# Exploring the Relationship between Gameplay Self-efficacy and Anxiety when Playing the Puzzle Game

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## 1. Introduction

Gestalt is related to the visual domain, and have to find out the complex objects from local elements (Navon, 1977; Cooper & Humphreys, 2000; Riddoch & Humphreys, 2004). Gestalt perception results in an emergent manner from top-down, and recurrent network processes are built from the known low-level mechanisms. (Herzog, Thunnell, & Ö gmen, 2016). Based on the Gestalt perception, a puzzle game that have to recognize particular objects by inferring the whole picture from a few segments of that picture is designed for this study.

## 2. Literature Review

### 2.1 Gameplay Self-efficacy

Based on the research result of Brunet and Sabiston (2011), task self-efficacy beliefs have been considered as possible mediators of the association between cognitive-affective factors. It has also support for considering pathways from task self-efficacy beliefs to motives (Howle, Dimmock, & Jackson, 2016) which may positively align with learning behavior. Task self-efficacy beliefs may positively predict the construct of performance motives and goals. In line with this, it is important to consider players' game self-efficacy as the role of mediators between cognitive factors and game performance (Howle et al., 2015).

### 2.2 Gameplay Anxiety

Anxiety has been recognized as a cognitive response to a threat to the one's self-concept, by his or her subjective, consciously perceived feelings of tension (Spielberger, 1970). The state-trait anxiety theory has been introduced by Spielberger (1972), and described state anxiety as a "here and now" transitory feeling of tension that varies in intensity and fluctuates over time. Trait anxiety refers to a stable susceptibility to experiencing state anxiety. Trai anxiety is stable, and represented for the individual's experience of game playing.

### 2.3 Perceived Value

Expectancy beliefs are subjective perceptions of competence and confidence about future success in a task (Vekiri, 2013). Value-expectancy model also provides an understanding of game behavior (Vekiri, 2013). So, we would like to find out the relationship between gameplay self-efficacy and anxiety in this study.

## 3. Research Design

### 3.1 Hypotheses

This study aims on find out the relationship between gameplay self-efficacy and anxiety. Followings are the three hypotheses of this study.
H1: Gameplay self-efficacy is related to gameplay anxiety
H2: Gameplay self-efficacy is related to perceived value
H3: Gameplay anxiety is related to perceived value

### 3.2 Research Instrument

The puzzle game of this study is designed by cutting images into 25 parts (see figure 1) and using the Fibonacci series (e.g., 3, 5, 8, 13) to add parts of each image for players to identify. The more parts the players needed to identify from the object, the lower score they get.



Figure 1. The puzzle game

### 3.3 Research Participants

This research employed purposive sampling to select participants from elementary school located in New Taipei city. There were 60 students who participated in this experiment; 30 were male (50% of the total sample), and 30 were female (50% of the total sample).

## 4. Research Results

### 4.1 Correlation Matrix

Table 1 show that there were significant correlations between gameplay anxiety, gameplay self-efficacy and perceived value. The correlation coefficient between gameplay anxiety and perceived value was -.70, between gameplay self-efficacy and perceived value it was .81, and between perceived value and gameplay performance it was .40.

Table 1: Construct discriminative validity

| Constructs | Gameplay anxiety | Gameplay self-efficacy | Perceived value |
|---|---|---|---|
| Gameplay anxiety | 1 | | |
| Gameplay self-efficacy | -.70** | 1 | |
| Perceived value | -.71** | .81** | 1 |

## 4.2 Structural Equation Modeling

This study used SEM with Amos 20 to test the goodness of fit for the model. We adopted Hair's recommendations to set chi-square /df< 5 as an acceptable level, together with multiple indicators to obtain a more objective conclusion to avoid power problems that arise using the Chi-square test in a large sample. The model was hypothesized as chi-square = 137.08, , RMSEA=.06, GFI=.87, AGFI=.82, in which GFI and AGFI were more than .8 and RMSEA was lower than .05, to represent that this model fit the data best.Hair et al. (2009) proposed that researchers should not only pay attention to the Chi-square values but should consider other fitness measures at the same time. The values of fitness were all larger than .9: NFI=.92, RFI=.91, IFI=.93, TLI=.95, and CFI=.94. Overall, judging from the comprehensive indicators, the theoretical model fit the overall pattern of the data.

Figure 2 shows the results of the path relationship among the hypotheses. It is evident that all hypotheses were supported. Figure 2 also indicates and supports that the test of gameplay self-efficacy influenced gameplay anxiety and perceived value with standardized regression coefficients of -.40 and .65. The test of gameplay anxiety influenced and supported perceived value with an standardized regression coefficients of -.26. The $R^2$ value is the percentage of variation as explained by the exogenous variable to the endogenous variables, thus, representing the predictive ability of the research model. Path coefficients and $R^2$ values indicated the fit of the structural models with the empirical data. In addition, the explanatory power of this study was 72%.
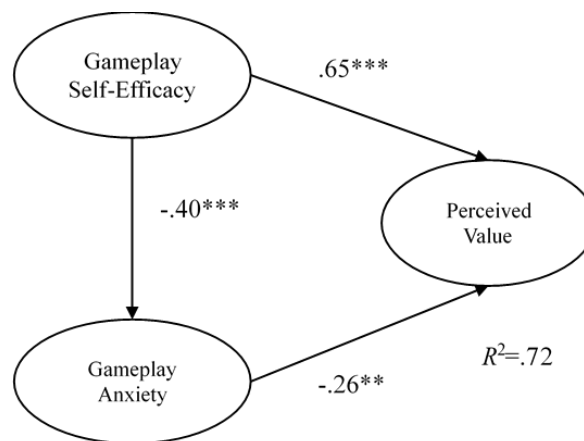


Figure 2. Verification of research model

## 5. Findings

The result of this study shows that students' gameplay anxiety is influenced by gameplay self-efficacy. When the student has higher gameplay self-efficacy, they will have lower gameplay anxiety. The result also shows that students' perceived value may influence by their gameplay self-efficacy and gameplay anxiety. It reveals that students' perceived value is influenced by their feeling of gameplay self-efficacy and gameplay anxiety. If the students have higher gameplay self-efficacy, they will have higher perceived value, and if they have lower gameplay anxiety, they may also have higher perceived value.

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