What's In a Face?

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Duke UNIVERSITY | BASS CONNECTIONS

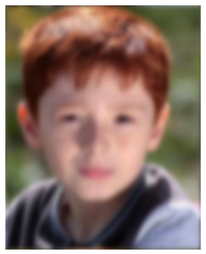
MAKING FACES
Art, Vision & the Brain

Project Summary: In order to better understand how humans process faces, we observed how the perception of human, non-human and digitally altered faces differs within a neurotypical subject population.

Objectives:

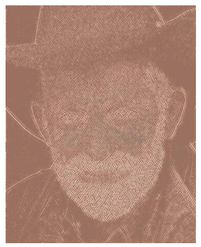
- To use eye-tracking to investigate how the brain processes images of faces.
- To explore how facial information affects gaze patterns.
- To understand how gaze patterns are related to various personality traits and social cognition.
- To establish a neurotypical control group for use in future research.

Low Spatial Frequency



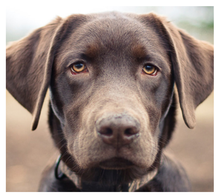
Spatial frequency refers to the level of detail in an image. Lower frequencies have coarser detail and smoother edges. Previous studies show that low frequency information draws eyes to faces.

High Spatial Frequency



Higher frequencies include fine details and sharper edges. We presented images with only low frequency (far left) or high frequency (left), to determine how spatial frequency affects gaze patterns.

Animal Faces



Gaze patterns with animal faces have not been studied despite the prevalence of animal-assisted therapy in autism interventions.

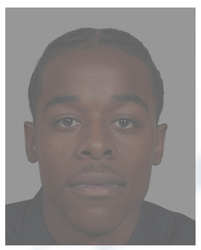
Face-like Objects

People tend to see face-like patterns in random objects, and these images were included to better understand this psychological phenomenon.

Grayscale

Facial processing studies commonly use grayscale images even though they are less naturalistic. We investigated whether they elicit the same gaze patterns as color images.

Contrast Filtered



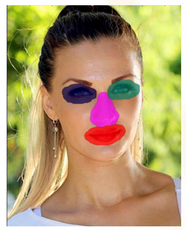
Previous studies show that overlaying a colored filter over a picture or block of text can help subjects with autism better process the information in the image.

Future Research:

Future research will investigate how the results of the eye-tracking experiment done with an autistic population will compare to the results of the neurotypical control group already studied. Previous studies have suggested differences in certain gaze patterns.

Methods:

We measured subjects' gaze patterns using eye-tracking in order to measure the proportion of time spent on the four core areas of the face: left eye, right eye nose and mouth.

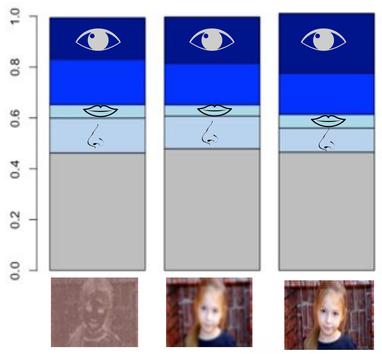


After the eye-tracking task, subjects completed the Broad Autism Phenotype Questionnaire.

Broad Autism Phenotype Questionnaire (BAPQ):

- Neurotypical individuals can still exhibit certain characteristics commonly associated with autism. These characteristics compose the Broad Autism Phenotype
- Subjects whose scores on the BAPQ fall above a certain threshold (3.15) correlate with the autism phenotype.

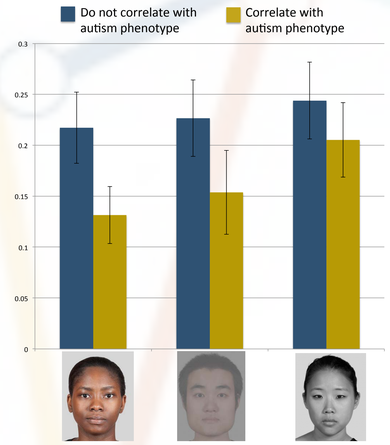
Spatial Frequency Filters Lessen Gaze Time Spent on Eyes



When spatial frequency filters were applied to images of faces, subjects spent less time looking at the eyes of these images relative to unfiltered faces and spent more time looking at the nose.

Findings:

Performance on the BAPQ does not predict time spent on eyes for grayscale and contrast-filtered images

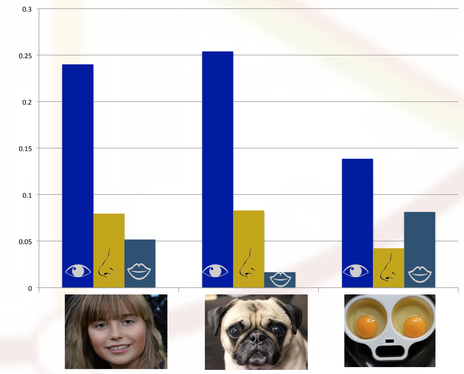


Previous studies show that subjects with autism spend less time on the eyes of facial images than neurotypical subjects.

However, subjects whose BAPQ scores correlated with the autism phenotype did not spend less time on the eyes of filtered or grayscale facial images.

Our results show that grayscale and filtered images fail to elicit the decrease in eye dwell time expected in an autistic population—implying that they do not prompt the same gaze patterns as naturalistic images.

Gaze Patterns Similar Across Human, Animal, and Face-like Objects



Results suggest that neurotypical individuals look at human faces, animal faces, and face-like objects in similar patterns, establishing a baseline control for future comparisons with how autistic individuals look at different kinds of faces.

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