

## Introduction

Board games have long been thought of as toys for children that centered around luck and minimal strategy to win the game, such as "Candy Land" or "Sorry!". However, there is an entire world of board games unknown to a huge portion of the public, but it seems that they are gaining popularity as new games are being produced and targeted towards millennial consumers (Graham, 2016).

The type of games that are picking up traction are those that steer away from luck driven mechanics and move towards strategy, such as Catan (Graham, 2016). Catan is an example of an introductory or "light-weight" Eurogame, which are games specifically designed to rid themselves of luck-based mechanics (Board Game Geek, n.d.). Eurogames are a genre of strategic board games that usually involves indirect conflict between players competing for resources and/or points to achieve victory; there is very little to no luck or randomness within the games, but rather, ability to problem solve and recognize patterns – critical skills for game success.

The current study explored the relationship between pattern recognition ability and the frequency and complexity of participant board game play, focusing specifically on Eurogames as an initial test of our hypotheses about the possible link between the nature of these games and pattern recognition.

We hypothesized that (1) the frequency of Eurogame-play would be a significant predictor of pattern recognition scores, after controlling for education, gender, race, and other genres of board games, (2) complexity rating of Eurogames specifically (i.e., the "weight" of the game) would be a significant predictor of pattern recognition scores, after controlling for education, gender, race, and other genres of board games, and (3) interaction between weight and frequency of the Eurogame play reported would be a significant predictor of pattern recognition assessment scores, after controlling for education, gender, and race.

## Participants

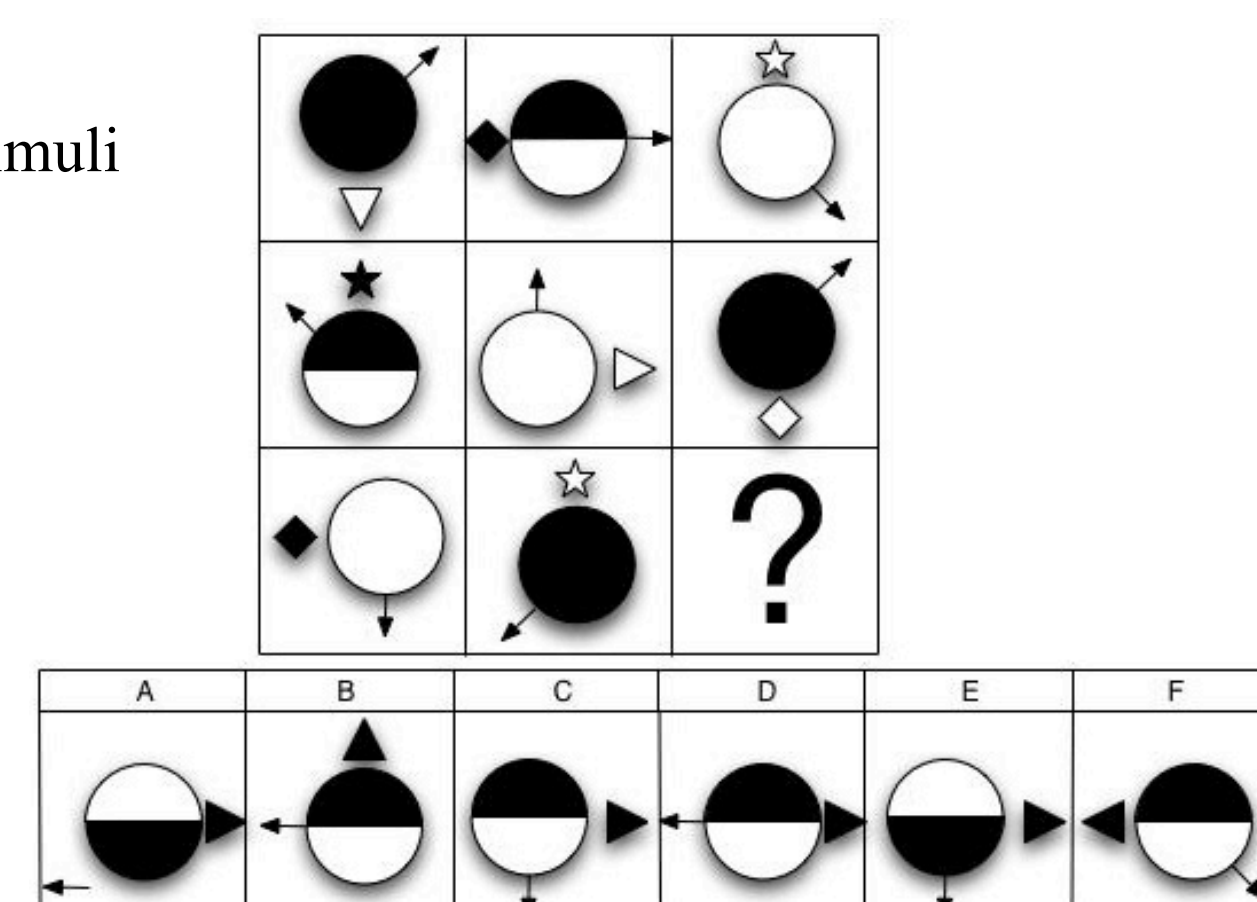
374 participants were recruited from Baruch College's Undergraduate Subject Pool (n=237) as well as online board gaming forums (n=137). Demographics are presented in **Table 1**.

Table 1. Demographics		N	%
<b>Age</b>	18 - 24	226	60.4
	25 - 34	70	18.7
	35 - 44	40	10.7
	45 - 54	20	5.3
	55 - 64	13	3.5
<b>Gender</b>	65 - 74	5	1.3
	Male	198	52.9
	Female	176	47.1
<b>Race</b>	Latino	37	9.9
	Black/AA	13	3.5
	White	179	47.9
	Asian	115	30.7
	Other	30	8
<b>Education</b>	> High School	2	0.5
	High School	104	27.8
	Some College	84	22.5
	College or Higher	184	49.2

## Methods

Participants were given measures of demographics and game-playing experience, and were then presented with an online pattern recognition assessment. Participants were asked how often they play board games in general and how often they play specific genres of board games (a description of each genre was provided). To measure participants' level of pattern recognition, an assessment tool designed to assess one's ability to recognize visual patterns was employed, known as Matrix Reasoning, from the International Cognitive Ability Resource Project (Condon & Ravelle, 2014), presents participants with 11 items of varying difficulty (see example item below in **Figure 1**).

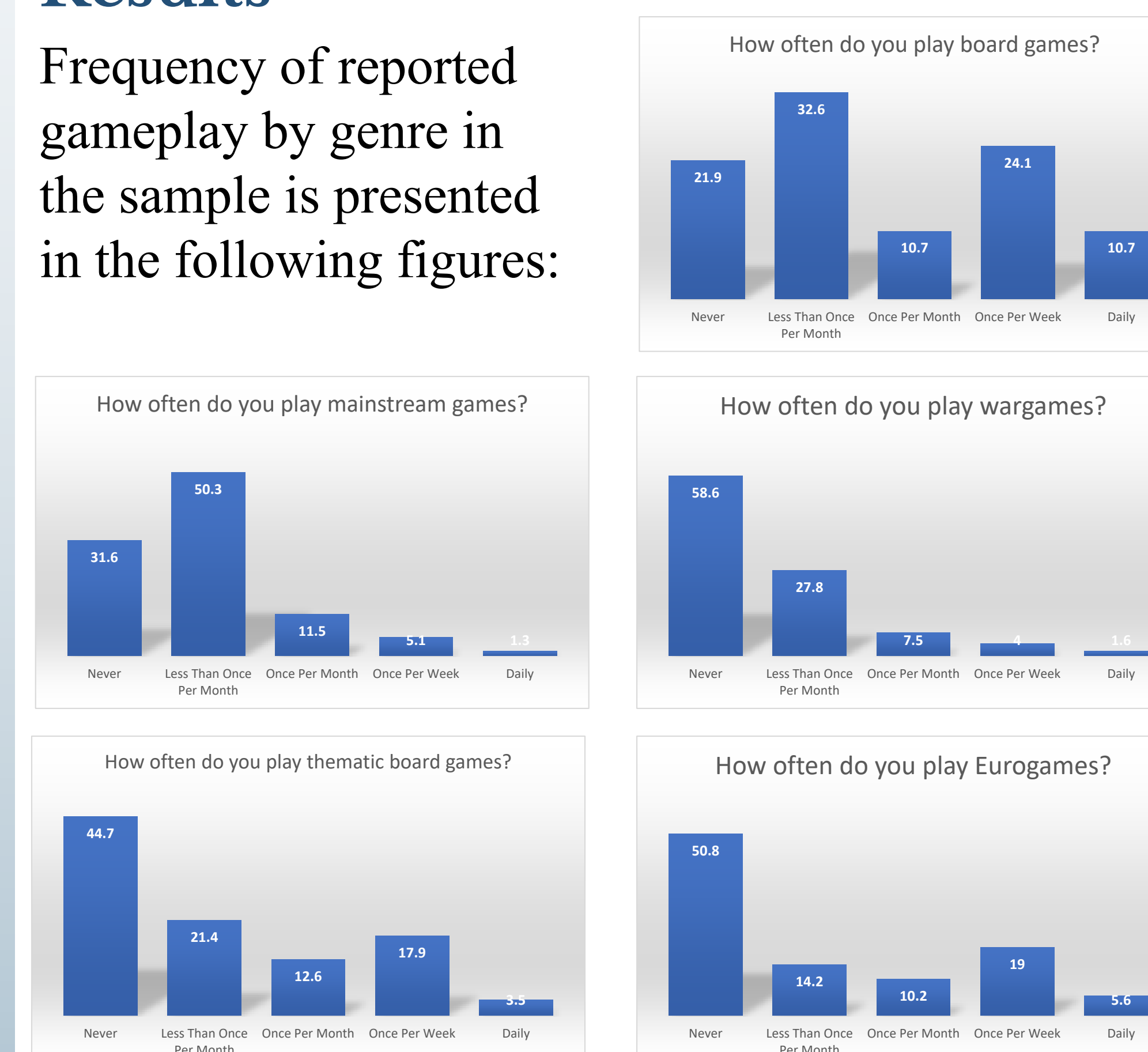
Figure 1. Example Stimuli



Participants were not time limited, and took 11 minutes on average to complete the task. Scores on this assessment were analyzed with game playing behavior in order to test our hypotheses.

## Results

Frequency of reported gameplay by genre in the sample is presented in the following figures:



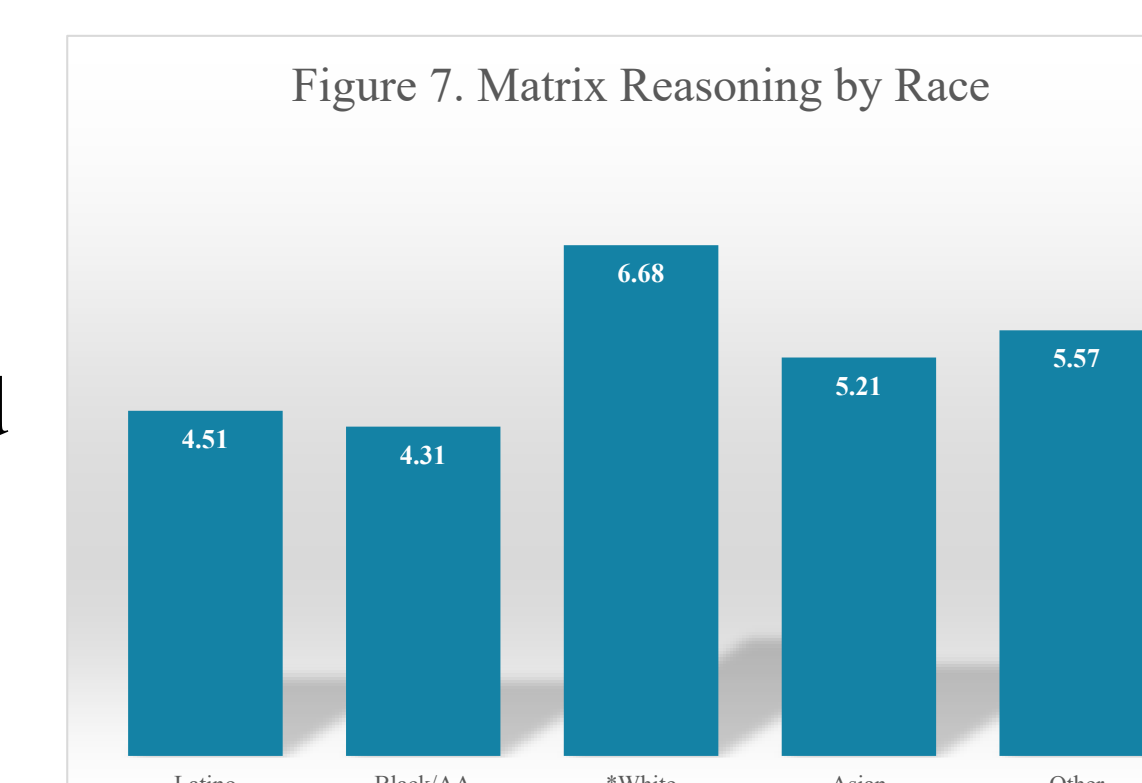
Demographic group comparisons revealed a number of significant differences in gameplay frequency based on race, education level, gender.

With regard to race, White participants reported significantly higher gameplay frequency than all other racial/ethnic groups for Any Board Games ( $p < .001$ ), Abstract Strategy Games ( $p < .006$ ), Thematic Games ( $p < .001$ ), and Eurogames ( $p < .001$ ).

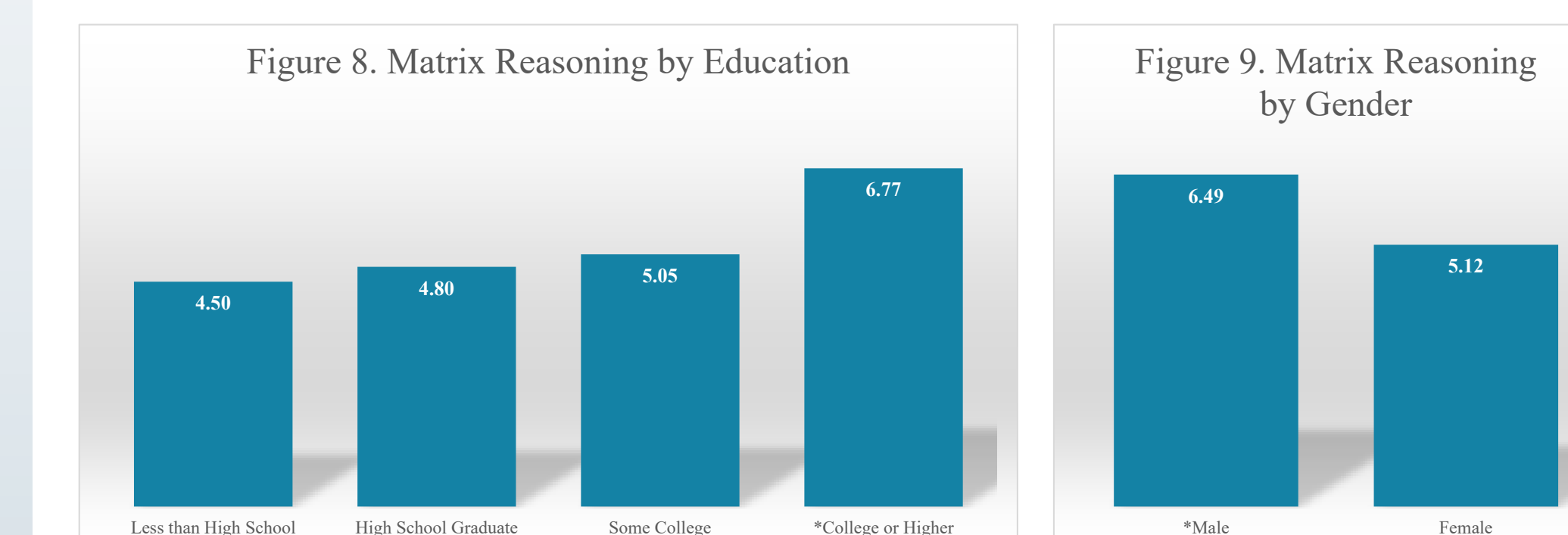
With regard to education, participants with a college degree or greater reported significantly higher gameplay frequency for Any Board Games ( $p < .001$ ), Abstract Strategy Games ( $p < .01$ ), Thematic Games ( $p < .001$ ), and Eurogames ( $p < .001$ ).

With regard to gender, Male participants reported significantly higher gameplay frequency for Any Board Games ( $p < .001$ ), Abstract Strategy Games ( $p < .002$ ), Thematic Games ( $p < .001$ ), Wargames ( $p < .001$ ), and Eurogames ( $p < .001$ ).

Matrix Reasoning analyses also revealed significant differences by race, education, and gender (all  $ps > .001$ ). See Figures 7-9.



## Results



In order to evaluate the unique relationship between gameplay and pattern recognition, we conducted a regression analysis examining frequency of gameplay by genre as a predictor of Matrix Reasoning scores, controlling for race, education, and gender. Results showed that frequency of Thematic ( $p < .023$ ) and Eurogame ( $p < .001$ ) play were significant predictors of Matrix Reasoning scores when controlling for race, education, and gender. No other game genres emerged as significant predictors of pattern recognition. Analyses of game complexity ("weight") and weight by frequency interactions had no significant findings.

## Conclusion

Our findings demonstrate that the frequency of playing Eurogames and Thematic games is associated with higher pattern recognition skills as measured by Matrix Reasoning scores, even when accounting for the effects of race, education, and gender.

Additional research is needed to determine a possible causal relationship between gameplay and pattern recognition skill. However, if future research can establish such a link, it may be possible that incorporating or adapting Eurogames and Thematic games for classroom settings could have a positive impact on developing one's ability for pattern recognition, which is a critical skill for problem-solving in many academic and occupational domains. Our study focused on participants 18 years or older, with the majority of our sample of college age, thus higher education settings may be an ideal initial focal point for attempts to incorporate Eurogames and Thematic games into the classroom. As these games continue to grow in popularity, future research exploring their potential cognitive benefits in educational settings is warranted.