Other and other waters in the river: Autism and the futility of prediction

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Abstract:

Autism has been described as a neural deficit in prediction, people with autism manifest low perceptual construal are impaired at traversing psychological distances, and Gilead et al.’s hierarchy from iconic to multimodal to fully-abstract, socially-communicated representations is exactly the hierarchy of representational impairment in autism, making autism a natural behavioural and neurophysiological test case for the prediction-abstraction relationship.
Commentary on GILEAD, TROPE & LIBERMAN

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Other and other waters in the river: Autism and the futility of prediction
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ABSTRACT: Autism has been described as a neural deficit in prediction, people with autism manifest low perceptual construal are impaired at traversing psychological distances, and Gilead et al.’s hierarchy from iconic to multimodal to fully abstract, socially communicated representations is exactly the hierarchy of representational impairment in autism, making autism a natural behavioural and neurophysiological test case for the prediction-abstraction relationship.
Gilead et al. lament that theories of abstract cognition have been left unintegrated in part because of a lack of terms of discourse common across branches of the cognitive sciences, or even between social and biological aspects of psychology. There is indeed some irony in this all too lowly construed approach to the cognitive science of construal and abstraction, distinct threads of which have been appearing in the history of cognitive science for at least the past seven decades. Our story begins with Witkin’s (Witkin & Asch, 1948; Witkin et al., 1962) notion of ‘field dependence’ in perception and psychophysics, and its subsequent relation to gestalt-orientated cognition and to social affiliation and perspective-taking (Witkin & Goodenough, 1977). This same idea of a concrete-abstract representational axis cutting across perceptual and social aspects of cognition was recapitulated by Frith (1989; Frith & Happé, 1994) as ‘central coherence’ in describing both autism’s decontextualised detail-orientated perceptual stance and its likewise decontextualised egocentric social perspective. Around the same time the idea was introduced to social psychology by Trope (1989) first as an account of dispositional trait versus situational state explanations of others’ behaviour, then extended to effects of temporal and other psychological distances on what Trope et al. had come to call perceptual ‘construal’ (Trope & Liberman, 2003), the term adopted in the rest of this commentary.

The syndrome of autism, along with its dimensional extension to individual differences in autistic (or what Witkin called field-independent) traits, exemplifies this association between construal and psychological distance: Spatial, temporal, social and hypothetical distances resurface as autistic differences in mapping between allocentric and egocentric space (Frith & de Vignemont, 2005; Hamilton et al., 2009; Pearson et al., 2014; Conson et al., 2015; Ring et al., 2018), impulsivity and executive disinhibition (Hill, 2004), social perspective-taking and other aspects of cognitive empathy (Baron-Cohen, 1995), and repetitive-behavioural aversion to unpredicatability and change (Gomot & Wicker, 2012). Gilead et al. relate the distinction between raw perceptual observations and elaborated cognitive models (abstracta) to the contrast between detail-orientated, first-person simulation and abstract, allocentric theory in predicting the behaviour of the world; impairment in prediction when constraints are underspecified, dynamic or real-time- as is the case in social cognition- has been identified time (Courchesne & Allen, 1997) and again (Van de Cruys et al., 2014; Sinha et al., 2014) as a unifying feature of autism which may drive the co-occurrence of anxiety and rituals, perceptual dysmodulation, visuomotor deficits, slowed orienting of attention, and undifferentiated processing of stimuli regardless of task-relevance. Because autistic predictions tend to be founded more on iconic, concrete perceptual data rather than on abstracta, they evoke many violations of expectation in instances where observations would match the broad strokes of an abstract model yet fail to match these minutiae (Van de Cruys et al., 2014). This hyper-reliance on
iconic representations produces a style of cognitive inference by *bricolage*, that is, by effortful construction and maintenance of complex representations and ideas bottom-up from the underlying details and instances (Belmonte, 2008a), which are preserved in lieu of abstracta (Belmonte, 2008b). This flattening of Gilead et al.’s hierarchy of abstracta implements a cognitive style adroit at recognising relationships amongst numerous, low-construal percepts, described by Baron-Cohen et al. (2009) as ‘systemising’. Whilst it can confer superiority at detail-orientated disciplines, this systemising style imposes such a great cognitive representational load that it cannot scale. Because predictions based on inappropriately detailed cognitive models frequently evoke mismatches with observations, and such errors of accidental detail are not differentiated from errors of essence (Van de Cruys et al., 2014), the world amounts to a constant chaos of Heraclitean flow in which one’s expectations are always and inexplicably wrong, sabotaging social and other domains of reward and thus impairing learning and development. It’s no surprise, then, that Gilead et al.’s hierarchy of representational qualities— from concrete, iconic, modality-specific impressions, through multimodal convergences (Brandwein et al., 2013, 2015; Ostrolenk et al., 2019), to socially communicated, categorical abstractions (Smith et al., 2017; Stevenson et al., 2017; Beker et al., 2018; Feldman et al., 2018)— is exactly the hierarchy of perceptual and representational abnormality in autism.

All this evidence shows Gilead et al.’s ontology of abstraction and prediction to be consistent with historical concepts and findings, and with what we know about autism, its prime test case. But retrospection is the game of Monday-morning quarterbacks— what of prospective predictions, and experiments yet to be performed? Drawing together all these strands can relate behavioural and neural aspects of prediction and abstraction, psychological distance and construal, with corollary implications for cultural and sex differences in cognition: Gilead et al. speculatively peg the default-mode network as the home of their cognitive abstracta, although the true locus may lie rather in this network’s interactions with other control networks. The default-mode network is constitutively active in autism (Kennedy et al., 2006), perhaps reflecting constant and largely fruitless attempts at predictive modelling (Raichle, 2015) of accidental detail, associated with low-construal impulsive action (Shannon et al., 2011) and anxious affect (Simpson et al., 2001ab).

The female advantage in default-mode network deactivation in reward contexts (Dumais et al., 2018) seems consistent with autism’s association with male-typical cognition (Baron-Cohen et al., 2005), linking construal to cognitive sex differences. And Witkin (1979) himself noted that construal variations can be a function of culture; indeed individualistic cultures are associated with a more systemising bias (Nisbett & Masuda, 2003; Markus & Kitayama, 1991) and collectivistic cultures with higher construal (Masuda & Nisbett, 2006; Boduroglu et al., 2009). One might
predict, then, associations of individual trait construal level (a.k.a. autistic traits, field dependence), situational state construal level, sex and/or gender, and individualistic/collectivistic culture with the frequency and/or duration of dynamic coupling of default-mode with attentional and executive control networks (Ryali et al., 2016). The degree of network coupling would reflect individual and situational differences in the bias and range of model-driven feedback versus environmentally bound feedforward cognitive control of perception, action, and affect, and would be measurable with fMRI, or perhaps EEG/MEG (Kitzbichler et al., 2015). Such a study would afford an opportunity to reconstrue (as it were!) as a neurophysiological variable the diversity with which individual humans walk the tightrope between Aristotelian category and Heraclitean instance, between Lacan’s (1966) *le symbole* and *la chose*.

REFERENCES


