (1974) suggests two internal factors (ability and effort) and two external factors (task difficulty and luck) that are students' primary attributions for success or failure. The type of attribution made has been shown to influence performance through influencing the amount of success-striving behaviors, such as effort, persistence, and ambition for task selection (Dweck, C. S., & Goetz, T. E. 1978). Further, some have

argued that development and age play an important part in the locus of control, where distinctions between internal and external factors become more separated as development advances. Nicholls and Miller (1983) showed that there are three distinct stages of differentiation of difficulty, where children in the earliest stage can not distinguish the concepts of self-ability assessments vs. task difficulty assessments, where those at the later stages of development see task difficulty characteristics as totally independent of their own abilities. Nonetheless, attribution theory maintains that task difficulty is a stable and external attribute that learners can use to explain their success or failure on a task (Weiner 1974).

Perception of Task Difficulty and Performance

While determining the appropriate difficulty level for a task is highly important to facilitate learning, the perceived difficulty of a task can be just as important, especially when a student is learning a new skill or beginning a task (Mangos and Steele-Johnson, 2001). Maynard and Hakel (1997) showed that perceptions of task difficulty were negatively associated with performance. Anticipated difficulty levels of tasks have this influence performance in many ways. Perhaps most significantly, perceptions of task difficulty play a large role in determining expectancies of success and/or failure (Wigfield and Eccles, 2000). Additionally, task difficulty influences performance indirectly through influencing self-perceptions of ability – over time, consistent perceptions of tasks as being difficult leads to lower levels of self-percieved ability (Eccles et al., 1983). Similarly, Li, Lee, & Solmon (2007) found that those who

perceived a task as being more difficult than others performing the same task had lower self-perceptions of ability, lower levels of interest and motivation, and scored lower overall than their counterparts.

Research examining the relationship between perceptions of task difficulty, actual difficulty, and performance has not been consistent in its findings. Arkes (1979) asked students to complete a task of moderate difficulty, and varied task instructions among groups between low difficulty and high difficulty. It was found that students were more motivated and interested under the hard difficulty condition than those in the low difficulty condition, and therefore produced better performance. A similar study by Hom & Maxwell (1983) contradicted these findings, showing that students who were instructed that a task of moderate difficulty was going to be easy had higher interest than those told it would be hard, but did not display better performance as a result of this categorization. Links between locus of control/attribution theory and expectancies of success have also been suggested, where students that are successful tend to explain scholastic achievement as due to their own ability and effort and explain their failures as due to lack of effort or various external factors (Weiner and Kukla, 1970).

CHAPTER 3: DESIGN

Sample

This study used a sample of 21 undergraduate students at various New Jersey colleges. The percentage of each gender in the sample was 9.52% (n=2) for males and 90.48% (n=19) for females. The mean age of the sample was 20.71 with a *SD* of 1.31.

Measures

Demographic Questionnaire

Participants were presented with a brief self-report questionnaire in order to assess basic demographic characteristics of the sample. The questions were presented in a fill-in format, and information gained from responses to items on the questionnaire were used to assess age and gender.

Instruction/Problem Packet

Each participant was presented with a seven page packet, containing instructions for completing the problem sets and survey questions that would follow, and also the problems and surveys themselves. The first page of the instruction/problem packet contained short instructions for completing the sets of problems. It stated the type of problems (anagrams), gave an example of a problem solution, time allowed to complete each set of problems (90 seconds), instructions regarding the completion of survey questions after each set, and a description of the increase in difficulty from set to set. Following the instruction sheet were three pairings of a problem set sheet followed by the post-completion survey.

Problem Sets

Each of the three problem sheets (easy, medium, hard) contained six anagrams, which are scrambled groupings of letters that must be rearranged to form a known English word. Although each set gave a different difficulty description, each had two easy anagrams, two medium anagrams, and two difficult anagrams. The difficulty of anagrams was determined by guidelines set by others (Mayzner & Tresselt, 1958; Zacks et. Al., 1983), in which both the complexity of the pattern used to rearrange the letters in the word and also the frequency of which the word in the completed anagram appears in daily use are used to make a judgment of anagram difficulty. Participants were given a 90 second time limit to complete each set of problems, in order to make sure equal amounts of time were spent on each set.

Post-set Completion Survey

The post-set completion survey was filled out by participants each time they completed a set of problems, in order to assess various aspects of their condition while completing the problems. Items taken from the applicable sub-scales of the Intrinsic Motivation Inventory were used in order to measure self-perceived competence, effort/importance and pressure/tension, all in relation to the task asked to be performed. The items are in the format of a 7-point Likert scale in which the participant is presented with a statement and then are asked to indicate how true the statement is for them, with (1) being not true at all and (7) being very true. Some modifications were made to the wording of some of the items and sub-scales to make them better apply to the task involved in this study. McAuley, Duncan, and Tammen (1989) investigated the validity of the inventory and found strong support for its validity. Caution must be used when

interpreting the results of the study for this research however, as only portions of the inventory are being used and they are being altered to fit the task used in the study. The items on these subscales and the subscales themselves have all been shown to be statistically stable across varying tasks, task types, conditions, and participants. Also, using the subscales separately from the greater scale has not been shown to have adverse effects on the reliability or validity of the measures used.

Perceived Difficulty

Perceived difficulty was measured by one item asking the participants to rate the difficulty of each set of problems using a 7-point likert scale from (1) not at all difficult to (7) extremely difficult.

Procedure

A portion of the participants were recruited through the undergraduate psychology participant pool at Rowan, in which the participants respond to postings in the psychology building and agree to participate in studies in order to receive class credit for undergraduate psychology courses. Other participants were recruited through acquaintances at various New Jersey Colleges.

The study began with the participants receiving the demographic questionnaire and being asked to complete it. Once all of the demographic questionnaires were handed in, the participants were told that they would be given an instruction/problem sheet with instructions for completing the included problems. The sheet was then administered, and upon completion, participants were given a debriefing form explaining the goals and methods of the research.

Design

This study used an experimental design in which task performance (measured in terms of correct responses to anagram problems) was compared for participants' performance on each of the three problem sheets. Also, participants' self-reported ratings of perceived self-competence, effort, anxiety, and perceived difficulty for each problem set were compared in order to find relationships among the ratings. Paired samples t-tests were used for all possible pairings of data.

Hypotheses

First, it is hypothesized that students who receive the hard instruction set will perform worse on the task than students who receive the easy or medium instruction set. Second, it is hypothesized that students who receive the medium instruction set will perform worse than those who receive the easy instruction set. Third, it is hypothesized that students who perceive the task as difficult will have lower ratings of effort, task skills, and perceived competence and higher ratings of pressure/tension. Fourth, it is hypothesized that participants receiving the difficult instruction set will have higher ratings of perceived difficulty than participants receiving the easy or medium instruction set.

Summary

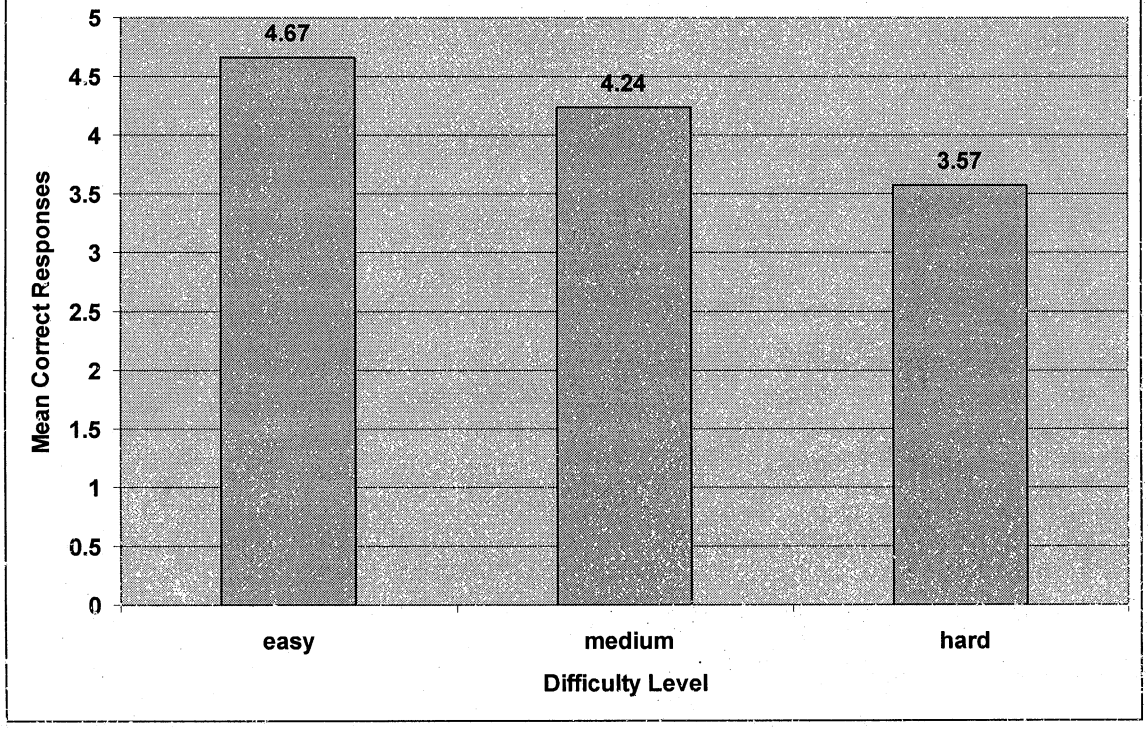
21 undergraduate college students recruited through the undergraduate psychology subject pool and through university acquaintances were used as participants in this study. Participants were first asked to complete a demographic questionnaire, and then given an instruction/problem sheet which contained instructions for completing problems included on the sheet and also a description of the problem difficulty unrelated

to actual problem difficulty. The first problem sheet contained instructions describing the problems as easy, the second as medium, and the third as hard. It was hypothesized that scores on sheets with hard and medium instructions would be lower than scores on sheets with easy instructions. Also, it was hypothesized that ratings of task skill, self efficacy, and effort would be lower after completing the hard set than the easy set, while ratings of anxiety would be higher.

CHAPTER 4: RESULTS

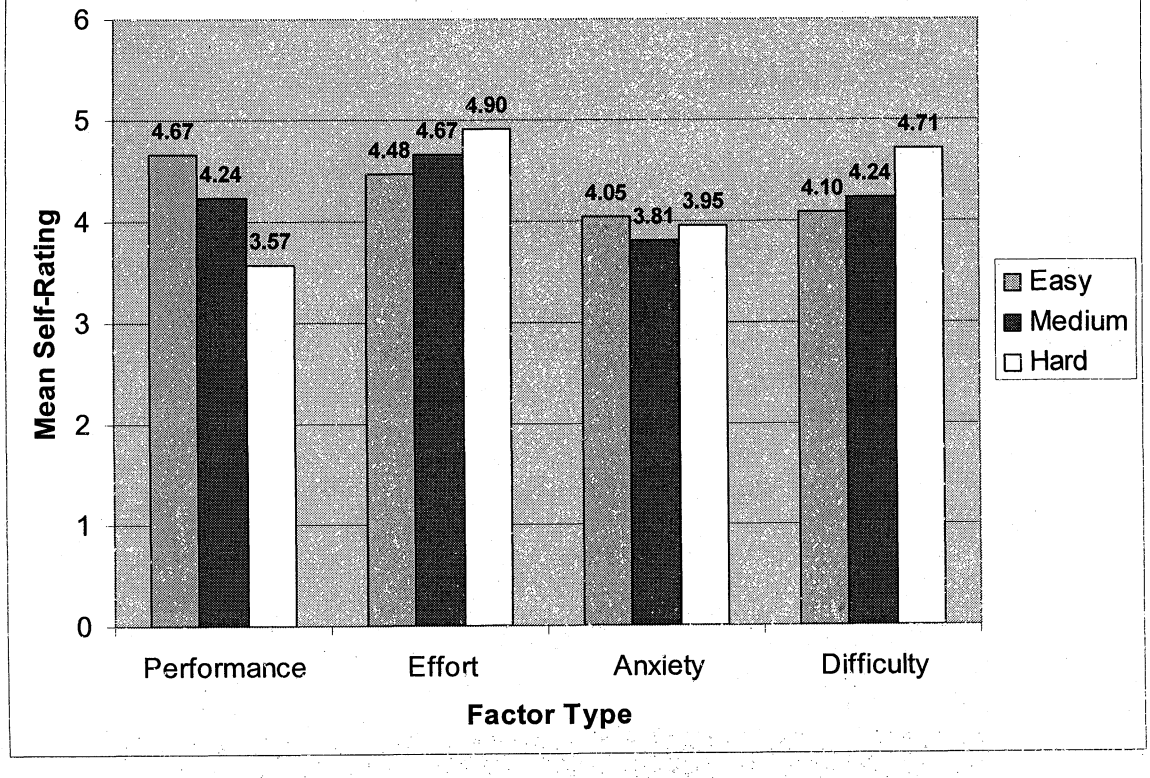
A visual representation of the mean scores across difficulty levels is shown in figure 4.1. There was a significant linear effect found for difficulty using a repeated-measures ANOVA ($f(1) = 10.42$, $p<0.05$), supporting the main hypothesis that task performance would worsen as a result of increased perceived task difficulty. A paired-samples t-test was used to further examine the findings by detecting differences among pairings of scores for each difficulty set. Further support for the main hypothesis was found, as the mean score of correctly answered problems in the easy difficulty set ($M = 4.67$, $SD = 1.11$) was higher than the mean score of correctly answered problems in the hard difficulty set ($M = 3.43$, $SD = 1.99$), a significant difference ($t(20) = 3.23$, $p < .05$). Similarly, the mean score of correctly answered problems in the medium difficulty set ($M = 4.48$, $SD = 1.36$) was higher than the mean score of correctly answered problems in the hard difficulty set ($M = 3.43$, $SD = 1.99$), again a significant difference ($t(20) = 2.45$, $p < .05$). Differences in scores between the easy difficulty set ($M = 4.67$, $SD = 1.11$) and the medium difficulty set ($M = 4.48$, $SD = 1.36$) were not significant.

Figure 4.1 Mean Correct Responses Across Difficulty Levels



Also, paired-samples t-tests were used to assess variations in self-ratings of personal factors and thoughts about each of the three problem sets, as shown in figure 4.2. Of these pairings, only the difference between self-ratings of performance for the easy set (M = 4.67, SD = 1.65) and for the hard set (M = 3.57, SD = 2.16) was significant ($t(20) = 2.48$).

Figure 4.2 Post Completion Self-Reported Factors



CHAPTER 5: DISCUSSION

As previously reported, the main hypotheses of this study were supported by the results. Although the actual difficulty level of all three sets of problems was the same, participant performance on the tasks were significantly better when they were told the problems would be of easy or medium difficulty rather than hard. Only part of the secondary hypothesis was supported, as the only significant variation in self-ratings of personal factors (perceived success, effort, anxiety, and perceived difficulty) was for self-rated performance.

There are several factors of the study and also relating to the concepts of task difficulty and task performance that may have influenced the results. While the work of Nunan & Keobke (1995) would explain these results by stating that the hard description of difficulty caused intimidation and a subsequent reduction of effort and/or a misuse of time in the form of looking for difficulty where it is non-existant, such an explanation is not supported by the post-set completion survey used in this study (although limitations of this survey and method are discussed later). This lack of support is also true for other explanations, such as those that maintain that this relationship may exist due to the mediating factors of anxiety (Morris & Libert 1970; Light & Oberst 1983), motivation/effort (Clifford 1972, Belanic h et al., 2004), and self efficacy (Honeyfield 1993).

There are many possible reasons for this study's inability to find support for any particular explanation of the mechanism by which perceived task difficulty, actual task

difficulty, and task difficulty are related. Perhaps the most salient factor is the lack of true motivation on the part of the participant to be successful on this task. Because there was no grade or course credit at risk based on the successful completion of these tasks, both actual performance and ratings of effort, motivation, and anxiety might have been affected. Likewise, these results might have been influenced by the psychological research tendencies outlined by satisficing theory, which states that participants often respond to multiple items with a singular rating scale in a fashion that minimizes cognitive effort, and therefore taints results.

Limitations

While the most obvious limitation of this study is the sample size, there are other limiting factors. For one, practice effects might have played a role in the results of this study. Although the hypothesized relationship was still supported by the results, the fact that the sets were presented in order from easiest to hardest suggests that participants might have improved their anagram completion skills throughout the duration of the study, therefore improving performance on the "hard" problem set. Thus, perhaps a study utilizing a larger sample size and therefore more able to minimize practice effects might show an even stronger influence of perceived task difficulty on task performance. Similarly, there is a possibility of fatigue influencing results on the medium difficulty set and even more so for the hard difficulty set. Since the task is somewhat mentally demanding, perhaps randomizing the difficulty order of the sets would reduce the influence that fatigue would have on the number of correct responses.

Suggestions for Future Research

The most pressing need for future research on the relationship between perceived task difficulty and actual task performance is to use a better sample, both in terms of numbers and type. A larger sample size would prove to be more statistically powerful, and also seeing how these results generalize to other populations (younger children, different ability levels, cultural groups) might shed some light on the relationship. Also, different types of tasks should be used to test this relationship. Although this study used anagrams both because their difficulty level is easily manipulated and prior knowledge does not greatly influence performance, a better understanding of the relationship might be attained by using other task types, including math based tasks, response time tasks, or even physical tasks. Also, perhaps future research on this topic can use a reward system for correct responses, as this may influence task performance and self-ratings of anxiety, effort, and motivation. Lastly, rather than self-reported levels of effort and anxiety, perhaps physiological methods could be used, which would provide a much better understanding of the physiological response to perceptions of difficulty levels and the influence it may have on performance.

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