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Editorial Preface

AUTISM: A DIFFERENT PERCEPTION

Our primary objective in proposing and editing this special issue was to provide a forum for the emerging and rapidly expanding area of study of perception in autism. This includes the rethinking and reworking of the predominant theories in light of recent empirical findings, reviews of domain-specific research within the context of advances in basic neuroscience research on perception, and examples of state-of-the art research in this area. Despite the recent growth of interest and activity, as evident in the contributions to this special issue, perception is not exactly a new area of research in the study of autism. Rather, the conceptual roots of the basic tenets and many essential areas of the current work date back to the earliest eras of autism research. For example, both Frith's (1970a, b) findings of the skewing of processing toward superficial, or perceptual, aspects of display materials in pattern recognition and reproduction and Shah and Frith's (1983) discussions of islets of abilities in the Embedded Figure Task in relation to diminished top-down influences and locally oriented processing, can be seen as early precursors of Frith and Happé's (Frith, 1989; Frith & Happé, 1994, this issue) seminal model of weak central coherence (WCC). Similarly, Ornitz's (1974) idea of excessive, poorly modulated and subjectively disturbing sensory input presages some aspects of our Enhanced Perceptual Functioning (EPF) model (Mottron & Burack, 2001; Mottron, Dawson, Soulières, Hubert, & Burack, this issue), the current work on modified imbalance between low and high level visual processes in face recognition (Jemel et al., this issue) and the subjective perceptual experience of persons with autism (Iarocci & MacDonald, this issue). Other significant contributions in the 1970s and 1980s included papers on face processing (Hobson, Ouston, & Lee, 1988; Langdell, 1978; Volkmar, Sparrow, Rende, & Cohen, 1989), basic auditory processing (Martineau, Laffont, Bruneau, Roux, & Lelord, 1980), and sensory modulation (Kootz & Cohen, 1981; Kootz, Marinelli, & Cohen, 1982).

Despite the promising contributions of the early research on perception, this area took a back seat to the empirical work on social-cognitive and social-emotional functioning during the latter part of the 1980s and much of the 1990s. During this time, the shift in focus in autism research was evident both in the vast literature on social processes, especially joint attention and theory of mind (ToM), and in the emphasis on markers of reciprocal social interactions and communication in the development of diagnostic tools. The diminished role of the domain of restricted interests and repetitive behaviours, including perception-based manifestations, in the DSM-IIIR and DSM-IV reflected a general consensus that these manifestations were not considered specific to autism, and therefore only peripherally relevant to diagnosis or research.

The rejuvenation of research on perception in autism was spurred on by the increasing prominence of cognitive neuropsychology in the realm of psychological research (for a discussion, see Ozonoff, 1997), the initial empirical support for the WCC model (Frith, 1993), and the questioning of the explanatory power of ToM and other social-cognitive theories (Frith & Happé, 1994). After an initial period in which only basic intelligence tests were used, early examples of this work included experimental tasks with responses that could be measured with short reaction times of less than 1 or 2 seconds, the systematic manipulation of independent variables (e.g., Burack, 1994; Mottron & Belleville, 1993; Ozonoff, Strayer, McMahon, & Filloux, 1994), and even the occasional use of state-of-the art electrophysiological measurements (e.g., Kemner, Verbaten, Cuperus, Camfferman & van Engleland, 1994). This work on perception in autism blossomed quickly to include sophisticated theories of cognitive neuropsychology (e.g., Plaisted, 2001; Plaisted, O'Riordan & Baron-Cohen, 1998), empirical evidence from brain imaging and eye tracking techniques (e.g., Klin, Jones, Schultz, Volkmar & Cohen, 2002; Schultz et al., 2000; for a review, see Kemner, this issue), and the large number of behavioral studies that are cited and reviewed in the various contributions to this issue.

The first section of this issue includes updates of two primary theories of perceptual functioning in autism. In the first, Happé and Frith introduce three modifications to their seminal WCC model. They highlight enhanced local functioning rather than impaired global deficits, reconceptualize the notion of the WCC deficit as a style or bias, and disentangle WCC from social-emotional characteristics of autism. These modifications are discussed with regard to top-down relations and connectivity, which are seen as essential mechanisms of WCC. In the second article, Mottron, Dawson, Hubert, Soulières, and Burack propose an updated version of the Enhanced Perceptual Functioning (EPF) model with eight principles for the study of perception in autism, based on behavioral and functional imaging findings. They introduce new concepts and mechanisms in the actualization of enhanced perceptual functioning.

The second section includes innovative theoretical proposals for perceptual processing within specific domains of study. Kemner and van Engeland suggest that atypical processing of high and low spatial frequencies can account for the characteristic hierarchical processing observed among persons with autism. In this context, the focus is on an absolute, anatomically constrained parameter of vision that may be more robust than the commonly used concepts of global and local functioning, which are defined only in relation to each other. Bertone and Faubert argue against the pathway specific hypothesis, in which global and movement processing are impaired due to a specific disruption of the magnocellular pathway. Rather, they propose a perceptual signature of autism that arises from the disassociation of enhanced discrimination of first order, simple, gratings, defined in relation to luminance, and diminished discrimination of second-order, complex, gratings, defined in relation to texture. Samson, Mottron, Belin, and Ciocca generalize this perceptual signature to the auditory modality. The congruence of perceptual dissociation in the visual and auditory modalities is evidence for a multi-modal model of perception in autism. The potential implications of assessing perception across modalities are further highlighted in Iarocci and MacDonald's discussion of the perceptual experiences of autism. They suggest the study of multi-modal processing as a framework for understanding the experience of sensory overload among persons with autism. In the final paper of this section, Jemel, Mottron, and Dawson challenge the commonly held, and often cited, notion of impairments in face processing among persons with autism. This re-evaluation is relevant to the current focus on differentiating between social and non-social aspects of perception in autism.

In the last section of this issue, new empirical findings on perception in autism are presented. In an effort to disentangle WCC and EPF predictions on atypical microgenesis of hierarchical perception, Plaisted, Dobler, Bell, and Davis manipulated exposure time and structural properties of units that comprise a hierarchical stimulus. Their failure to find differences between persons with and without autism reflects limitations of both WC and EPF. In a study of the roles of task bias (frequency of occurrence) in relation to structure of hierarchical stimuli, Iarocci, Burack, Shore, Mottron, and Enns found a typical sensitivity to structural bias among persons with autism, but a higher sensitivity to implicit task biases, especially those oriented toward the detection of local targets. Bar-Haim, Shulman, Lamy and Reuveni compared the pattern of allocation of attention toward eyes and mouth in high functioning autistic boys and typically developing children when viewing static faces. In all conditions, the two groups displayed a similar pattern of attention allocation. The children from both groups attended more to the eye region than to the mouth region, and to the same extent, both for initial and late orientation of attention.

We believe that the type of issues and data presented in this special issue should be ultimately considered in the development of diagnostic criteria, so that the perceptual and cognitive characteristics of autistic perception are included along with behavioural markers. This would provide a more comprehensive approach that would also be consistent with the emphasis by persons with autism on the importance of perceptual differences (Martin, Mottron & Tremblay, 2004).

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REFERENCES

Burack, J. A. (1994). Selective attention deficits in persons with autism: Preliminary evidence of an inefficient attentional lens. *Journal of Abnormal Psychology*, *103*, 535–543.

Frith, U. (1970). Studies in pattern detection in normal and autistic children. I. Immediate recall of auditory sequences. *Journal of Abnormal Psychology*, *76*, 413–420.

Frith, U. (1970). Studies in pattern detection in normal and autistic children. II. Reproduction and production of color sequences. *Journal of Experimental Child Psychology*, *10*, 120–135.

Kemner, C., Verbaten, M. N., Cuperus, J. M., Camfferman, G., & VanVan Engeland, H. (1994). Visual and somatosensory event-related brain potentials in autistic children and three different control groups. *Electroencephalography and Clinical Neurophysiology*, *92*, 225–237.

Frith, U., & Happé, F. (1994). Autism: Beyond "theory of mind". *Cognition*, *50*, 115–132.

Klin, A., Jones, W., Schultz, R., Volkmar, F., & Cohen, D. (2002). Visual fixation patterns during viewing of naturalistic social situations as predictors of social competence in individuals with autism. *Archives of General Psychiatry*, *59*, 809–816.

Martin, R., Mottron, L., & Tremblay, P., L'autisme, vu de l'intérieur. VHS vidéo document, CECOM (Montréal), 32 mn.

Mottron, L., & Belleville, S. (1993). A study of perceptual analysis in a high-level autistic subject with exceptionnal graphic abilities. *Brain and Cognition*, *23*, 279–309.

Ornitz, E M. (1974).)The modulation of sensory input and motor output in autistic children. *Journal of Autism and Childhood Schizophrenia*, *4*, 197–215.

Ozonoff, S., Strayer, D. L., McMahon, W. M., & Filloux, F. (1994). Executive function abilities in autism and Tourette syndrome: An information processing approach. *Journal of Child Psychology and Psychiatry*, *35*, 1015–1037.

Plaisted, K. (2001). Reduced generalization in autism: An alternative to weak central coherence. In: J. A. Burack, T. Charman, N. Yirmiya, & P. R. Zelazo (Eds.), *The development of autism: Perspectives from theory and research.* (pp. 149–169). Mahwah, NJ: Erlbaum.

Plaisted, K., O'Riordan, M., & Baron-Cohen, S. (1998a). Enhanced discrimination of novel, highly similar stimuli by adults with autism during a perceptual learning task. *Journal of Child Psychology and Psychiatry*, *39*, 765–775.

Schultz, R. T., Gauthier, I., Klin, A., Fulbright, R. K., Anderson, A. W, Volkmar, F., Skudlarski, P., Lacadie, C., Cohen, D. J., & Gore, J. C. (2000). Abnormal ventral temporal cortical activity during face discrimination among individuals with autism and Asperger syndrome. *Archives of General Psychiatry*, *57*, 331–340.

Shah, A., & Frith, U. (1983). An islet of ability in autistic children: A research note. *Journal of Child Psychology and Psychiatry*, *24*, 613–620.

Shah, A., & Frith, U. (1993). Why do autistic individuals show superior performance on the block design task? *Journal of Child Psychology and Psychiatry*, *34*, 1351–1364.

L. Mottron and J. Burack
Guest Editors
Hopital Riviere-des-Prairies
Montreal, Canada
E-mail: mottron1@istar.ca