

Effects of Competence and Arousal on Psychic Payoffs: Are They Independent?

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Abstract

This paper presents the results of an experimental study that tests whether both arousal and competence affect psychic payoffs, and if so, are the effects independent or interactive. The study determines that both do affect psychic payoffs and that the effects are independent of each other. The conclusion is that emotional arousal is an important omitted variable in many competence models that powerfully affects psychic payoffs.

Keywords: Achievement; arousal; competence; motivation

Introduction

This paper presents an experimental study designed to determine if the effects of arousal and competence act independently on psychic payoffs or if there is an interactive effect. Several researchers discuss broader relationships between attribution theory, which is the basis for most competence models, and emotional arousal (hereafter arousal) (Schachter, 1962; Weiner, 1985; Kahneman et al. 1999; Russell, 2003). This study investigates alternative links between arousal and competence based on the broader literature concerned with attribution theory and arousal (Weiner, 1985; Russell, 2003, 2009). This leads to the research question: Does arousal help to explain psychic payoffs, and if so, does it affect psychic payoffs independently or does it moderate the effects predicted by competence models (such as Heath & Traversky 1991)? We provide theory-consistent evidence that arousal acts independently of competence on psychic payoffs.

Psychic payoffs are measured using Loewenstein & Issacharoff's (1994) method. This involves endowing each subject with a reward object when his or her outcome is revealed and then eliciting willingness to accept to sell the object. Based on the theory of associationalism, positive (negative) psychic payoffs would provide an incentive for increasing (decreasing) one's valuation of the reward object above (below) what it would be if it were obtained in a more neutral way (Loewenstein & Issacharoff, 1994).

This paper contributes to the literature by adding an important alternate explanation to the results found in competence model tests (Heath and Traversky 1991, Taylor 1995). The condition of arousal can affect psychic payoffs independently and must be controlled for in addition to attributions of competence.

This paper has broader implications for motivating knowledge workers within organizations. Although most economists assume that money is a more effective motivator than reward objects (e.g., Baker, Jensen & Murphy, 1988), this paper demonstrates that competence along with arousal explain and predict when reward objects motivate more effectively than money.

Another implication is that organizations can stimulate psychic payoffs by creating arousing situations such as awards ceremonies and by helping people to internalize attributions of competence.

Literature and hypotheses

Links between arousal and attribution theory are discussed in the literature (Schachter, 1962; Weiner, 1985; Russell, 2003, 2009). For example, the arousal-cognition model posits that arousal is necessary to trigger the attributional information processing that is expected to produce psychic payoffs in competence models. Importantly however, arousal was not directly measured or controlled in many of these competence studies (Heath & Traversky 1991, Taylor 1995).

This study focuses on the question of whether and how arousal affects psychic payoffs. In addition, this study is concerned with the question of whether arousal acts independently of competence in affecting psychic payoffs.

Arousal is defined as immediate superficial processing triggered by an antecedent event (Russell, 2003). Research investigates arousal in the context of sex, drugs, and medical treatments. However, no research examining arousal in an achievement context was evident.

Weiner (1985) and Russell (2003) discuss two ways arousal can affect psychic payoffs. Arousal can moderate the effect of attributions of competence on psychic payoffs or it can affect psychic payoffs independently. The former alternative is referred to as the arousal-cognition model and the latter alternative as the attribution-independent model. For example, consistent with the attribution-independent model, Weiner (1985) views surprise and frustration as depending on arousal—but not attributions of competence. In contrast, consistent with the arousal-cognition model, Weiner (1985) considers pride and blame as depending on the interaction of arousal and attributions of competence.

The arousal-cognition model (Schachter, 1962; Weiner, 1985; Russell 2003) supports the expectation that people process attributional information when they are aroused but not otherwise. This model predicts that a stimulating event, such as an exciting reward object, is necessary to trigger psychic payoffs.

In contrast, the attribution-independent model predicts that arousal affects psychic payoffs independently of the attributions of competence or outcome. If the attribution-independent model explains arousal, by definition, arousal should affect willingness to accept—but not self-attributions of skill. This is because, unlike self-attributions of skill, willingness to accept is expected to capture broader associations, including mood and arousal (Loewenstein & Issacharoff, 1994). These theories support the following alternative hypotheses:

H1a. Arousal-cognition model: Arousal moderates the effect of outcome on willingness to accept and self-attributions of skill.

H1b. Arousal independence model: Arousal affects willingness to accept independently of outcome, however, it does not affect self-attributions of skill.

Method

Participants and design

The subjects consisted of junior- and senior-level undergraduate accounting students at a large state university. In total 94 subjects completed the experiment (44 men and 50 women). The study was a 2x2 between subjects design in which arousal (moderate vs. high) and outcome (favourable vs. unfavourable) were the independent variables. Willingness to accept and self-attributions of skill are used as the dependent measures. Willingness to accept is elicited for the unfavourable outcome group as well as the favourable outcome group. Collecting this additional data had the cost of limiting the expected “floor” on the arousal manipulation to a moderate level. Therefore, moderate—instead of low—arousal was anticipated because eliciting willingness to accept required endowing all subjects with stimulating reward objects.

We manipulated arousal by following a real world achievement context described by Peters & Waterman (1982, 123). We used the presence (or absence) of: loud stimulating music, applause, flash photography, and high enthusiasm on the part of the people conducting the experiment. The variable outcome was manipulated following Loewenstein and Issacharoff (1994). We used a quiz with questions most subjects were not expected to know to affect a random distribution of quiz scores. The quiz score was then used to split the subjects into two groups, favourable or unfavourable, by ranking the scores and performing a median split.

Subjects in the favourable outcome group received the message: "... you scored high on the quiz – *your score was in the upper half of the class scores.*" In the unfavourable outcome group subjects were informed: "... you scored low on the quiz – *your score was in the lower half of the class scores.*"

Gender was controlled for, as this was found to affect the outcomes due to differences in the way reward objects were viewed by the two genders. This control for gender was effected by selecting coffee mugs as gender neutral reward objects. A search of the literature and found no reported evidence of gender effects in studies that endowed subjects with coffee mugs as the basis for eliciting willingness to accept (e.g., Kahneman, Knetsch, & Thaler, 1990; Loewenstein & Issacharoff, 1994; Van Boven, Dunning, & Loewenstein, 2000; Nayakankuppam & Himanshu, 2005). The mugs were designed to be attractive to the target subjects by using school colours with the words "Outstanding Accounting Student" screen-printed on each side in gold letters.

Procedure

Prospective subjects were informed that in exchange for participating in the study they would receive a prize or an unspecified amount of cash. The experimental procedure took approximately 25 minutes to complete. First, the quiz was administered, consisting of 15 definitions each followed by an objectively correct and an incorrect word. Subject's task was to choose the correct word for each definition based on the textbook. Individuals graded their own quiz and then passed their quiz to a partner who checked the score. Quizzes were returned with a mug and the appropriate high or low score message (described above). Subjects then completed the experimental and post-experimental instruments, where we captured our two dependent variables.

Self-attributions of skill (from "pure luck" to "pure skill" on a 10-point scale) and willingness to accept (\$0.00 to \$15.00, in \$0.25 increments) were the dependent measures. Both measures were elicited from all subjects. All subjects received a reward object, the previously described coffee mug. The reward object would retail for \$5.95 based on our search of comparable mugs. Subject's willingness to accept to sell their mugs was elicited with the following instructions, adapted from Loewenstein & Issacharoff (1994, 160):

"You now have the opportunity to trade your mug for some money. Below are a series of lines marked: 'keep mug _____. Trade it for \$ amount _____.' Please mark 'keep mug ____' for each \$ amount where you would prefer to keep the mug instead of trading it for the \$ amount that is listed. Please circle 'Trade it for \$ amount _____' for the *first* amount at which you would rather have cash than the mug.

We have predetermined a maximum "buyback price" for the mugs. The amount is written on a slip of paper in the envelope. When everyone has completed their questionnaires, the amount will be revealed. If the \$ amount you circled is less than or equal to the amount we reveal then you will give up the mug and we will give you the \$ amount you circled in cash. If the \$ amount you circled is greater than the amount we reveal then you will keep the mug. Note that it is in your interest to indicate what the mug is truly worth to you. All trades will take place immediately."

After subjects indicated their willingness to accept, the experimenters revealed the predetermined amount of money to exchange (\$4.75). Subjects who chose a willingness to accept that was less than or equal to \$4.75 exchanged their mug for the amount they specified in cash. Individuals who set willingness to accept over \$4.75 kept their mug.

In the high arousal group, the experimenters and the class instructor set a high energy tone. In addition, loud, stimulating music was played (e.g., Queen's "We are the champions") while each subject was called to the front of the class to receive his or her mug. A flash photograph was taken as each subject was presented with his or her mug. During this process everyone in the room was encouraged to clap and cheer (in fact, the clapping and cheering got so loud in the high arousal group that people in a neighbouring classroom asked us to restrain the enthusiasm). This was in contrast to the moderate arousal group in which the class instructor set a low energy tone, no music was played, no flash photograph was taken, there was no clapping and cheering, and subjects received their mug while seated.

Results

Manipulation checks and gender

Providing evidence that outcome was successfully manipulated, ninety-nine percent of subjects correctly identified whether their outcome was favourable or unfavourable (one subject failed to answer the question).

To test the effect of our arousal manipulation, we used an arousal instrument described by Baron (1987), with the following four questions (measured with a ten-point scale): calm-tense, relaxed-on edge, sleepy-wide awake, and dull-alert. The results for these items were examined using a factor analysis and it was found that the sleepy-wide awake and the dull-alert questions had Eigen values greater than 1 (together explaining 93% of the variance). Using a composite measure of arousal, constructed by weighting the two items by their factor scores, it was found that the arousal manipulation had a marginally significant effect on the composite arousal score ($F(1, 92) = 1.93, p = .08$). Considering that arousal is partly an unconscious phenomenon (Frijda, 1999; Russell, 2003) and that the self-report measures were designed to capture only the conscious part of this construct, the above results provide evidence that arousal was successfully manipulated.

Although the study was designed to be gender neutral, evidence suggests that women set willingness to accept higher than men (*paired t*(92) = 2.05, $p < .05$). However, gender was successfully randomized across outcome (*Wald χ^2* (1, 92) = 0.84, $p = 0.83, n.s.$) and arousal (*Wald χ^2* (1, 92) = .03, $p = .87, n.s.$). Several studies find that women are more prone to arousal than men (for a review see Nolen-Hoeksema & Rusting, 1999). The design of the study enables the ability to test whether a gender x arousal interaction explained the results. This was tested using a MANOVA with gender and arousal as independent variables and willingness to accept and self-attributions of skill as the dependent measures. No evidence of a gender x arousal interaction was found for either willingness to accept ($F(1, 91) = .49, p = .87, n.s.$) or self-attributions of skill ($F(1, 91) = 1.1, p = .22, n.s.$). These results indicate the interaction between gender and arousal was successfully controlled.

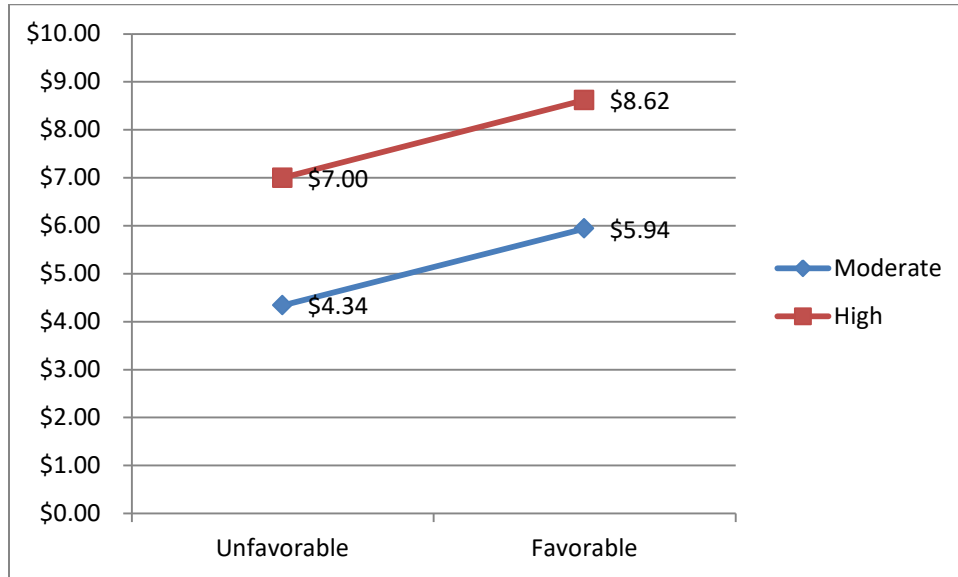
Effects of arousal and outcome on psychic payoffs

We dropped one subject from our analysis because her mug had a small scratch. The subject called this defect to our attention and expressed her disappointment. Another subject was eliminated because she chose a willingness to accept of \$0.00 for her mug, which was interpreted as a protest vote. Dropping these subjects did not qualitatively impact the results we report.

Based on the arousal-cognition model, H1a predicted that arousal would moderate the effect of outcome on willingness to accept and self-assessed skill. In contrast, based on the arousal-independence model, H1b presented the competing expectation that arousal would affect willingness to accept independently of outcome but that arousal would have no effect on self-attributions of skill.

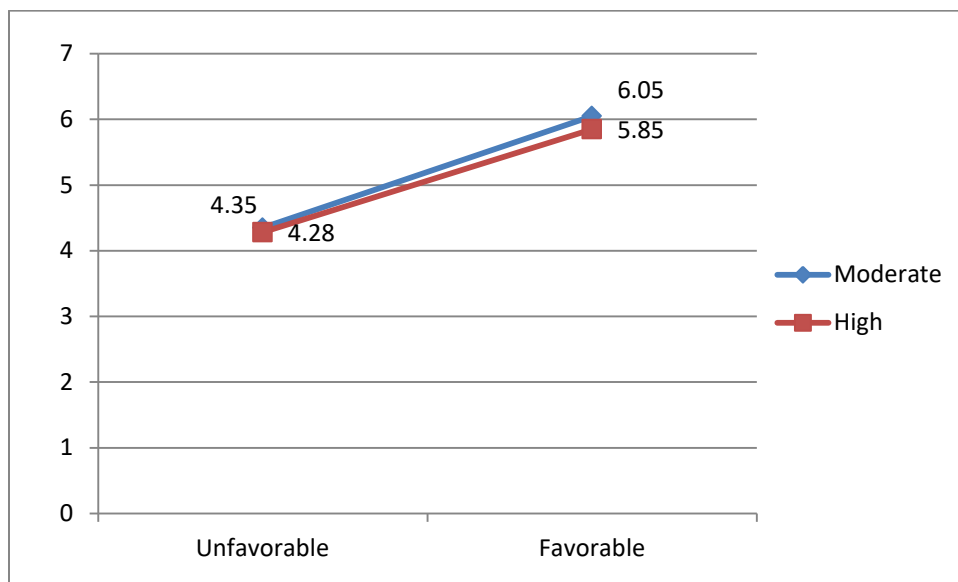
Figures 1a and 1b present graphs of mean values for willingness to accept and self-attributions of skill as a function of outcome and arousal. The test of H1a/arousal-cognition versus H1b/arousal-independence was done using a MANCOVA with gender as the covariate, arousal and outcome as the independent variables, and willingness to accept and self-attributions of skill as the two dependent measures. Contrary to H1a/arousal-cognition, arousal and outcome did not interactively affect either willingness to accept ($F(4, 87) = .01, p = .46, n.s.$) or self-attributions of skill ($F(4, 87) = 0.22, p = .32, n.s.$). Absent an interaction between arousal and outcome, the moderating relationship predicted by H1a/arousal-cognition (Baron & Kenny, 1986) can be ruled out. Thus, no support is found for H1a/arousal-cognition. However, consistent with H1b/arousal-independence, arousal affected willingness to accept ($F(4, 87) = 9.39, p < 0.01$) but not self-attributions of skill ($F(4, 87) = .00, p = .48, n.s.$). These results provide strong support for H1b/arousal-independence but no support for H1a/arousal-cognition. The evidence therefore points to the conclusion that arousal is an explanatory variable in determining psychic payoffs, one that is omitted in competence models, and, consistent with H1b/arousal-independence, arousal affects psychic payoffs independently of attributions of competence. In addition, the alternative hypothesis that arousal moderates the relationship between attributions of competence and psychic payoffs (H1a) is ruled out.

Figure 1a. Mean Values of Willingness to Accept



Based on a monetary scale ranging from \$0.00 to \$15.00 in \$0.25 increments

Figure 1b. Mean Values of Self-attributions of Skill



Based on a 10-pt scale with 1 labelled 'Pure Luck' and 10 labelled 'Pure Skill'

Conclusion

This paper presents an experimental study designed to test whether arousal and competence affect psychic payoffs, and if so, are the effects independent or interactive. Regarding the research question, evidence indicates that arousal is a potentially omitted variable in competence models that powerfully affects psychic payoffs. It is also found that arousal affects psychic payoffs independently of competence.

Some of the limitations of this paper include that expected psychic payoffs were not measured. As a consequence, whether people accurately anticipate the (ex post) psychic payoffs they experience could not be measured. The ability to predict ex post psychic payoffs would have economic implications.

This paper has broader implications for motivating knowledge workers within organizations. Although most economists assume that money is a more effective motivator than reward objects (e.g., Baker, Jensen & Murphy, 1988), this study demonstrates that H&T's model along with arousal explain and predict when reward objects motivate more effectively than money. Another implication is that organizations can stimulate psychic payoffs by creating arousing situations such as awards ceremonies and by helping people to internalize attributions of competence. Future research could contribute by examining both expected and experienced psychic payoffs, by investigating the effects of variation and levels of source ambiguity, and by analysing the effects of arousal and eliminating noise on psychic payoffs

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