INTRODUCTION

• Humans readily attribute animacy to and infer mental states from movements of 2D geometric shapes (1).
• Previous studies have found interindividual differences in performance in these Heider-Simmel style tasks: Individuals with ASD perform worse than neurotypicals when making mental state inferences from animations (2).
• These differences have in part been linked to movement kinematics: Neurotypicals show poorer performance when interpreting the higher jerk trajectories in animations, we used a well-established method developed by Huh & Sejnowski (4).
• At present it is unclear which other factors contribute to performance in interpreting Heider-Simmel style animations.
• We were interested whether the shape trajectories of the triangles’ movements played a role in their interpretation.
• For quantifying the presence of different types of trajectories in animations, we used a well-established method developed by Huh & Sejnowski (4).

METHODS

Stimuli
• 52 healthy participants created 45 sec. long Heider-Simmel style animations of 5 target words by moving 2 triangles on a touch-screen device.
• Target words: mocking, seducing, surprising, following and fighting.
• The final stimulus set contained 203 animations with an average of 41 videos of each word.

Procedure
• 36 naive observers viewed 8 animations of each target word that were pseudo-randomly selected from the stimulus set.
• After viewing each animation, participants rated the extent to which it depicted the target word.

Analyses
• Accuracy was calculated as: rating target word – mean(ratings non-target words).
• For each word, videos were grouped in high- and low-accuracy by median split.
• Power in angular frequency bands (see following box) was compared using permutation testing and cluster threshold multiple comparison correction.
• Using stepwise entry, significant clusters of power were entered into a regression model together with other predictors in the following order:
  1. Significant power cluster
  2. Velocity, acceleration, jerk
  3. % of both triangles moving, distance between triangles, rotation
• Hand movements while drawing curved trajectories exhibit regularities that can mathematically be described by the 1/3rd power law, inversely relating speed and curvature.
• The gradient of this relationship between speed and curvature is a function of the shape (= angular frequency band) of the movement trajectory (4).
• Spatial fast Fourier transform (FFT) of log speed was performed to decompose the animations’ curved trajectories into their constituent angular frequency bands
• Previous studies have found interindividual differences in performance in these Heider-Simmel style animations created by individuals with ASD (3).
• These differences have in part been linked to movement kinematics: Neurotypicals show poorer performance when making mental state inferences from animations (2).
• Significant clusters of difference in angular frequency were observed for 2 words: seducing and surprising.
• After entering kinematic variables and other spatial factors into the model, power in angular frequency remains significant predictor only for surprising.
• Trajectory shape plays a significant role in accurate interpretation of some words and in one example explains variance beyond kinematic variables.
• Future studies employing Heider-Simmel style animations should consider trajectory shape as an additional factor that discriminates performance.

REFERENCES