Are Robots Autistic?

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ABSTRACT

This paper discusses the implications of the embodied approach for understanding emotional processing in autism and the consequent application of this approach for robotics. In this pursuit, author contrasts the embodied approach with the traditional amodal approach in cognitive science and highlights the gaps in understanding. Other important issues on intentionality, intelligence and autonomy are also raised. The paper also advocates a better integration of disciplines for advancing the understanding of emotional processing in autism and deploying cognitive robotics for the purpose of developing the embodied approach further.

Keywords: Autonomy, Embodiment, Emotion, Intelligence, Intentionality

INTRODUCTION

Popular arguments in literature focus on the role of embodied versus disembodied approaches for explaining social cognition. Each of these approaches, have their own set of merits and demerits. I will take up this issue more thoroughly in this paper by concentrating on the implications of adopting the embodied approach for understanding emotional processing in autism. In the present pursuit, emotional processing is treated as falling under the broad rubric of social cognition and more specifically is treated as part of the intersubjective practices. Furthermore, I will concentrate on two separate levels of this endeavor. On one hand emotional processing is usually considered atypical in autistics in the ‘embodied’ sense of the term and on the other, this deficient emotional processing could be deployed as a model to study the autistic mind.

EMBODIED THEORIES VS AMODAL APPROACH

The traditional symbolic approaches for understanding information processing maintained that information is initially encoded in basic sense modalities but in order to interact with higher level cognitive processes these basic codes need to be “transduced” or changed into amodal language like symbols. Later the embodied theories were propounded as an alternative to the traditional approach where the basic sensory modalities play an important role for both lower and higher order information processing (Barsalou, 1999, 2008; Wilson, 2002). According, to the embodied view any cognitive activity does not require a separate set of representations except for what is contained within the modality specific systems. Within the framework of amodal approaches, the mind is usually described as a highly abstract entity with little connections to the outside world which stands in stark contrast to the embodied view where the very interaction of the body with the

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environment is seen as important. In the latter, cognitive activity becomes situated as it takes place in a real world context. More recently, the amodal approach has been described as inadequate to explain the workings of social cognition (see Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Traditionally these theories advocated a representation of the outside world as the basis for symbol manipulation. For instance, repeated encounters with a “similar” kind of social situation leads to re-description of the experienced events into an abstract code that permanently gets stored in memory (see Collins & Quillian, 1969) supporting social inferences, reasoning and decision making (examples include semantic networks, schemata and propositions). The most popular reason to adhere to the amodal approach is its ease of implementation in computer simulation (e.g., intelligent systems) even though it has been hard to obtain solid neural and cognitive empirical support for the re-description process.

More specifically, the embodied framework has also been applied for understanding emotional information processing (Niedenthal, 2007). The amodal view would explain the perceptual and conceptual processing of emotion in a similar manner as the processing of other neutral objects (Ortony, Clore, & Collins, 1988) but the embodied theories emphasize the importance of both central and peripheral resources that support emotional information processing for perceptual and conceptual processing of emotion (see Winkielman, McIntosh, & Oberman, 2009). For instance, thinking about an emotional event will recruit the same bodily reactions and brain regions that are helpful for processing an actual/real emotional event and on parallel lines, understanding the emotional reactions of others is dependent upon similar mechanisms that support the same emotional reactions in one’s own self. An important stance of the embodied approaches for emotional processing is the close relation between the peripheral and central processes (Damasio, 1994), where similar modal representations could be generated peripherally or centrally (Barsalou, 1999, 2008).

Most notable theoretical alternatives to the amodal approach in social psychology have been documented in recent developments like the Damasio’s theory of emotion (1994), Gallese’s theory of intersubjectivity (2003) and Gallagher’s interaction theory (2004). Of these Gallagher’s account is comprehensively worked out for understanding autism and thus will be elaborated below. Other examples include, imitation of facial gestures (Meltzoff & Prinz, 2002), imitation of emotional prosody (e.g., Neumann & Strack, 2000) and postural synchrony between people engaged in social interaction (Bernieri & Rosenthal, 1991).

Interaction Theory

People need to understand behavior of others in order to engage in effective social interaction. This grasp is important considering the fact that behavior of humans is not governed by laws of physics and hence cannot be explained based on such laws. The behaviors can only be understood and this understanding is based on non-mentalistic embodied practices (without any mediating cognitive representations as might be claimed by the amodal approach). These embodied practices are explained as comprising of two major levels namely, primary intersubjectivity (as mentioned by Trevarthen, 1979) and secondary intersubjectivity (Gallagher, 2001).

Primary intersubjectivity involves a focus at the body and helps automatic imitation of facial and emotional gestures as mentioned above. For instance, consider the following statement, “You frown, I frown”. In evolutionary terms, this type of mimicry may also serve an important survival role as it aids in social adaptive living for example by facilitating social bonding (Chartrand, Maddux, & Lakin, 2005). On the other hand, secondary intersubjectivity involves a focus at the shared social and pragmatic contexts and can involve a three element interaction between two people and an object.
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