

# On the Dangers of Autism Automation

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## DRAFT

### Acknowledgements

- The title of this paper is borrowed from *On the Dangers of Stochastic Parrots* [4] and *Automating autism* [8], two papers that have substantially shaped the development of this paper and whose work I hope to build on.
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- All of the code and (small) data files can be found on this paper's GitHub repository at [github.com/mindsresearch/autism-ai](https://github.com/mindsresearch/autism-ai).

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# 1 Introduction

In *Automating autism* [8], Keyes analyzes two distinct corpora using a Critical Discourse Analysis-based approach to arrive at a set of themes pertaining to the sentiment towards autistic people both in academic research and in the commercial space. In my previous work, [C2C202B PAPER TITLE HERE], I analyzed the current flaws in the workforce sentiment towards autism and neurodiversity in post-secondary employment.

In the present paper, I focus on a more fundamental issue: the genesis of how autism is defined “under a ‘medical’ model of disability” [8, p. 2], subsequent issues stemming from the major flaws in this definition, and the implications of this systemic bias in the present development of AI and machine learning models to diagnose the disorder.

[TODO: Rebuild to make more specific (as a function of development)]

## 2 The Genesis of Autism

### 2.1 Following the Footnote Trail

The term “autism” was first coined by Eugen Bleuler in 1913 to describe schizophrenic patients [7, p. 213]. Specifically, Bleuler dubbed “autism” to refer to a state where one “[seems] totally detached from the outside world ... and basking in fantasy” [7, p. 213]<sup>1</sup>. However, the history of autism as a syndrome as opposed to Bleuler’s symptom begins some 30 years later with the near-simultaneous descriptions by Leo Kanner in 1943 and Hans Asperger in 1944. The latter’s penning of “autistic psychopathy” adapted the original description by framing it as “a durable way of being..., a different kind of contact with [the world]” [7, p. 213] in response to the rising popularity of intelligence testing in 1930s Vienna. Kanner’s “infantile autism” on the other hand, waived from this definition by incorporating psychogenesis and mental r■■■■ation [7, p. 215].

Division between the two descriptions would then deepen further following the 1971 publication of [11] which created a sharp split between them, noting that Asperger’s description “did not receive the attention it deserves” [11]. Furthermore, the split aligned with Kanner’s desire<sup>2</sup> to restrict autism to “a rare and unique disorder” fearing that Asperger’s description would “[water] down autism”, thus “[depriving] the category of any relevance” [7, p. 216].

However, [11] represents something *far* more significant than creating this divide - one of many introductions of Asperger’s work to English-reading “researchers” [7, pp. 216-7]. This debunks the common myth, perpetuated in [3], that Asperger’s work was unknown to the English world until 1981 (or in the case of [3], 1997) [7, p. 216]. Rather, the latency in adoption of Asperger’s work stems from an “inability to synthesize [Asperger’s] and Kanner’s descriptions” [7, p. 222].

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<sup>1</sup>aka “zoning out”/“daydreaming”?

<sup>2</sup>Kanner was an editor for the journal in which [11] was published.

This carries over into the present popular and academic conceptualization of autism, presented in Simon Baron-Cohen’s 1995 book *Mindblindness* [2] and his 2003 book *The Essential Difference* [3], particularly chapter 10 [8, p. 12]. The latter posits that autism can be described as possessing “the extreme male brain” since the systematization ability of autistic people is enhanced whereas their empathy capabilities are significantly hampered [REPLACE WITH QUOTE]. This lack of empathy is described in the former as an inability to “come up with a sensible interpretation of the causes of [others’] actions” [2, p. 4], and is likened to the social ineptitude [TODO: word choice] of primates, an excerpt of this comparison being shown in Table 1.

group	ID	EDD	SAM	ToMM
autism (A)	+	+	-	-
autism (B)	+	+	+	-
higher primates	+	+	+?	-
normal humans older than 4 years	+	+	+	+

Table 1: Excerpt of table 8.1 on pg. 127 of [2]

Baron-Cohen’s ideas were then applied to “theory and philosophy ... implying that the default state for autists is total ignorance of self” [8, p. 13]. This and subsequent logical leaps were then taken through other works in popular science and medicine to arrive at the present construction of autism: robotic, asocial, non-agentic, and ultimately, non-human [8, pp. 14-5].

## 2.2 Disability and Dis-humanity in Antiquity

While derivatives of Baron-Cohen’s works popularized the dehumanization of autism, the first belittlement of disability dates back significantly further to the ancient Greek philosopher Plato’s work, *Phaedo*. According to the interpretation on page 145 of *Gendering Disability* [10], disability presents a severe impediment to philosophy. Since the healthy body is a source of “innumerable distractions” in the pursuit of knowledge, the bodily unpredictability of disability compounds this, halting philosophical progress altogether. Virginia Woolf’s 1930 essay *On Being Ill* applies this to literature since both “[aspire] to transcendence”, thus “in illness, the body demands acknowledgement” [10].

These notions of disability impeding human development are just as prevalent today, albeit in slightly more subtle ways. While special education (SPED) is presented as an exercise in inter-human empathy, its underpinning of something far darker are undeniable - attempting to “train” disability, particularly intellectual disability, out of children in order to force them into the capitalistic societal molds built specifically to exclude them. [SOURCES FOR THIS PARAGRAPH?]

### 3 Real Harms of Contemporary Definitions

Arguably, [11] marks the division between what is considered today the distinction between "low-functioning" and "high-functioning" autistic people, perpetuated by the "autism (A)" and "autism (B)" sub-groupings in Table 1. As we have explored in section 2, this distinction stems from the differences between Kanner's and Asperger's descriptions of autism and the "inability to synthesize [their] descriptions" [7, p. 222].

Furthermore, this divide is perpetuated through the construction of SPED programs and classrooms [TODO: word choice]. The curriculum of Life Skills, a form of SPED, focuses heavily on teaching the "correct" strategies for social skills and "normal" societal interaction. Some examples include the teaching of white middle-class [TODO: research history of table manners to verify this] version of table manners without acknowledging those of other cultures, an allistic approach to friendships without the expression of authenticity<sup>3</sup>, and problem solving strategies that focus on minimizing reliance on adults.

### 4 The State of AI-assisted Autism Diagnosis

AI-assisted Autism diagnosis (AIAD) is a rapidly growing field in machine learning research, motivated by the perception that present autism diagnosis methods are unnecessarily arduous. Researchers therefore seek to employ AI models and other machine learning techniques in the pursuit of streamlining the diagnostic process by identifying additional diagnostic modalities or adjusting existing modalities.

However, the bedrock and foundations of how AI research is set up to handle the ethical considerations when working with disabled populations are frequently severely lacking. A 2019 review of AI ethics publications found that of the nearly 1700 article abstracts reviewed by the study, only eleven of them contained keywords linked to disability [6].

#### 4.1 AI Ethics

Understanding the rationale behind this lack of consideration is seemingly straightforward; gaining a deeper understanding is more complex.

The straightforward answer is to point to the historical lack of consideration given to disabled people and consider this exclusionary attitude to simply be a "natural extension/continuation" [TODO: WORD CHOICE] of this bias. This theory is further validated by the fact that the increasingly large and complex models being used in research fundamentally require additional training data to achieve higher accuracy metrics [4, p. 613].

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<sup>3</sup>thus implicating the concept of "masking", or concealing autistic traits, which can cause substantial mental health issues

## 4.2 General Issues in AI Bias

For an example of how historical bias gets perpetuated in machine learning research, we turn to [4], which examines (among other things) the historical biases that are present and perpetuated in large language models (LLMs) such as ChatGPT. In these cases, the “problematic characteristics” [4, p. 613] of LLMs stem from the deceptively uninclusive data sources that encode a fundamental WEIRD [CITE] bias despite efforts to mitigate these shortcomings. This inability to mitigate the shortcomings of data collection methodologies comes from the aforementioned need for additional training data thus resulting in these strategies casting a wider net encompassing the “low hanging fruit” of internet-based platforms without consideration of their userbase.

## 4.3 Going Too Far

In the case of AIAD, one such way this need for increased data size manifests is in the inclusion of toddlers and other young children, pointing to the supposed benefits of early intervention. However, this fails to consider the increasing skepticism towards early intervention programs on the basis that they fail to embrace the growing neurodiversity movement [1].

Furthermore, many of the present diagnostic methods require some form of communication with the child to a degree that may not be present even in a “normal” child of that age. One such metric that is frequently used for the early diagnosis of ASD is that of joint attention [9]. This is rooted in Baron-Cohen’s criteria of autism which describes a “shared attention mechanism” (referred to as SAM in table 1) that may be lacking in some autistic individuals.

According to [2], this SAM is usually fully developed by 18 months of age, with the “ToMM” developing by 4 years old. Therefore, attempting to use behavioral assessments between these two points risks failing to diagnose children with subgroup B autism. Despite this, a popular dataset used for the development of this type of AIAD model features a large amount of data from children in this age range, which we explore further in section 6.

## 4.4 Issues in AIAD Research

This subsection summarizes the previous subsections in this section, providing an overview of the major issues in AIAD research.

# 5 Evaluating the Present AIAD Corpus

In the present research surrounding the use of AI in autism detection and diagnosis, there appear to be two major “tracks” that research follows: optimization of behavioral assessment and analysis of brain imaging. These methods are discussed in turn below.

## 5.1 Behavioral Assessment

## 5.2 Neural Imaging

The second major track that AIAD research follows is that of detecting structural differences in autistic versus non-autistic brains through the use of EEG and MRI scanning. [5] provides an "excellent" overview of the work in this track. Here is a list of reasons why [5] is so "amazing":

- Directly mentions Kanner; ASD related to the brain
- Autism is this horrible epidemic that must be addressed at all costs!
- "Unfortunately, this test-based screening method [ADOS] can only diagnose children when they have the ability to communicate." (pg. 2)
- Genetic testing!
- Cerebrospinal fluid increases within first two years of life correlates to ASD (pg. 3)
- "The accuracy of a classifier/predictive model is improved by training the model on large datasets." (pg. 3) - uh... no... not necessarily... unless we're talking about overfitting...?

My thoughts:

- HOW HAS THIS PAPER NOT BEEN RETRACTED!?!?!?!?!?
- It looks like accuracy hovers in the 80s-percent range. Precision/recall scores?
- Stop. Just. Stop. Sure, you might be able to detect autism with some degree of accuracy, but *why*? Getting an MRI, (especially pediatrics?), isn't cheap...
- Table 1 has repeated rows...?
- This paper is so bad that I almost want to print it...

## 6 Replicating Results

### 6.1 Behavioral Assessment

### 6.2 Neural Imaging

## 7 Discussion

### 7.1 Approaches to Autism Diagnosis

### 7.2 Developing Benchmark Datasets

## Bibliography

- [1] Dawson et al. “At a Crossroads”. In: (2022).
- [2] Simon Baron-Cohen. *Mindblindness: an essay on autism and theory of mind*. Learning, development, and conceptual change. Cambridge, Mass: MIT Press, 1995. 171 pp. ISBN: 978-0-262-02384-9.
- [3] Simon Baron-Cohen. *The essential difference: male and female brains and the truth about autism*. New York, N.Y: Basic Books, 2004. 271 pp. ISBN: 978-0-7382-0844-2 978-0-465-00556-7.
- [4] Emily M. Bender et al. “On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?” In: *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*. FAccT ’21: 2021 ACM Conference on Fairness, Accountability, and Transparency. Virtual Event Canada: ACM, Mar. 3, 2021, pp. 610–623. ISBN: 978-1-4503-8309-7. DOI: 10.1145/3442188.3445922. URL: <https://dl.acm.org/doi/10.1145/3442188.3445922> (visited on 02/13/2024).
- [5] Ahmad Chaddad et al. “Can Autism Be Diagnosed with Artificial Intelligence? A Narrative Review”. In: *Diagnostics* 11.11 (Nov. 3, 2021), p. 2032. ISSN: 2075-4418. DOI: 10.3390/diagnostics11112032. URL: <https://www.mdpi.com/2075-4418/11/11/2032> (visited on 02/28/2024).
- [6] “Coverage of Ethics”. In: (2019).
- [7] Gil Eyal et al. *The autism matrix: the social origins of the autism epidemic*. Cambridge, UK: Polity, 2010. 320 pp. ISBN: 978-0-7456-4399-1 978-0-7456-4400-4.
- [8] Os Keyes. “Automating autism: Disability, discourse, and Artificial Intelligence”. In: *Journal of Sociotechnical Critique* 1.1 (2020). Ethics. DOI: 10.25779/89BJ-J396. URL: <https://digitalcommons.odu.edu/sociotechnicalcritique/vol1/iss1/8> (visited on 01/12/2024).
- [9] Tiffany Kodak and Samantha Bergmann. “Autism Spectrum Disorder: Characteristics, Associated Behaviors, and Early Intervention”. eng. In: *The Pediatric clinics of North America* 67.3 (2020), pp. 525–535. ISSN: 1557-8240.
- [10] Bonnie G. Smith and Beth Hutchison, eds. *Gendering disability*. New Brunswick, N.J: Rutgers University Press, 2004. 314 pp. ISBN: 978-0-8135-3372-8 978-0-8135-3373-5.
- [11] D. Arn Van Krevelen. “Early infantile autism and autistic psychopathy”. In: *Journal of autism and childhood schizophrenia* 1.1 (Jan. 1, 1971), pp. 82–86. ISSN: 1573-3432. DOI: 10.1007/BF01537745. URL: <https://doi.org/10.1007/BF01537745>.