“Usage of the term Theory of Mind (ToM) has exploded across fields ranging from developmental psychology to social neuroscience and psychiatry research. Yet its meaning is often vague and inconsistent, its biological bases are a subject of debate, and the methods used to study it are highly heterogeneous” Schaafsma, Pfaff, Spunt, & Adolphs (2015, p. 65)

Rationale

Disagreements in science and clinical practice often arise, not because people hold incommensurable world views, but because of variable methodology and vague terminology. As a broad, complex, and multifaceted hypothetical construct, Theory of Mind (ToM) is a particularly “slippery concept” that has been “difficult to pin down” (Belmonte, 2009, p. 122). We agree with Schaafsma and colleagues (2015) who underscore the predicaments encountered when endeavoring to understand ToM. Confusion arises, in part, because many professionals implicitly treat ToM as a monolithic process (Wellman & Lui, 2004) and/or conflate varieties of ToM (Schaafsma et al., 2015). With regard to the latter, prominent distinctions have been made to distinguish 1) implicit (a rapid/automatic form) from explicit ToM (a slow/deliberative form), 2) cognitive from affective ToM and, 3) representation of one’s own mental states from those of others (self-other ToM). “Despite all these different flavors of ToM, one general observation is critical to note: These psychologically based ways of dichotomizing ToM are not generally intended to begin to disassemble ToM. The schemes offer psychological theories about ToM, but they all leave the original construct of ToM untouched” (Schaafsma et al., 2015, p. 67)
Understanding ToM is an intellectually challenging enterprise also because of its subjectivity and openness to interpretation. This challenge holds for all hypothetical constructs but owing to its broad scope and dimensionality (and perhaps again, vague terminology), ToM has proven particularly exasperating for professionals interested in the assessment and treatment of ToM. Consider the case of autism spectrum disorder (ASD): a condition that is biologically-based and behaviorally-defined but for which assessment and intervention is situated at the cognitive level of functioning (Morton, 2004; Morton & Frith, 1995). Imagine a situation in which professionals, working with 8-year-old Johnny, have targeted a specific social communicative impairment for intervention. As is common in ASD, Johnny has a tendency to talk exclusively and exhaustively about only those things that interest him. This is making it difficult for Johnny to make and keep friends and his support team is committed to addressing this problem. The first challenge, however, is one of subjectivity as our professionals try to determine exactly what the problem is. One might interpret incessant self-interest talk as a result of a “Theory of Mind” or “perspective-taking” deficit: two global terms that are so broad that they are essentially useless for the present purposes. Still another could conclude that the behavior is a result of an inability to accurately identify the subtle social cues that signal disinterest (e.g., looking away, looking at watch). Working from this assumption, the next professional might refine this thinking and decide that impairment in affect recognition is the problem. Still another might decide that the core cognitive deficit is impairment not in affect recognition but in empathy: perhaps Johnny simply doesn’t care whether others are interested in his topic of conversation.

Subjectivity is not blameworthy in this dilemma of interpretation. Indeed, subjectivity is unavoidable and necessary and even subjective interpretations can be reliable, accurate, and
valid. Rather, the problem involves the breadth, dimensionality, and general lumpiness of the overlapping subconstructs that comprise ToM. This problem of interpretation is compounded when one considers the issue of construct granularity and specificity. If our professionals were to target empathy or affect recognition, they would soon discover that there is nothing straightforward about either empathy or affect recognition. We can always grind away at what first appears to be a distinct ToM entity to identify subdomains. In the case of empathy, researchers often identify a cognitive (intellectual) component as well as a distinct affective (emotional) component (e.g., Mathersul, McDonald, & Rushby, 2013). In the case of affect recognition, we could parse the domain and consider only the ability to map specific facial expressions (a visual stimulus) to inner mental states (e.g., downcast eyes + downturned mouth → sad). The problem also works in reverse: we can lump what initially appears to be a restricted ToM subdomain and decide that affect recognition includes not only the mapping of a facial configuration to an emotion, but also the recognition of basic and complex emotions, the capacity to discriminate emotions, and the ability to recognize hidden emotions that are disguised through the manipulation of culturally-defined display rules.

Understanding ToM is, indeed, difficult but it is crucially important for explaining and predicting behavior. Although the literature is sometimes mixed, theory of mind (ToM) impairment has been documented in conditions such as sensory loss (i.e., deaf and hard of hearing and blindness; Stanzione & Schick, 2014; Peterson, Person, & Webb, 2000), attention deficit hyperactivity disorder (Buhler, Bachmann, Goyert, Heinzel-Gutenbrunner, & Kamp-Becker, 2011; Buitelaar, Van der wees, Swaab-Barnveveld, & Jan Van der gaag, 1999; Perner, Kain, & Barchfeld, 2002; Ueckermann, et al., 2010), fetal alcohol syndrome (GreenBaum, Stevens, Nash, Korean, & Rovet, 2009), fragile X syndrome (Cornish, Burack, Rahman, Russo,
& Grant, 2005; Grant, Apperly, & Oliver, 2007), dyslexia (Egilsdottir, 2015), specific language impairment (SLI; Nilsson & de Lopez, 2016), learning disability (Ashcroft, Jervis, & Roberts, 1999), intellectual disability (Abbeduto, Short-Meyerson, Benson, & Dolish, 2004), schizophrenia (Hans, Auerbach, Styr, & Marcus, 2004), traumatic brain injury (Martin-Rodriquez & Leon-Carrion, 2010), and Parkinson’s disease (Freedman & Stuss, 2011). This large body of research on ToM demonstrates commonalities but also considerable heterogeneity in the ToM profiles between and within clinical groups (Gonzalez-Gadea et al., 2013; Hutchins et al., 2016; Lombardo et al., 2016; Peterson & Wellman, 2005). A novel approach is needed to parse this heterogeneity to enhance precision in clinical and translational research. As Schaafsma and colleagues (2015) recently argued:

“We believe that our current concept of ToM hinges on the essence of a mental representation of minds, but that a scientific concept of ToM needs to disassemble that essence into a collection of simpler processes…In short, we believe that a programmatic revision of ToM is the way forward. One might imagine going about this simply by constructing a kind of dictionary for the vocabulary of the scientific study of cognitive processes and attempting to relate these concepts to others that explain behavior at a lower level” (p. 68).

**Content, Development, and Use**

The scope of the content of the Theory of Mind Atlas (ToMA) is directly informed by the content of the Theory of Mind Inventory-2 (see the Technical Manual for the Theory of Mind Inventory-2 for an in-depth description of content). A primary aim of the ToMI-2 was to develop a content-valid, broadband measure of ToM. As such, the ToMI-2 reflects a wide range of ToM domains with regard to content and complexity as well as granularity and specificity. Although
the ToMI-2’s 60 items provide excellent construct coverage, the content is not perfectly comprehensive (in fact, additional domains have been identified which will be assessed in a future version of the measure that will employ approximately twice as many items).

The ToMA consists of a series of primers: one for each item on the ToMI-2. Each primer defines the construct, notes any and all synonyms used in the research base, describes related cognitive achievements when relevant, reviews the developmental progression of the ToM domain in neurotypical samples, and gives three separate brief reviews detailing what is known about how that domain is disrupted in individuals with ASD, ADHD, and those who are DoHH (deaf or hard of hearing). Inclusion of this information should be crucial to service-providers. Insofar as the mechanisms or developmental progression of ToM differ across clinical populations, this has clear implications for treatment planning and the creation of scaffolded instruction programs. Information for these clinical populations is included because of their prevalence and likelihood to be most relevant to service-providers although, as noted previously in this document, ToM deficits occur in a vast array of clinical conditions beyond the three given special attention here.

The specific terms chosen for the ToMI-2 and used in the ToMA to describe ToM domains were carefully selected. The terms used are adopted by a majority of researchers who are experts in each area reviewed. As such, the terms employed have not only gained considerable currency in the literature but they are often credited for their accuracy, clarity, and meaningfulness.

The ToMA is currently in development with content being continually added under the Theory of Mind Atlas link at theoryofmindinventory.com. The ToMA is intended as a tool to support the understanding of the nature and scope of ToM. We imagine the ToMA will be useful
in clarifying the construct of ToM among professionals and caregivers interested in the study or remediation of social cognitive processes. Service-providers, researchers, and other professionals are invited to download, adapt, and share the content of the ToMA provided that the names and copyright information are retained in the header of the document. If you have any questions or comments about the ToMA, please contact the authors at: Tiffany.Hutchins@med.uvm.edu

**Recommended citation:**


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