Critical Review:

Dynamic vs static stimuli: Effectiveness in emotion recognition for individuals with Autism Spectrum Disorder

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This critical review examines the effectiveness of dynamic and static stimuli in emotion recognition for individuals with Autism Spectrum Disorder (ASD). A literature search yielded eight case-control nonrandomized clinical trials. Overall results of these studies indicate that there is no significant difference between the use of static and dynamic stimuli in emotion recognition. Clinical implications and recommendations for future research are discussed.

Autism Spectrum Disorder (ASD) is a condition that results in a range of deficits including cognitive, behavioral, language and pragmatic difficulties. Individuals with ASD often demonstrate d

individuals with ASD and the controls did not differ in accuracy between the static and dynamic conditions.

The methods employed in this study were well described and contained extensive validation of stimuli on typically developing individuals prior to their use in the study. Participants in the ASD group were selected based on well-defined criteria. The authors stated that the control group did not contain any autistic features; however they did not explain how this was assessed. This study provides highly suggestive evidence that there is no difference between the use of dynamic and static stimuli in emotion recognition.

Enticott, Kennedy, Johnston, Rinehart, Tonge, Taffe and Fitzgerald (2013) examined the recognition of six basic emotions (anger, disgust, fear, happy, sad and surprise) using static and dynamic stimuli in 36 adolescents and adults with high functioning ASD (M age=25 years; SD=8.83) and 36 typically developing controls matched for gender and age. Participants identified emotions corresponding to static and dynamic stimuli from six written options in a forced choice task. Appropriate regression analysis revealed that both the controls and individuals with ASD achieved higher accuracy for identifying anger when dynamic stimuli were used. The individuals with ASD achieved lower accuracy for identifying sadness when static stimuli were used. All other effects involving motion were not significant.

Overall, participants in both groups were identified using well-established inclusion and exclusion criteria. Limitations of participant selection included the reliance on self-reports to confirm the absence of psychiatric and neurological disorders. As acknowledged by the authors, the stimuli may have minimized the differences between conditions. In particular, the dynamic stimuli ended with a static facial expression that remained onscreen until participants made a decision and the dynamic stimuli were created using morphed static stimuli. This study provides mildly suggestive evidence that there is no significant difference between the use of dynamic and static stimuli in emotion recognition.

Gepner, Deruelle and Grynfeltt (2001) studied the effect of dynamic facial expressions on children with ASD's ability to recognize four basic emotions (joy, surprise, sadness and disgust) in 13 children with ASD (M age=69.38 months; SD=11) and 13 controls matched for gender and developmental level. The participants matched still, dynamic and strobe emotional facial expressions to their corresponding photographic equivalent by selecting from an array of four photographs (1 match, 3 foils). A series of t-tests revealed that children with ASD performed slightly lower than controls in all three conditions and that there was no significant difference in their performance when static or dynamic stimuli were judged.
One inherent limitation of the procedures in this study was that judgments were made by selecting a static photograph in all conditions. Therefore, even the strobe and dynamic conditions had a static element. In addition, the authors acknowledge that the still images may have contained small movements. Therefore, the static images may have contained a dynamic element. One limitation of the statistical analysis was that a series of t-tests were used rather than a single omnibus ANOVA without providing justification. A series of t-tests increases the risk of a type 1 (false positive) error. This study provides mildly suggestive evidence that there is no difference between dynamic and static stimuli in emotion recognition.

Tardif, Laine, Rodriguez and Gepner (2007) conducted a study that replicated and expanded on the Gepner et al (2001) study. In a forced choice task involving matching expressions to a photograph, judgments were made about emotional facial expressions according to 2 variables, only the first of which is relevant to the present review: 1) static and varying degrees of dynamic (very slow, slow and normal speed); 2) silent and audio. Participants included 12 children with ASD (M age= 10;5 ; SD= 2;6) and two age-matched typically developing control groups additionally matched for either verbal mental age or nonverbal mental age. Appropriate ANOVA revealed the following results: 1) children with ASD performed significantly poorer than their matched control groups on all conditions; 2) children with ASD were significantly better at facial emotion recognition in the slow condition; 3) children with moderate to severe ASD performed significantly better in the slow and/or very slow condition compared to children with mild ASD.

design ANOVA revealed no significant difference between the use of static and dynamic stimuli in emotion recognition for individuals with Asperger syndrome and for controls.

Participants in both groups were identified using well-established inclusion and exclusion criteria. One limitation of the methods was that the dynamic stimuli ended with a static image. This study provides highly suggestive evidence that there is no significant difference between the use of dynamic and static stimuli in emotion recognition.

Speer, Cook, McMahon and Clark (2007) examined the gaze fixation duration of 12 children and adolescents with ASD (M age=13.6 years, SD=2.7) and 12 gender, chronological age and verbal intelligence matched controls. Six facial regions (eyes, mouth, body, other facial features, object, and off) were examined according to two variables: 1) isolated and social; 2) static and dynamic. Appropriate ANOVA and planned contrasts revealed that for the social-dynamic condition participants with ASD spent a significantly shorter duration looking at the eyes and a marginally longer duration looking at the body compared to the control group. All other comparisons were non-significant.

Participants in both groups were selected using well-established inclusion and exclusion criteria. The analysis was strengthened by a high inter-rater and test-retest reliability for coding eye gaze fixation duration in the dynamic condition. However, a limitation was that inter-rater and test-retest reliability were not reported for the static condition. This study provides mildly suggestive evidence that there is a significant difference in the eye gaze strategy used by individuals with ASD when viewing emotional dynamic and static stimuli.

Falkmer, Bjallmark, Larsson and Falkmer (2011) examined the number and duration of eye gaze fixations on the eyes, mouth and other facial features in 15 adults with Asperger syndrome (M age= 26.5 years; SD=9.6) and 15 age and sex matched controls while viewing static (no emotion and emotion) and interactive dynamic stimuli. The interactive dynamic condition involved a dialogue between the researcher and participant. Appropriate t-tests and Wilcoxon's signed rank tests revealed that all but one participant with Asperger syndrome and the entire control group used similar

Speer et al (2008) reported that when viewing social dynamic stimuli, individuals with ASD tend to spend less time looking at the eyes and more looking at the body compared to controls. This finding is significant because it suggests that individuals with ASD employ different visual strategies when viewing dynamic stimuli compared to static stimuli. In the five studies examining the accuracy of emotion recognition, only the face was provided in the stimuli. Considering Speer et al's findings, different results may have been obtained if a full body view was used in these studies rather than only a facial view. Contrary to the results of Speer et al, Falkmer et al (2011) found that individuals with ASD employ similar visual strategies when viewing static and interactive dynamic stimuli. The authors therefore suggest that findings from eye gaze studies using static stimuli can be generalized to everyday dynamic situations. Given the mixed results of these studies, it is difficult to conclude whether individuals with ASD use different visual strategies when viewing static stimuli such as a picture versus dynamic stimuli such as a social interaction. Further research is required to determine the impact of visual strategies on emotion recognition.

Lastly, one study in this review conducted by Uono et al (2010) demonstrated that individuals with ASD perceive dynamic stimuli to be more emotionally exaggerated. However, the authors do not interpret the significance of this finding in terms of emotion

Harms, M.B., Martin, A., & Wallace, G.L. (2010). Facial emotion recognition in autism spectrum