

# The Relationship Between Body Image Concerns and 3D Shape Discrimination

Paige Osborn, Eric Egan & Catherine Walker

UNION  
COLLEGE

Anorexia Nervosa (AN) and Body Dysmorphic Disorder (BDD) are both characterized by a disturbance in the evaluation of body image. Individuals with anorexia can be described as having an overwhelming fear of gaining weight, the use of compensatory methods to avoid weight gain (restricting food, exercise, diet pills, etc), and a preoccupation with body shape and size.

Individuals with BDD share the preoccupation on perceived flaws in appearance, but tend to focus on smaller details such as skin, or facial features. While some symptoms of anorexia are specific to the acute stage of their illness, their heightened attention to detail and impaired visuospatial processing, may be present before the manifestation of the disordered eating, and persist after weight has been restored through treatment. Neuropsychological measures of central coherence suggest that both BDD and AN may be somewhat rooted in dysfunction in visuospatial processing and integration of local and global detail.

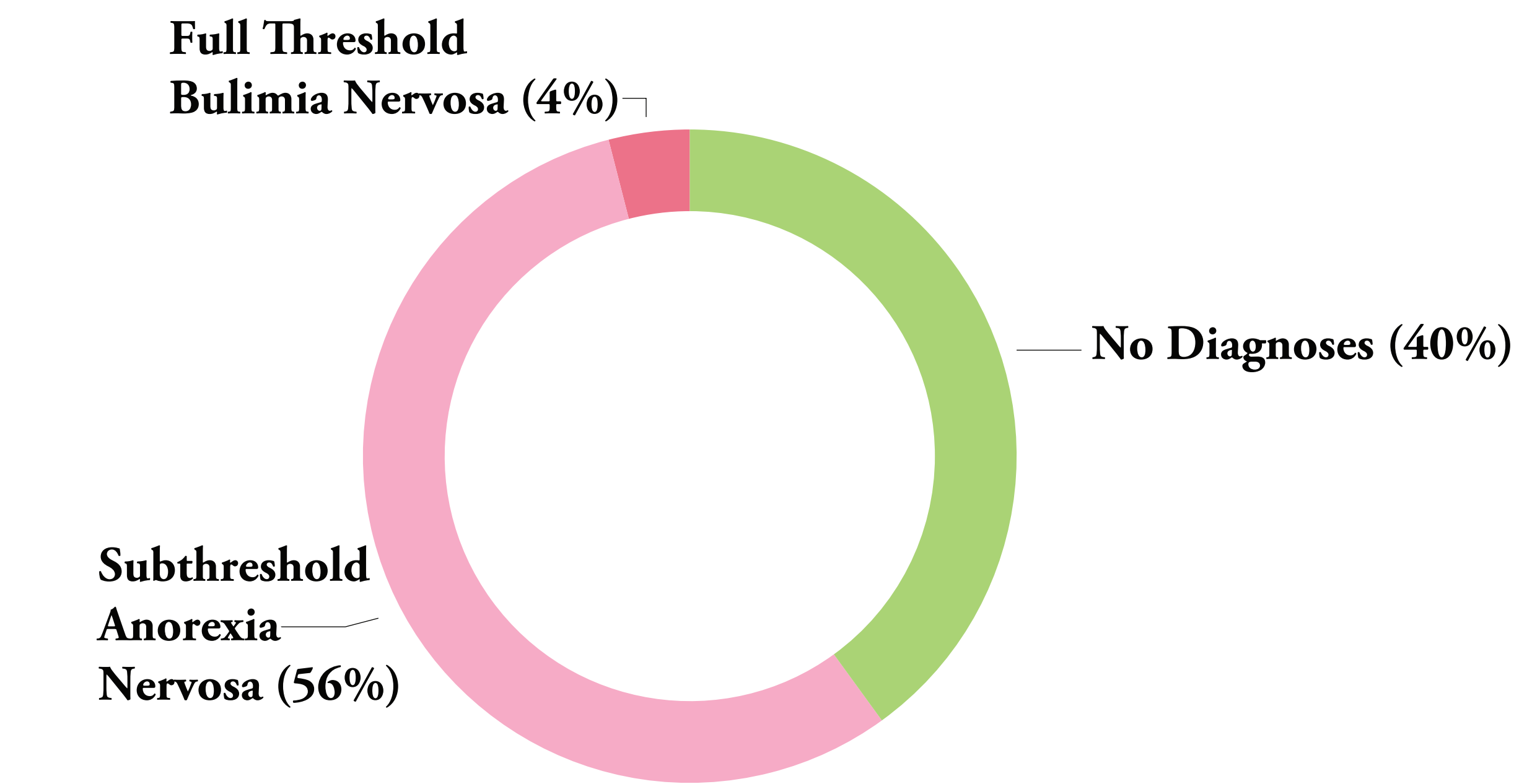
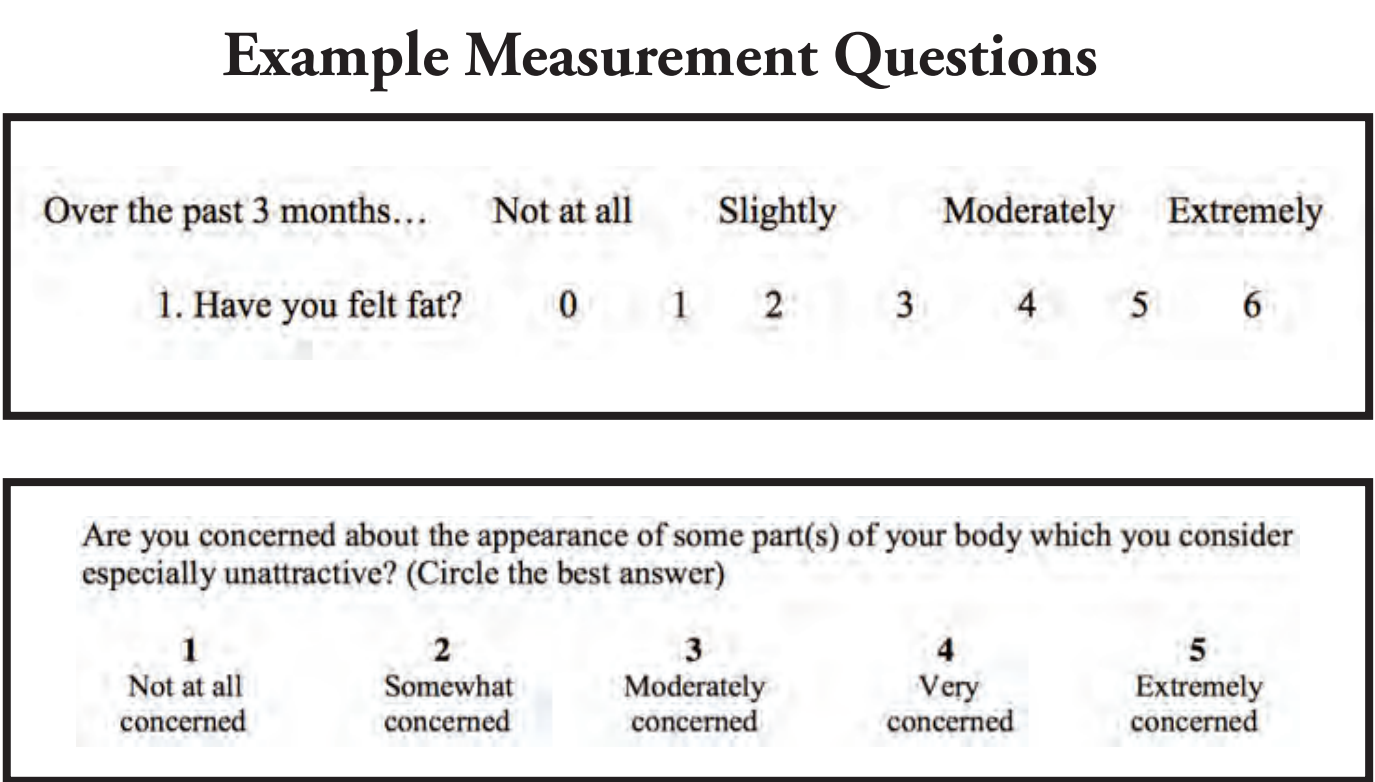
**Hypothesis 1:**  
The main aim of this study is to investigate visuospatial processing biases in females with a range of Body Image Concerns (BIC). Those with higher BIC may show a superior performance on a visual discrimination task, particularly for stimuli higher of difficulty.

**Hypothesis 2:**  
Whether or not symmetry facilitates 3D shape constancy is still debated in the field. The secondary aim of this study is to investigate how symmetry contributes to this increased shape constancy and to identify any interactions with BIC measurements.

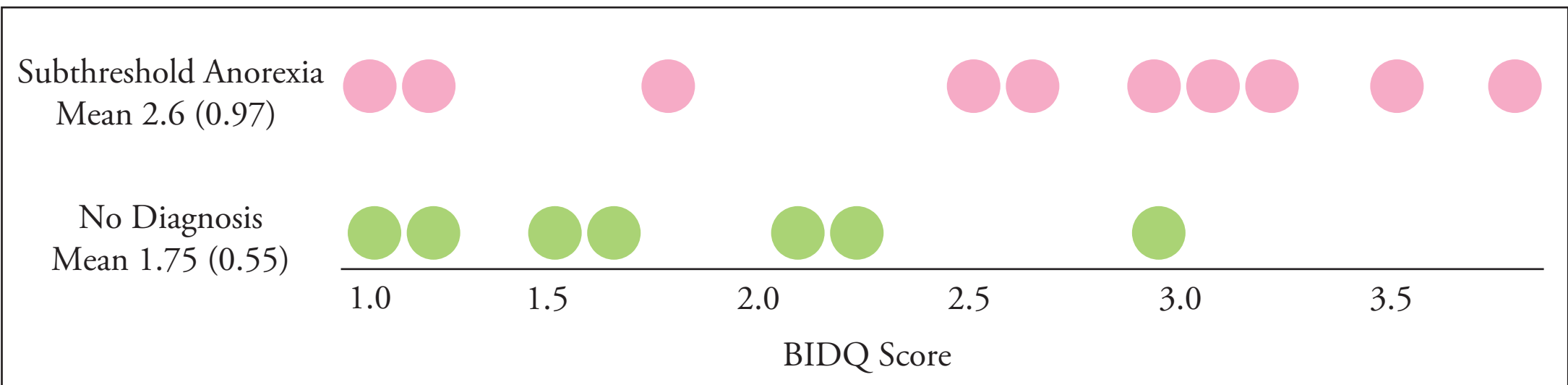
**Measures:**  
To measure Body Image Concerns, two measures were used.

The Eating Disorder Diagnostic Scale (EDDS) was used to assess eating disorder symptomatology and give a tentative diagnosis.

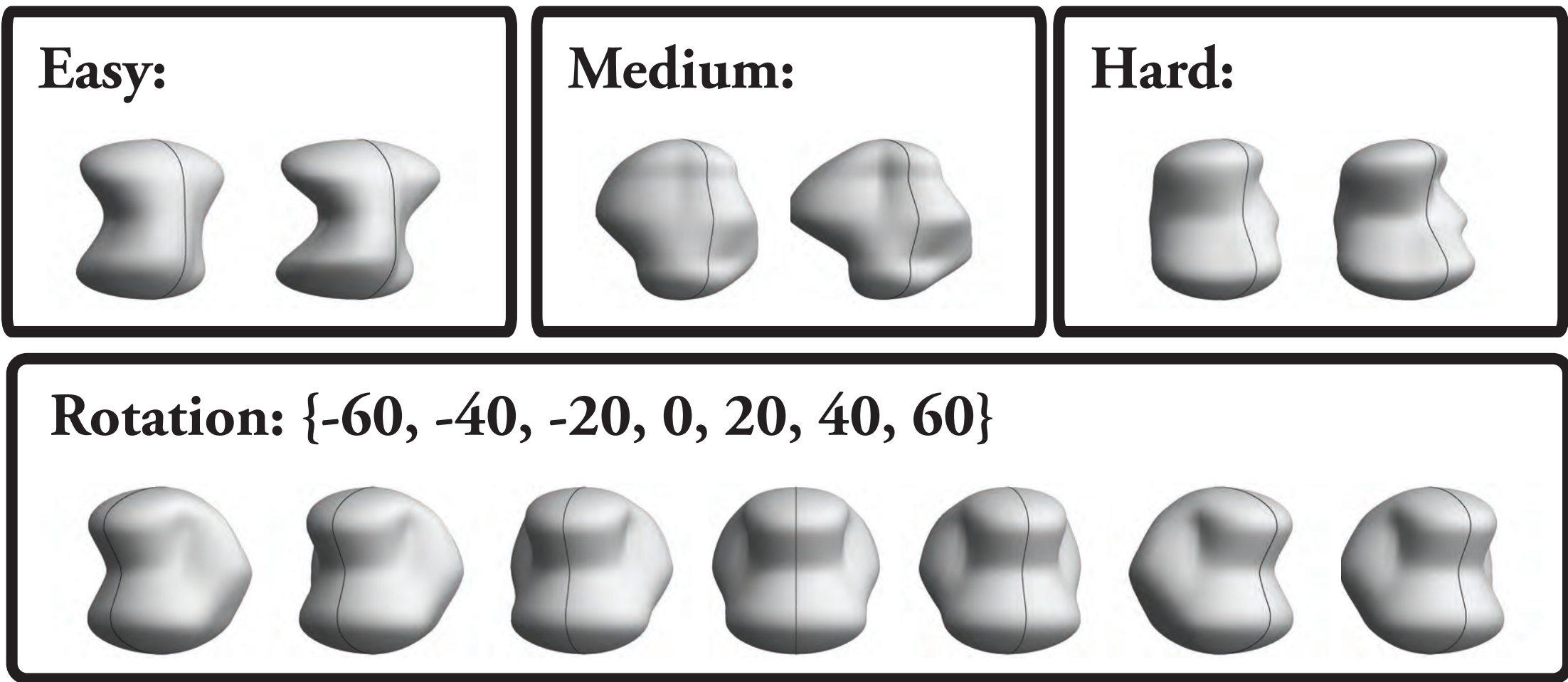
The Body Image Disturbance Questionnaire (BIDQ) was used to assess body dysmorphia symptoms.



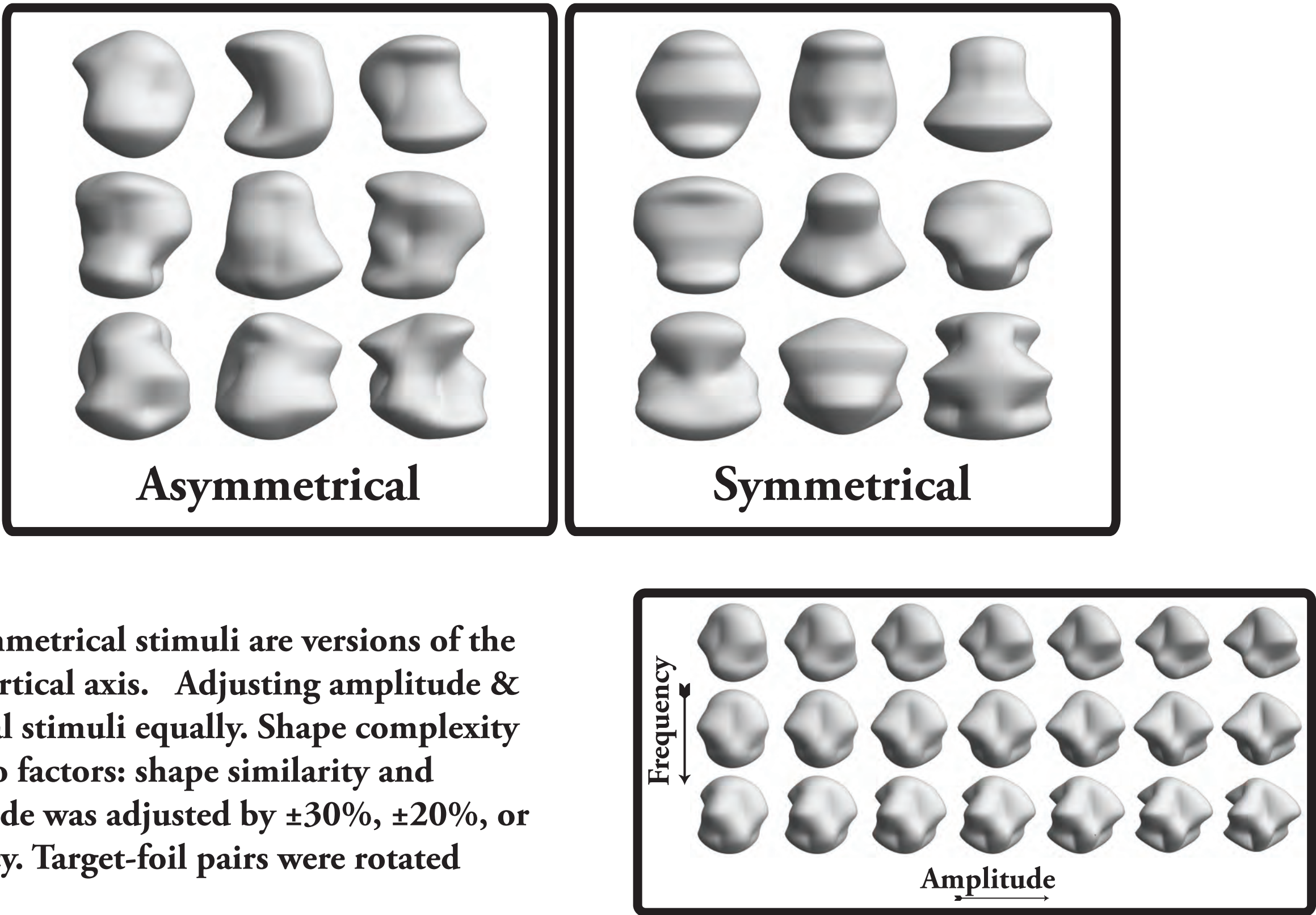
Although the study was not advertised as being about body image, 14 of 25 (56%) subjects scored as having sub threshold anorexia nervosa on the EDDS. One (4%) of subjects scored as having full threshold bulimia.



A t-test revealed a significant difference in BIDQ score depending on EDDS group such that those who received an eating disorder diagnosis were significantly higher than those who received no diagnosis.

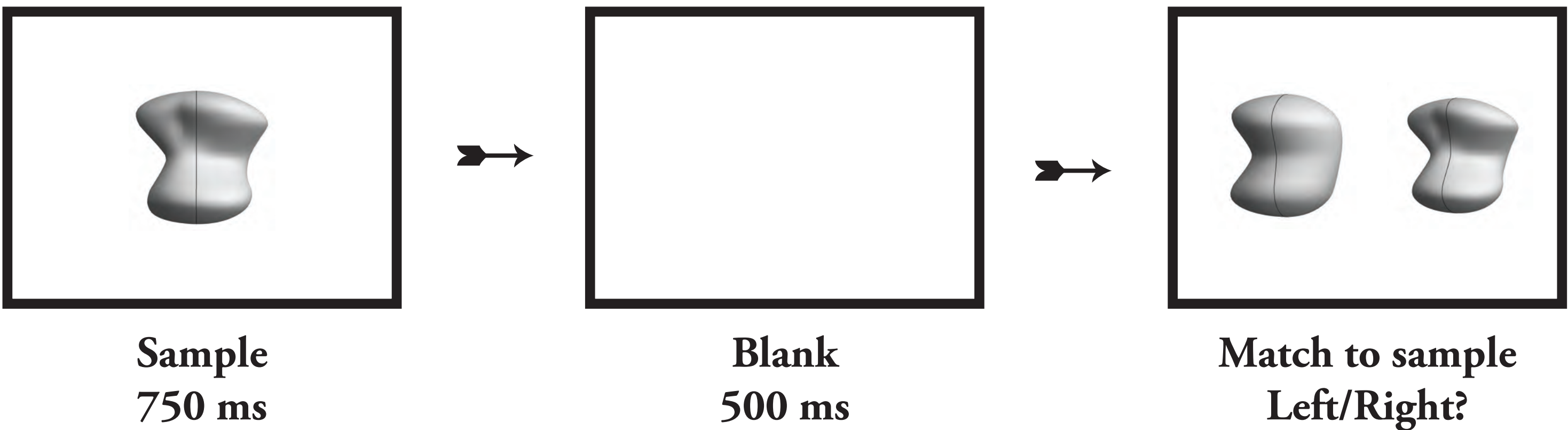


**Stimuli:**  
Globally convex 3D shapes were generated by deforming a 3D cylinder with a random noise function. Symmetrical stimuli are versions of the asymmetrical stimuli that were smoothly mirrored across a plane of symmetry that intersects the central vertical axis. Adjusting amplitude & frequency of the random noise function affects the shape complexity of both asymmetrical and symmetrical stimuli equally. Shape complexity increases as a function of both frequency and amplitude. Discrimination difficulty was manipulated by two factors: shape similarity and magnitude of stimulus rotation. To manipulate shape similarity, the sample stimuli noise function amplitude was adjusted by  $\pm 30\%$ ,  $\pm 20\%$ , or  $\pm 10\%$  to created easy, medium or hard foils, respectively. Target-Foil pairs always shared the same frequency. Target-foil pairs were rotated about their central vertical axis by  $\pm 20^\circ$ ,  $\pm 40^\circ$ , or  $\pm 60^\circ$  relative to the original target stimuli.



**Task:**  
Twenty-five observers each performed 864 match-to-sample trials. Each trial consisted of a 750 ms sample stimulus presentation, a 500 ms white screen, and a Target-Foil pairing that was presented until a keyboard response.

The random block design had 36 factorial combinations (2x2x3x3) produced by symmetry (2), contour presence (2), shape similarity (3), & degrees of rotation (3).

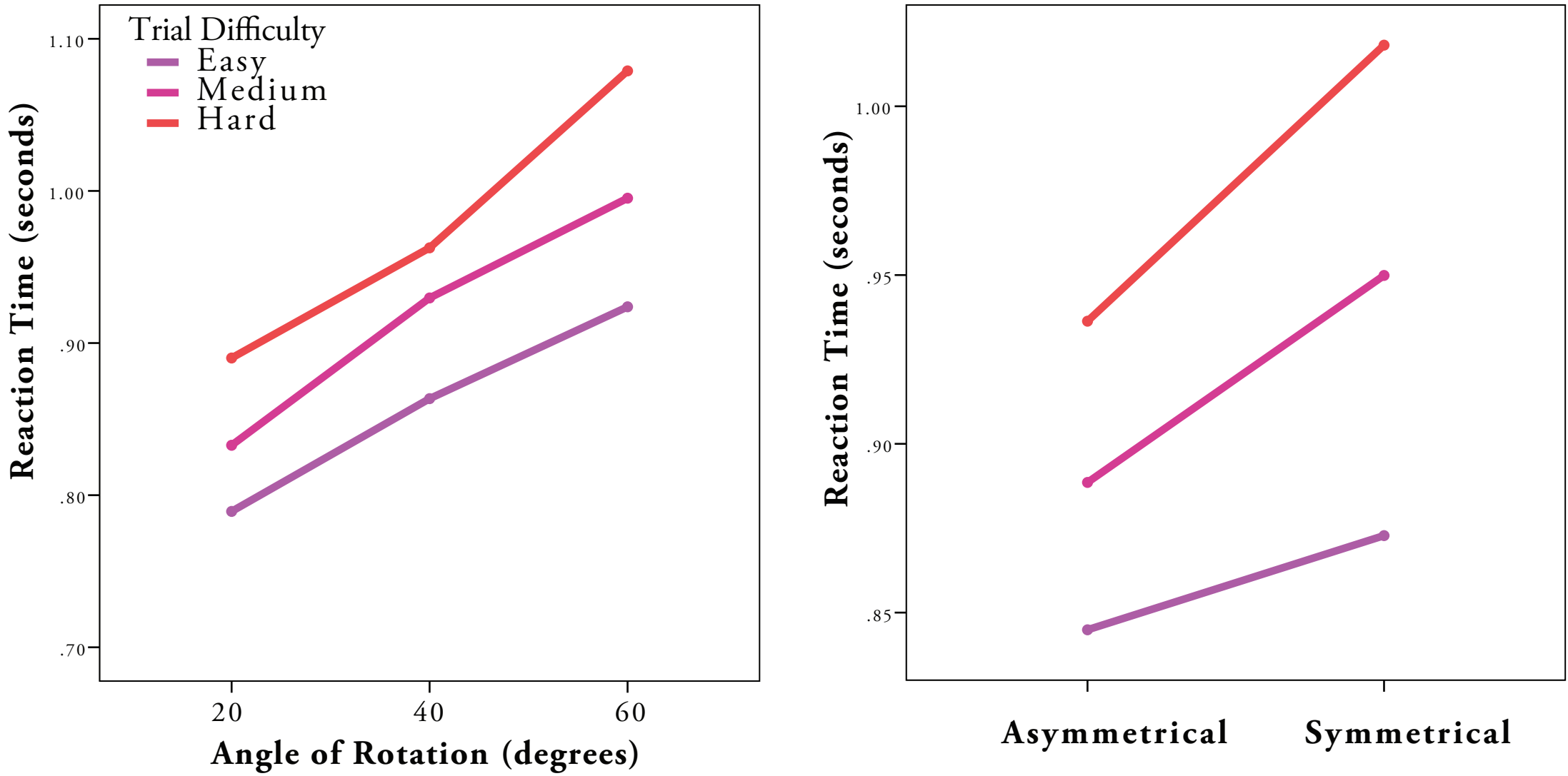
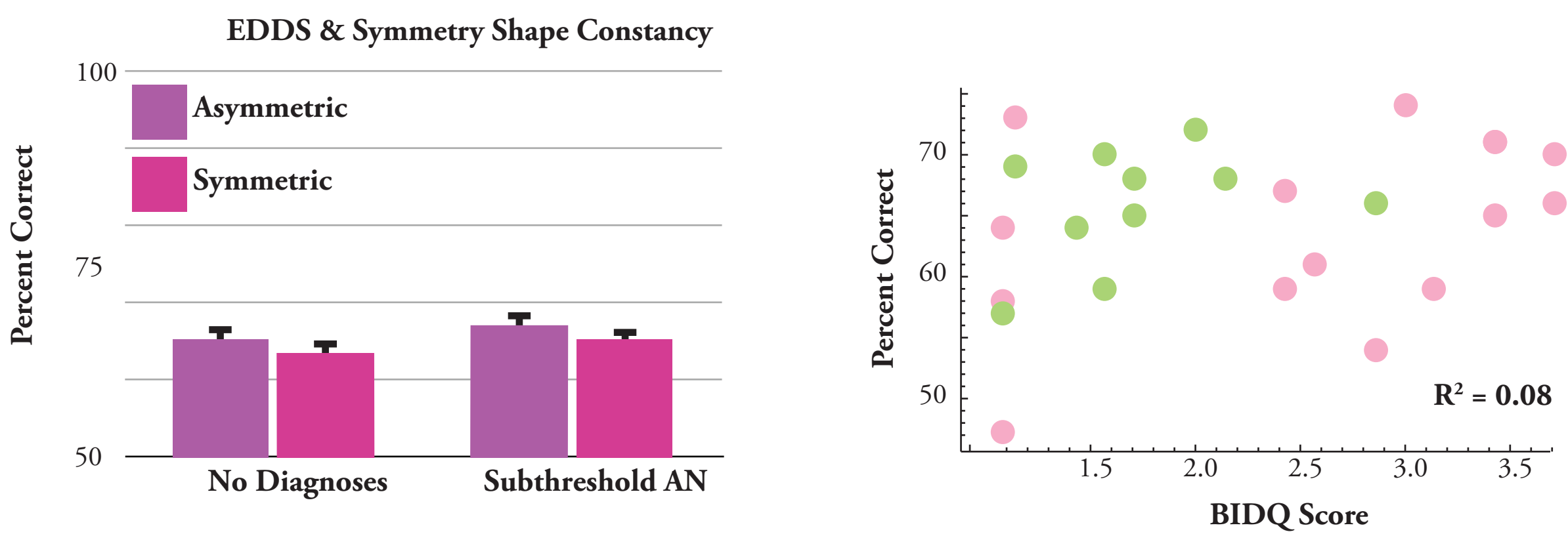
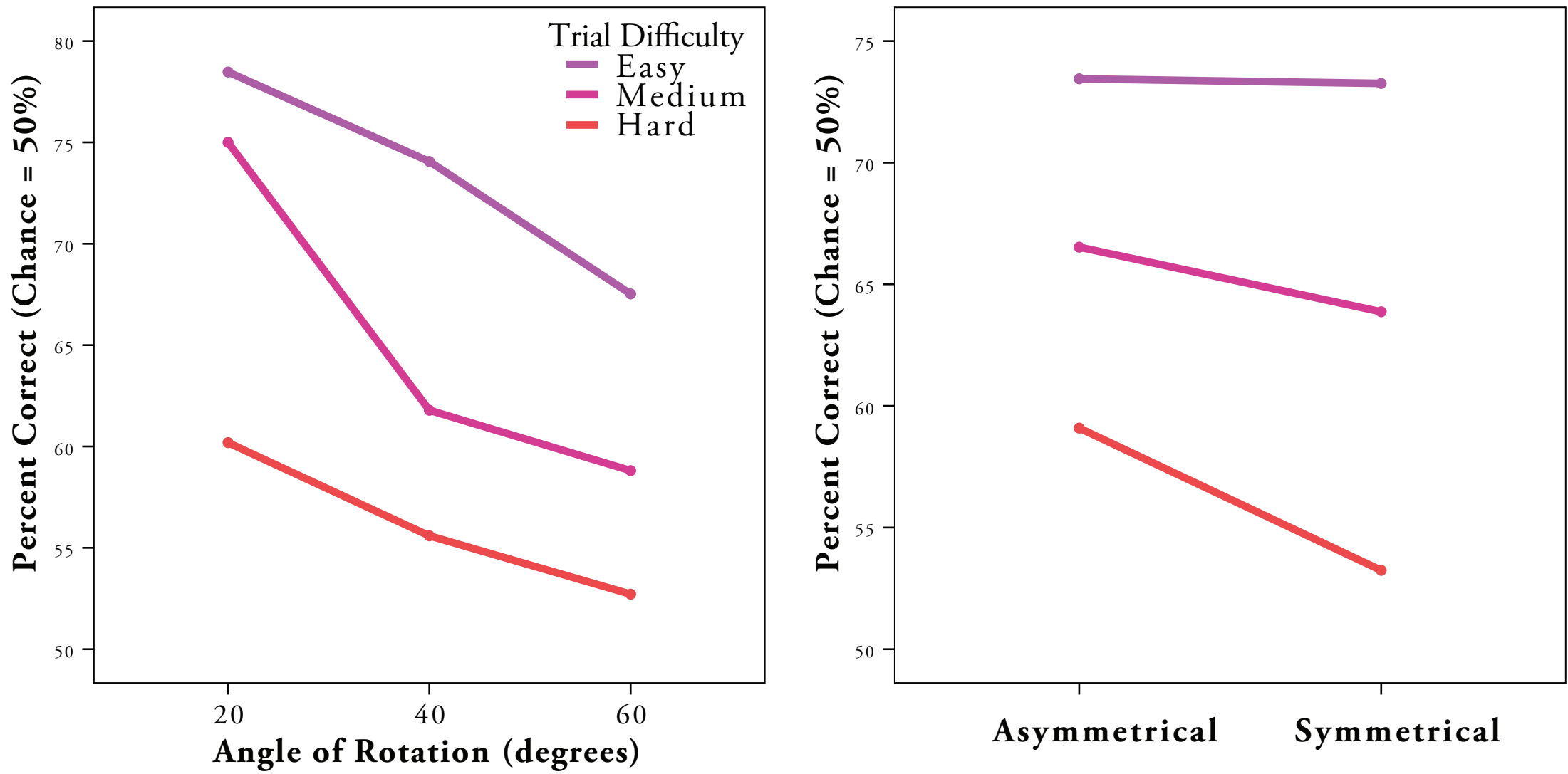


**Results:**  
A 4-way within subjects ANOVA was conducted on the data. There were no significant effects of EDDS or BIDQ scores on performance, all  $p > .05$ .

There was a main effect for symmetry,  $F = 20.1$ ,  $p < .005$ ,  $df(1,24)$  where symmetrical objects had lower performance. This main effect was qualified by a significant interaction,  $F = 4.2$ ,  $p < .05$ ,  $df(1,24)$  such that the performance differences between asymmetrical and symmetrical objects were only found for the hardest difficulty trials.

As expected, there was a significant main effect for difficulty such that accuracy on the task decreased as the stimuli became more difficult,  $F = 141.9$ ,  $p < .001$ ,  $df(2,24)$ . There was also a main effect for rotation, with accuracy decreasing as stimuli were further rotated,  $F = 31.7$ ,  $p < .001$ ,  $df(2,24)$ .

There were significant results for reaction time that mirrored the results for accuracy.



**Conclusion:**  
While unfortunately there were no results in terms of Body Image Concerns, the results about object symmetry are contradictory to previous studies which found symmetry to aid in shape constancy. Furthermore, previous research on shape constancy concerning angle of rotation and difficulty were replicated.