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# A Kantian Theory of the Sensory Processing Subtype of ASD

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**Biography**

I am trained as a Western Analytic philosopher. My research is centered in Kant scholarship and focused on normative issues that are informed by current science, with a broadly interdisciplinary aim. Recently I have been engaged in researching the family of phenomena involved in acting or cognizing as if, in contexts ranging from idealizations in science to imagination in autism to Immanuel Kant's peculiar moral imperative to act as if your maxim were to become by your will a universal law of nature.

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# A Kantian Theory of the Sensory Processing Subtype of ASD

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**Abstract**

Immanuel Kant's theory of imagination is a surprisingly fruitful nexus of explanation for the prima facie disparate characteristics of autism spectrum disorder (ASD), especially the sub-spectrum best characterized by the Sensory Integration (SI) and Intense World (IW) theories of ASD. According to the psychological theories that underpin these approaches to autism, upstream effects of sensory processing atypicalities explain a cascade of downstream effects that have been characterized in the diagnostic triad, e.g., poor sensory integration contributes to weak central coherence, which in turn contributes to difficulty participating in a back and forth conversation. To see why Kant's theory of imagination might be useful, consider that ASD is neither a sensory disorder nor an intellectual disorder per se. Cognitive dysfunction is a common comorbidity of ASD, not a characteristic of it. If we exclude sense and intellect, what's left? According to Kant, imagination is a synthesizing faculty that mediates between sense and understanding. It does so by transforming intuition from the canonic and vital senses. The uses of imagination include our spatially formative, temporally associative, and communicatively affinitive production, where affinitive production includes sympathy and fantasy. Imagination is thus the faculty of sensory integration, embodied subjectivity, empathy, mindreading, and social cooperation. The wide range of how autism presents and how it is experienced can thus be understood in terms of the atypical development of specific functions of imagination. Kant's theory of imagination provides a new perspective on how to organize our understanding of autism at the psychological level, one that makes sense of how some of the disparate characteristic phenomena of autism are systematically related and which might lead to novel predictions, research targets, or intervention recommendations.

**Keywords**

Immanuel Kant, Autism Spectrum Disorder, Sensory Processing, Imagination, Intense World, Sensory Integration

## Introduction

Recent philosophical work has begun to orient our understanding of autism through the work of major figures in the history of philosophy. Some have used prominent philosophers of language like Grice and Davidson to make sense of the communication component of autism (Glüer and Pagin 2003; Andrews 2002; Bouma 2006; Andrews and Radenovic 2006). Others have appealed to Aristotle, David Hume, or Immanuel Kant to make sense of moral development and human flourishing for people in the autism spectrum (Furman and Tuminello 2015a; Potter 2016, Furman and Tuminello 2015b;

Kennett 2002; Jaarsma 2013; Jaarsma et al. 2012). Here I am proposing a psychological theory of autism as a spectrum of atypical development of imagination, where imagination is understood in a Kantian sense.

One might wonder both why we need yet another theory of autism and why we would turn to Kant for anything more than an entertaining but quaint philosophical exercise. We need yet another theory of autism because our current theories of autism are far from adequate. The only touchstone of consensus we have is the current Diagnostic and Statistical Manual of Mental Disorders (DSM-5), which offers a set of diagnostic criteria rather than a theory of what autism is or how it works (American Psychiatric Association 2013; Cushing 2013). Though diagnostic criteria need not always carry explanatory power, there is a conceptual disconnect between the A criteria (social communication) and the more somatic B criteria that presents an explanatory challenge. Perhaps more pressingly, the individual criteria listed cannot even be applied without an understanding of what is meant by their non-trivial basic terms, e.g. "persistent deficits in social communication" (American Psychiatric Association 2013, 50). Consequently, we cannot avoid interpreting the ASD diagnostic criteria as the framework for a theory of autism, one that ought to have explanatory power. In order to *make sense* of these diagnostic criteria, then, we need a psychological framework that relates the disparate signs of autism like hand flapping and flat affect in a phenomenologically coherent and articulable understanding of autism – a theory[1] of what autism is and of what it's like to be autistic.

Kant, of course, had no theory of autism. He was unaware of autism, and despite his notorious punctuality was not himself autistic. What Kant did have is a theory of mind that posits a surprisingly useful theory of imagination. It is this theory of imagination, not the theory of reason for which Kant is most famous, that I will make use of in this paper. As I will explain, Kant's theory of imagination provides a new perspective on how to organize our understanding of autism at the psychological level, one that makes sense of how some of the disparate characteristic phenomena of autism are systematically related and which might lead to novel predictions and research targets or recommend interventions.

1. By a "theory" I mean a representation that is purported to be systematically explanatory. A good theory is a useful one. Kant's theory of imagination belongs to philosophical psychology, which may be useful for pedagogy, interpersonal relations, or politics, but should not be expected to yield neurological localization, physical etiology, or philosophical Truth.

As a final introductory note, my title targets autism spectrum disorder (ASD) rather than autism because the DSM-5 represents the best consensus we have as to what characterizes autism. However, ASD refers to a clinically diagnosable disorder, whereas autism is a human phenotype or "form of life" (Ingersoll and Wainer 2014; Mottron et al. 2008; Jaarsma and Welin 2012)[2]. I'm targeting a subtype of ASD rather than the whole because we have good reason to doubt whether ASD is a single disorder, or even a fixed target (Waterhouse 2013; Navon and Eyal 2016). In the first half of the paper I characterize ASD and what I am calling its sensory processing subtype. In the last half of the paper I turn to how the Kantian theory of imagination provides a nexus of explanation for this subtype of ASD.

## ASD and its Sensory Processing Subtype

Autism spectrum disorder is currently diagnosed on the basis of a triad of impairments, namely impairments of social interaction, communication, and behavioral flexibility. In the DSM-5 this triad is distributed into the first two of five categories, that is, the A and B categories.

ASD is diagnosed when

A. persistent characteristic deficits of social communication across multiple contexts are accompanied by
B. excessively repetitive behaviors, restricted interests, and insistence on sameness,
C. onset is present in early development,
D. these symptoms cause clinically significant impairment, and
E. A-B are not better explained by intellectual disability or global developmental delay (American Psychiatric Association 2013, 31 and 50–51).

The A category, now identified as the social communication category, includes social reciprocity, nonverbal communication, and difficulties establishing, maintaining, and understanding interpersonal relationships. Its three subcategories roughly correspond to impairments in verbal communication, nonverbal communication, and social relationships. A1 focuses on social-emotional reciprocity in interpersonal interactions like engaging in normal back-and-forth conversation. A2 covers nonverbal communication

2. Given that people who present all the classic characteristics of autism in the A-C categories might well fail to meet the D criterion for diagnosis – they're not clinically impaired – even according to the DSM-5, a person may be autistic without having ASD.

like gesture. A3 concerns interpersonal relationships including lack of engagement in imaginative play.

Now imagination is merely mentioned in A3, but historically it played a more prominent role (e.g. DSM-IV B3). Some researchers even characterized autism on the basis of a triad of impairments that included imagination as the third member. This is a quote from an interview with Wing regarding her research in the 1970s:

> …[A]ll the diagnostic systems referred to social and communication difficulties and rigidity. They were the three aspects. We referred to imagination as a separate deficit. The Triad of Impairments we introduced was social, communication, and imagination…. I thought that imagination was very important - it was the development of imagination in the non-autistic children which enabled them to think and feel what other people were thinking and feeling. That is what imagination and pretend play are for. That is the root of social skill and that is why we put imagination in the triad. (Feinstein 2010, 152)

To the extent that social and communication deficits in ASD arise from identifiable deficits of imagination, we might find that the triad is reduced to a single nexus of explanation, albeit a complex one, i.e. imagination[3].

The B category, commonly identified as restrictive and repetitive behaviors (RRBs), is divided into four subcategories, at least two of which must present. B1 includes stereotypies like stimming and echolalia. B2 (insistence on sameness) includes difficulty with variation. B3 (fixed interests) involves excessive attachment, circumscription, or perseverance of interest. Finally, B4 (atypical reactivity to sensory input) is not really restrictive or repetitive though it is similarly concerned with basic features of neurodevelopment like sensory integration, attention, and motor function. Atypical sensory reactivities include phenomena like indifference to pain, intolerance for light touching, or excessively adverse response to food textures.

Though the B criteria have obvious implications for social development, they are not overtly social in nature. B4 in particular has increasingly become a target of investigation due both to its high prevalence in the autistic population and its explanatory potential as a source of downstream deficits in higher level function like those involved in the A category social communication criteria (Kenet 2011; Guidetti 2013). Several research

3. This does not, however, imply that imagination should be a central diagnostic criterion. Diagnostic criteria should be as directly observable as possible.

tracks and theories of autism focus on B4 as an explanatory nexus, for example, sensory integration therapy, the intense world theory of autism, as well as embodied and enactive theories of autism (Watling and Hauer 2015; Markram and Markram 2010; Eigsti 2013; De Jaegher 2013; Klin et al. 2003). These are the theories or therapeutic approaches to autism that I classify as sensory processing. The subtype of ASD I'm theorizing about in this paper is that part of the ASD spectrum for which B criteria, especially B4, are a prominent source of clinical impairment. I'll say just a little about how sensory integration and world intensity figure into sensory processing before getting to Kant's theory of imagination.

When Jean Ayres introduced sensory integration (SI) therapy in the 1970s, she did not characterize sensory integration disorder as an autistic disorder (Ayres 2005). That quickly changed (Ayres and Tickle 1980). Ayres and her research contingent now theorize that sensory atypicalities are core symptoms of autism that have downstream effects on the development of the perceptual system as well as on the development of communication and social skills (Iarocci and McDonald 2006; Lang et al. 2012; Marco et al. 2011). SI theory and therapy focus on how readily and effectively one combines sense modalities, often with particular concern as to how well tactile, vestibular, and proprioceptive information is integrated and employed in movement. This integration may be extended for example to integration over time, which implicates memory, and to integration of meaning and sense of self into sensory experience. According to SI theory, a fully developed SI therapy might have the power to remediate any or all of the upstream causes of ASD dysfunction, at least for the sensory processing subtype of ASD.

The intense world (IW) theory of autism posits that the neuropathology of autism is "hyper-functioning of local neural microcircuits, best characterized by hyper-reactivity and hyper-plasticity" (Markram and Markram 2010). The psychological part of IW theory gives primacy of place to the phenomenology of autism, positing that sensory hypersensitivity is a defining feature of autistic experience. Globally this manifests as a torturously intense world (compare to enhanced interrogation techniques involving bright lights and loud noise). Given that hyposensitivities are just as characteristic of autism as hypersensitivities, IW can be extended to include impairments in modulation of sense intensity, which may then be implicated in the modulation of attention, memory and emotionality. IW purports to unify the neuropathology and the psychology of autism, which SI does not and Kant cannot do, but its phenomenology (and neuropathology) may limit its explanatory scope to a narrower range of the ASD spectrum than SI or Kant.

Generalizing from these examples, a sensory processing theory posits that any atypicality in sensory processing, whether it is atypical integration or modulation or any

other processing function, might be characteristic of the autistic phenotype or a source of clinical dysfunction. Which specific atypicalities are characteristic of autism is then an empirical question (Kern et al. 2006; Marco et al. 2011; Hilton et al. 2007). Sensory processing is an umbrella term for a subtype of ASD that includes at least SI and IW. The Kantian theory of autism as atypical development of imagination belongs to this sensory processing family of theories.

## Imagination according to Kant

Kant's theory of imagination is distributed through his philosophical work. It is very rich and nearly all of it has implications for autism[4]. In this half of the paper I highlight some features of imagination that are most salient to sensory processing in ASD. To frame the context, Kant posits imagination as a sort of bridge or mediator between sense and intellect in the *Critique of Pure Reason* (Kant [1781] 1998, 240). This is significant because ASD is neither an intellectual disorder nor a disorder of the senses per se. According to Kant, imagination is the sensory processing faculty that operates between sense and intellect, and it's immensely powerful.

Now getting into some of the details, sensibility and understanding are the two "stems" of cognition (Kant [1781/1787] 1998, 152). **Sensibility** is a receptive faculty, namely the ability to "acquire representations through the way in which we are affected by objects", so objects are "given" to us by means of sensibility (Kant [1781/1787] 1998, 155). The kind of representation we acquire through sensibility is **intuition**, which is *particular*, as opposed to the *general* representations like concepts and ideas through which we think and understand objects intellectually. Though Kant generally identifies sensibility as a receptive intuitive faculty, he posits that it must have an active or productive[5] part or use. Sensibility thus divides into **sense** and **imagination** (Kant [1792] 1992, 443 and 486; Kant [1798] 2007, 265). Imagination is the "active faculty of synthesis" (Kant 1781, 239) that transforms intuition to produce objects that are not present to the senses, or the ability to "give ourselves" objects in intuition (Kant

4. For example, Kant has some interesting things to say about the role of transcendental imagination in the constitution of subjectivity (e.g. Kant [1787] 1998, 257).

5. In attempting to characterize what Hume called "liberty" of imagination in I.1.3 of his *Treatise*, Kant is careful to avoid granting anything like transcendental freedom to imagination or to sensibility more broadly (Hume [1739] 2000, 12). He does, however, indicate that imagination might be spontaneous, at least contingently or relatively (Kant [1798] 2007, 283). Rather than explicitly positing imagination as a spontaneous "first cause" faculty, Kant typically refers to imagination as having "productive" uses.

[1781/1787] 1998, 256 and 171). Imagination is thus a condition of the possibility of perception, as opposed to mere sensing (Kant [1781] 1998, 239 note): Sights and sounds and feelings do not come to us already individuated and ordered by source and salience.

By imaginative **synthesis** Kant means a kind of putting together or combination (Kant [1781/1787] 1998, 210). Just as the synthesis of hydrogen and oxygen gives us water or heavy water, various syntheses of intuition give us objects and the objects differ both according to their matter and form, that is, according to their constituents and to the way in which those constituents are combined. The intuitive **materials** from which imagination synthesizes objects includes mass manifolds from the five "organic" or canonic sense modalities like the auditory field as well as from non-canonic "vital" senses like vestibular intuition and affective intuition (Kant [1798] 2007, 265). Even inclinations are fodder for imagination (Kant [1798] 2007, 257). Analysis yields parts whereas synthesis yields wholes, so any transformation that yields a whole would qualify as synthesis on Kant's view. In contrast with intellect, syntheses of imagination are gestalt or wholesale transformations of entire manifolds of intuition, rather than pointwise transformations or intellectual combinations of concepts into judgments and judgments into inferences.

Most generally, imagination is the ability to give ourselves objects in intuition, which entails transforming intuition in ways that *extend cognition* beyond what is given through the senses (Kant [1798] 2007, 265; Kant [1787] 1998, 256). Imaginative syntheses are thus ampliative, though in a different way from reason, and the operation of imagination is for the most part subconscious and automatic or involuntary:

> Synthesis in general is, as we shall subsequently see, the mere effect of the imagination, of a blind though indispensable function of the soul, without which we would have no cognition at all, but of which we are seldom even conscious. (Kant [1781/1787] 1998, 211)

Just as we are seldom conscious of the normal operation of imagination, we are likewise normally conscious of very little of the mass of intuition on which imagination operates (Kant [1798] 2007, 246). When it is healthy, imagination is always at work, (quasi-) spontaneously and automatically. Kant cautioned against the dangers of a too-powerful imagination unrestrained by reason, but he apparently did not consider the possibility that imagination could be underactive or weak, or simply different, as we might find in autism.

To give a salient example, **object completion** and **object permanence**[6] would both be subconscious automatic functions of a healthy imagination. Although I see only the facing side of objects in my visual field, imagination fills in the back side so that what I perceive is a complete object. When an object is removed from my sensory fields, imagination intuitively retains its existence in working memory and perhaps in long term memory (reproductive uses of imagination). It is still intuitively *there*. Then since imagination allows us to **vary** whatever intuition is given (B2 criterion), and do so in myriad ways, the objects of imagination extend from the actual to that which is merely intuitively possible, as in personification of inanimate objects in fantastic narratives (A3 criterion).

Kant organizes the functions or uses of imagination in multiple ways, for example distinguishing between reproductive and productive uses, voluntary and involuntary uses, and between specific functions like memory, sympathy, and fantasy. Each of these involves a transformation of intuition that could be articulated and extended. Here I focus on the three the productive powers of imagination Kant describes in the *Anthropology from a Pragmatic Point of View*. These include a **formative** power, an **associative** power and an **affinitive** power (Kant [1798] 2007, 284). These three powers are not to be narrowly construed, and all three are implicated in sociality and communication.

Consider the **formative** power of productive imagination. A simple spatial transformation might be geometric, for example a rotation in intuition, or a transformation in color, texture, or tone[7]. The full field of outer sense in all its particularity, and all possible intuitive transformations thereof, count as spatially formative. In order to perceive objects in what I see, hear, and feel, I need to determine object boundaries, distinguish foreground from background, modulate intensity to boost signal over noise, and integrate the manifolds of my various sense modalities. In a noisy room, I might need to parse the auditory field into three conversations between seven people talking over background music, and also foreground one conversation. These would be typical automatic formative syntheses of imagination.

6. Gunilla Gerland reports in her autobiography that as a child she did not take object permanence or person permanence for granted (Gerland 2003). A Kantian theory of autism predicts that dysfunctional object permanence and therefore person permanence might be common in ASD. Delays in object permanence have been found in some autistic populations and tied to development of theory of mind (Lawson 2017).

7. Formative transformations are "spatial" in that space is the pure a priori form of all outer sense; "spatial" does not limit formative syntheses to geometric transformations.

To give an example of how imaginative synthesis may formatively factor into sociality, in the *Ideal of Beauty* Kant describes the role of imagination in generating norms. To generate a normal idea or common measure, he says, imagination superimposes a great number of images, letting them glide together. Their concurrence is then the intuitive average, i.e. the normal idea for the superimposition.

> If I am allowed to apply here the analogy of optical presentation, it is in the space where most of them are combined and inside the contour, where the place is illuminated with the most vivid colors, that the average…is cognizable …[T]he imagination does this by means of a dynamical effect, which arises from the various impressions of such figures on the organ of internal sense. (Kant [1790] 2000, 118)

Extending Kant's aesthetic norm here to social norms, one's idea of a normal conversation (A1 criterion) requires a formative superimposition of experienced conversations in intuition, which by a dynamic effect on internal sense yields an intuitive average. A **social norm** is thus an archetypal idea, an image for the whole which hovers among all the particular and variously diverging intuitions of individual social experiences (B2 criterion) (Kant [1790] 2000, 118)[8].

The **associative** use of imagination is likewise quite powerful and directly implicated in the A category criteria for ASD. Associations may be created via temporal succession and proximity, as in **episodic memory** and **foresight** (Kant [1787] 1998, 291–5), or via any "sympathetic harmony" with one another (Kant [1798] 2007, 285–6). Notably, the faculty of signs is an associative capacity for social communication (Kant [1798] 2007, 298-302). Social signs like **gesticulation** (A2 criterion), vocal tone, and class indicators are particularly "arbitrary" and "artificial", Kant says, so we must recall their occurrences and associate them with meanings (Kant [1798] 2007, 300). As all **language** involves the use of artificial signs, deficits of the associative power of productive imagination are bound to make language acquisition and use difficult.

The **affinitive** power of imagination is prima facie the least familiar. Kant unhelpfully described it as "the union of the manifold in virtue of its derivation from one ground", but then helpfully illustrated this idea in terms of social conversation (Kant [1798] 2007, 286). In order for a conversation to thematically hang together as it progresses through various topics, there must be a common ground of progression – a

8. Compare Kant's floating or hovering metaphor with David Hume's take on abstract ideas in I.1.7 of the *Treatise* ((Hume (1739) 2000, 17). Both are activities of imagination.

ground that is shared by participants. In this context Kant uses chemical synthesis as a metaphor for how two heterogeneous substances "intimately act upon each other to bring about a third thing" (Kant [1798] 2007, 286). In conversational **communication** the heterogeneous substances are presumably the parties conversing and the third thing or "common ground" from which the conversation originates is the *we* engaged in a joint communicative activity Kant [1798] 2007, 287). Joint attention and shared ends require an imaginative synthesis of persons into a first person plural subject. This *we* is a community.

This power of affinitive imagination is also extremely broad, including dizziness (affinity or "community" with the abyss) and homesickness (affinity with a land or place). Most perspicuously, **sympathy** is an affinitive power of imagination (Kant [1798] 2007, 288). The sympathetic power of productive imagination includes the involuntary communication of "similar expressions" in processes of social infection like those described by David Hume (Kant [1798] 2007, 289; Hume [1739] 2000, 155ff). This includes phenomena ranging from the contagiousness of yawning to mirroring of emotional expressions. For example, blushing is a natural sign according to Kant, but what it reveals is uncertain. It might reveal a "*delicate* [finicky] sense of honor, or just … something about which one would *have* to suffer shame" Kant [1798] 2007, 301 emphasis added). The cause of the blush is not present to the senses, so one can only imagine it. When a healthy imagination communicates the blush sympathetically, it is *as if* we can see or feel the embarrassment. This is **mindreading**. Moreover, the unintentional play of productive power of imagination is the source of **lying** (Kant [1798] 2007, 289), which autistic people are not highly disposed to do.

Bringing these functions of imagination all together, **fantasy** marshals the full productive powers of formative, associative, and affinitive imagination. We intuit entire worlds populated with minded, embodied persons that hang together in institutions and social narratives. The right forms of play could thus predictably *exercise imagination* to therapeutic benefit on a Kantian view as well as on a more generic sensory processing view (Gallo-Lopez and Rubin 2012; Wolfberg 2009; Harris and Leevers 2000).

## Conclusion

Intellectual impairment is a common comorbidity of ASD, and many autistic people have atypical reactivity to sensory input. ASD is not, however, an intellectual or sensory disorder per se. Kant *helps* by providing a name of and characterization for that complex faculty which is neither sense nor intellect, the intermediary between sense and intellect

on which so much depends. The wide range of how autism presents and how it is experienced can then be understood in terms of the atypical development of specific functions of imagination. Imagination is not a package deal, any more than intellect is. A given deficiency of sympathy need not have any impact on memory, yet it may have predictable downstream effects given interdependencies in functions of imagination. Kant's theory of imagination usefully supports the prevalent view that autism has a kind of underlying unity, at least at the level of clinical psychology, and it provides a novel basis for understanding distinctive individuals' needs and abilities within the human spectrum. As a bonus, there is likely to be less stigma attached to deficits of imagination than to mindblindness or executive dysfunction. Theory can itself be therapeutic.

**References**

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders: 5th edition: DSM-5*. Arlington: American Psychiatric Publishing.

Andrews, Kristin. 2002. "Interpreting Autism: A Critique of Davidson on Thought and Language." *Philosophical Psychology* 15: 317–332.

Andrews, Kristin, and Ljiljana Radenovic. 2006. "Speaking Without Interpreting: A Reply to Bouma on Autism and Davidsonian Interpretation." *Philosophical Psychology* 19: 663–678.

Ayres, Jean. 2005. *Sensory Integration and the Child: Understanding Hidden Sensory Challenges*. 25th Anniversary edition. Western Psychological Services.

Ayres, Jean, and Linda S. Tickle. 1980. "Hyper-responsivity to Touch and Vestibular Stimuli as a Predictor of Positive Response to Sensory Integration Procedures by Autistic Children." *The American Journal of Occupational Therapy* 34(6): 375–381.

Bouma, Hanni K. 2006. "Radical Interpretation and High-Functioning Autistic Speakers: A Defense of Davidson on Thought and Language." *Philosophical Psychology* 19: 639–662.

Cushing, Simon. 2013. "Autism: the Very Idea" In *The Philosophy of Autism*, edited by Jami L. Anderson and Simon Cushing, 17–46. Lanham, MD: Rowmaan & Littlefield Publishers, Inc.

De Jaegher, Hanne. 2013. "Embodiment and Sense-making in Autism." *Frontiers in Integrative Neuroscience* 7: 1–19.

Eigsti, Inge-Marie. 2013. "A Review of Embodiment in Autism Spectrum Disorders." *Frontiers in Psychology* 4: 1–10.

Feinstein, Adam. 2010. *A History of Autism: Conversations with Pioneers*. Oxford: Wiley-Blackwell.

Furman, Todd M., and Alfred Tuminello, Jr. 2015. "Aristotle, Autism, and Applied Behavior Analysis." *Philosophy, Psychiatry, & Psychology* 22: 253–262.

----- 2015b. "The Deep Impact of Applied Behavior Analysis for Children with Autism Spectrum Disorder." *Philosophy, Psychiatry, & Psychology* 22: 333–334.

Gallo-Lopez, Loretta, and Lawrence C. Rubin. 2012. *Play-Based Interventions for Children and Adolescents with Autism Spectrum Disorders*. New York: Routledge.

Gerland, Gunilla. 2003. *A Real Person: Life on the Outside*. London: Souvenir Press.

Glüer, Kathrin, and Peter Pagin. 2003. "Meaning Theory and Autistic Speakers." *Mind and Language* 18: 23–51.

Guidetti, Giorgio. 2013. "The Role of Cognitive Processes in Vestibular Disorders." *Hearing, Balance, and Communication* 11: 3–35.

Harris, Paul L., and Hilary J. Leevers. 2000. "Pretending, Imagery and Self-awareness in Autism." In *Understanding other minds: Perspectives from developmental cognitive neuroscience,* edited by Simon Baron-Cohen, Helen Tager-Flusberg, and Donald J. Cohen, 182–202. New York: Oxford University Press.

Hilton, Claudia, Kathleen Graver, and Patricia LaVesser. 2007. "The Relationship between Social Competence and Sensory Processing in Children with High Functioning Autism Spectrum Disorders." *Research in Autism Spectrum Disorders* 1(2): 164–173.

Hume, David. (1739) 2000. *A Treatise of Human Nature.* Edited by David Fate Norton and Mary J. Norton. New York: Oxford University Press.

Iarocci, Grace, and John McDonald. 2006. "Sensory Integration and the Perceptual Experience of Persons with Autism." *Journal of Autism and Developmental Disorders* 36(1): 77–90.

Ingersoll, Brooke, and Allison Wainer. 2014. "The Broader Autism Phenotype." In *Handbook of Autism and Pervasive Developmental Disorders: Diagnosis, Development, and Brain Mechanisms (volume 1)*, edited by Fred R. Volkmar, Paul Rhea, Sally J. Rogers, and Kevin A. Pelphrey, 28–56. Hoboken, NJ: John Wiley & Sons, Inc.

Jaarsma, Pier. 2013. "Cultivation of Empathy in Individuals with High-Functioning Autism Spectrum Disorder." *Ethics and Education* 8: 290–300.

Jaarsma, Pier, Petra Gelhaus, and Stellan Welin. 2012. "Living the Categorical Imperative: Autistic Perspectives on Lying and Truth Telling – between Kant and Care Ethics." *Med Health Care and Philosophy* 15: 271–277.

Jaarsma, Pier, and Stellan Welin. 2012. "Autism as a Natural Human Variation: Reflections on the Claims of the Neurodiversity Movement." *Health Care Analysis* 20: 20–30.

Kant, Immanuel. (1781/1787) 1998. *Critique of Pure Reason*. Translated by Paul Guyer and Allen W. Wood. New York: Cambridge University Press.

Kant, Immanuel. (1792) 1992. *Lectures on Logic*. Translated by J. Michael Young. New York: Cambridge University Press.

Kant, Immanuel. (1798) 2007. *Anthropology, History, and Education*. Translated by Robert B. Louden. New York: Cambridge University Press.

Kant, Immanuel. (1790) 2000. *Critique of the Power of Judgment*. Translated by Paul Guyer and Eric Matthews. New York: Cambridge University Press.

Kenet, Tal. 2011. "Sensory Functions in ASD." In *The Neuropsychology of Autism*, edited by Deborah A. Fein, 215–224. Cambridge: Oxford University Press.

Kennett, Jeanette. 2002. "Autism, Empathy, and Moral Agency." *The Philosophical Quarterly* 52: 340–357.

Kern, Janet K., Madhukar H. Trivedi, Carolyn R. Garver, Bruce D. Grannemann, Alonzo A. Andrews, Jayshree S. Savla, Danny G. Johnson, Jyutika A. Mehta, and Jennifer L. Schroeder. 2006. "The Pattern of Sensory Processing Abnormalities in Autism." *Autism* 10(5): 480–494.

Klin, Ami, Warren Jones, Robert Schultz, and Fred Volkmar. (2003) "The Enactive Mind, or From Actions to Cognition: Lessons from Autism." *Philosophical Transactions B* 358(1430): 345–360.

Lang, Russell, MarkO'Reilly, Olive Healy, Mandy Rispoli, Helena Lydon, William Streusand, Tonya Davis, Soyeon Kang, Jeff Sigafoos, Giulio Lancioni, Robert Didden, and Sanne Giesbers. 2012. "Sensory Integration Therapy for Autism Spectrum Disorders: A Systematic Review." *Research in Autism Spectrum Disorders* 6(3): 1004–1018.

Lawson, Wenn B., and Brynn A. Dombroski. 2017. "Problems with Object Permanence: Rethinking Traditional Beliefs Associated with Poor Theory of Mind in Autism." *Journal of Intellectual Disability – Diagnosis and Treatment* 5:1–6.

Marco, Elysa J., Leighton B. N. Hinkley, Susanna S. Hill, and Srikantan S. Nagarajan. 2011. "Sensory Processing in Autism: A Review of Neurophysiologic Findings." *Pediatric Research* 69(5): 48R–54R.

Markram, Kamila, and Henry Markram. 2010. "The Intense World Theory – A Unifying Theory of the Neurobiology of Autism." *Frontiers in Human Neuroscience* 4: 1–29.

Mottron, Laurent, Michelle Dawson and Isabelle Soulières. 2008. "A Different Memory: Are Distinctions Drawn from the Study of Nonautistic Memory Appropriate to Describe Memory in Autism?" In *Memory and Autism: Theory and Evidence*, edited by Jill Boucher and Dermot Bowler, 311–329. New York: Cambridge University Press.

Navon, Daniel, and Gil Eyal. 2016. "Looping Genomes: Diagnostic Change and the Genetic Makeup of the Autism Population." *American Journal of Sociology* 121(5): 1416–71.

Potter, Nancy N. 2016. "Doing Right and Being Good: What it Would Take for People Living with Autism to Flourish." *Philosophy, Psychiatry, & Psychology* 22: 263–334.

Waterhouse, Lynn. 2013. *Rethinking Autism: Variation and Complexity*. New York: Elsevier Inc.

Watling, Renee, and Sarah Hauer. 2015. "Effectiveness of Ayres Sensory Integration and Sensory-Based Interventions for People with Autism Spectrum Disorder: A Systematic Review." *American Journal of Occupational Therapy* 69: 1–8.

Wolfberg, Pamela J. 2009. *Play and Imagination in Children with Autism*. New York: Teachers College Press.