

# AUTISM

## THE MOVEMENT-SENSING PERSPECTIVE



Edited by Elizabeth B. Torres • Caroline Whyatt

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# Conclusions

*Elizabeth B. Torres and Caroline Whyatt*

As we continue our journey through the first 20 years of the twenty-first century, the field of Neuroscience is undergoing rapid changes at all fronts. New technologies ranging from optogenetics to a plethora of wireless sensors are bound to revolutionize the ways in which we gather data from the brain and from the body the brain senses to enable its voluntary control. New analytics entering this landscape of big data will help profile the development and growth of the nervous systems, particularly during neurodevelopment. As such, autism spectrum disorders (ASD) at large are poised for radical change along a positive and optimistic pathway ahead.

While seminal literature and works have guided the field to new discoveries and enabled a new era of ASD understanding in the academic and public domain, this book has begun to highlight the imminent revolution in ASD. It is the byproduct of a superb collaborative effort among parents, therapists, clinicians, and researchers from all areas of science, physics, engineering, and applied mathematics, inviting us to learn about the coping nervous systems of the developing child and the new technological advances, enabling new designs for data-driven accommodations and support.

The book invites the reader and user to go far beyond subjective descriptions and interpretations of ordinal data gathered by hand into the realm of objective data harnessed, in tandem, from the brain and body. This new avenue of exploration will help researchers better understand the functioning of the nervous systems as the person behaves, naturally moves, and senses back the responses from natural interactions with the surrounding environment. Specifically, this book has introduced how movement, specifically movement sensing, may have a profound and reverberating impact on the various axes of development; axes characteristic of ASD. Viewed from this perspective, the authors unite in a singular message—that it is time to re-shift our focus and conceptualization to one that considers the needs and development of the individual from a more holistic approach. This departure from traditional isolated domains of constrained symptomatology opens new possibilities—for therapies, diagnosis, and data-driven research. For instance, by introducing the movement-sensing dyad of the child and clinician, or the child and parent, this book creates a new basic unit of social exchange—a core feature of ASD symptomatology and research. This unit is now quantifiable and longitudinally tractable in data-driven ways. Moving beyond mere descriptions of social exchange, and subjective attribution of preconceived ‘social appropriateness’, this dyadic exchange can now be objective profiled and steered in real time using sensory feedback derived from the person’s self-generated movements, with noninvasive technology. This new platform paves the way for a reconceptualization of both diagnostics and intervention strategies within a mobile health framework.

Informed from data that are harnessed directly from the nervous systems of the person, these new dynamic analyses of development, combined with probabilistic conceptualizations and characterizations of ‘traditional’ axes of symptomatology such as social exchange in ASD will inevitably bring positive outcomes for the affected individual and may improve the attitude of society at large. Indeed, through a personalized dynamic and probabilistic approach to diagnose and track treatment outcomes in ASD, we enter a new era of potential development of true target therapies aimed at minimizing off-target side effects. Together, we close this editorial with a constructive message as we begin the process of societal education with the immediate goal of better understanding and embracing ASD as one of the many human conditions.