

Autism and Difficulty Levels in Social Visual Pursuit

TO THE EDITOR: I wish to add a few remarks to the interesting discussion between Ami Klin, Ph.D., et al. (1, 2) and Chantal Kemner, Ph.D., and Herman van Engeland, Ph.D., M.D. (3), focusing on the levels of difficulty that social visual fixation poses to persons with autism. Considering a scale from 1 to 10, I will arbitrarily assign level 8 to the paradigm of Dr. Klin et al., the observation of filmed social scenes. Proportionally, an individual could experience level 9 while being engaged in a real, familiar social situation and level 10 in an unfamiliar one. As for the experiment of van der Geest et al. (4), level 3 could be attributed to looking at drawings in which human figures are not so rich in emotional and expressive data (p. 72 of their article).

At an intermediate level are tasks in which the probands' visual scan paths of photographs of expressive human faces are recorded (5). The graded results registered at these three different levels suggest that the richer the data to be processed, the less that relevant parts of scenes and faces are attended by viewers with autism. In the study by van der Geest et al. (4), low levels of difficulty permit autistic probands to look at human faces and objects in a way that is comparable to that of normal subjects. In the paradigm of Dr. Klin et al. (1), on the other hand, the presence of fluid, emotionally laden visual and verbal interpersonal exchanges overburdens the capacity of the mental apparatus. Individuals with autism automatically move their attention from the zones with the highest content of holistically explorable data (the eyes-nose-mouth area) to the segmentary scanning of lower and/or peripheral parts of the face, seemingly in order to keep inputs at a processable level. They rarely shift from one character to another for the same reason.

I think that in autism a central system of integration of brain functions is at fault, and the consequent reduced web of activation excludes higher abilities, such as the recognition of (complex) social cues. As a consequence, the functional development of cortical areas dedicated to that kind of global simultaneous processing (e.g., the fusiform facial area) is never facilitated because fully using these areas would absorb an excessive amount of mental energies at the expense of more basic abilities, and confusion would ensue. Areas dedicated to a more parsimonious, piecemeal computation of inputs (e.g., the inferior temporal gyrus) are alternatively employed.

References

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Dr. Klin Replies

TO THE EDITOR: Dr. Loddo's speculation is that the critical variable accounting for variable results in the visual scanning of faces by individuals with autism is "level of difficulty." Paradigms using static faces as stimuli are associated with more normative patterns of visual scanning because they place a lower level of stress on the "capacity of the mental apparatus." In contrast, paradigms using dynamic (i.e., video) stimuli place added burden, and therefore, individuals with autism move their attention to "segmentary scanning of lower and/or peripheral parts of the face...in order to keep inputs at a processable level." His hypothesis is that these paradigms stay in a continuum of difficulty, and he theorized some values for the various paradigms as well. His hypothesis is not one of overwhelming affective burden (e.g., too much arousal) but one of overwhelming cognitive burden. Although this is a possibility, we, and apparently other research groups, have no evidence to support or contradict this hypothesis. It is an empirical question that would require some measurement of "burden on mental processes." What we can state, however, is that there is evidence to suggest that typically developing children as young as 4 days old prefer to look at eyes that are looking at them and that by 3 months of age, they are preferentially looking at people's eyes (rather than mouths). Also, in nature, babies do not look at static faces but at dynamic faces moving and talking to them. Therefore, there is some evidence that the level of burden on mental capacities that viewing complex social stimuli exposes people to cannot be too overwhelming. More important, however, we have at present no evidence that looking at static faces in behavioral and neuroimaging experiments and looking at naturalistic social approaches (or our research group's attempt to simulate such situations in our eye-tracking laboratory), in fact, correspond to the same behavioral/cognitive demands and can be mapped onto the same neural systems. This is why our research effort has been to allow for great complexity in the stimuli used in our paradigms while developing highly sophisticated ways of measuring viewers' eye-scanning responses to those stimuli. Typically, researchers have reduced paradigm complexity in order to avoid confounds because measurements were relatively crude. The eye-tracking technology and the methods that we have developed to analyze eye-tracking data give us an opportunity to change this.

Dr. Loddo's hypothesis that "in autism a central system of integration of brain functions is at fault, and the consequent reduced web of activation excludes higher abilities, such as the recognition of complex (social) cues" has partial merit. Indeed, one of the speculations in structural and functional neuroimaging research, as well as the relatively recent findings of possible accelerated head growth in the first 2 years, is that there is reduced connectivity in the brains of individuals with autism. However, one wonders about how much complexity is involved in the scanning of social cues (from a brain integration perspective) when human babies—not to men-