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Special issue:
"In memory of Michael Turvey"

Editorial: Michael Turvey: The Most Influential Scholar in Motor Behavior in the Last 50 Years

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ABBREVIATIONS
CESPA Center for the Ecological Study of Perception & Action

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ABSTRACT
It is difficult to estimate the impact that Michael Turvey (February 14th, 1941 – August 12th, 2023) had on the field of motor behavior. His research and thoughts influenced uncountable scholars over the last 50 years, and his kindness and dedication were examples to many. Through the reflections of esteemed colleagues and former students gathered in this Special Issue of the Brazilian Journal of Motor Behavior, we gain insights into the profound influence of Michael Turvey on motor behavior and beyond.

KEYWORDS: Michael Turvey | Ecological Psychology | Dynamical Systems

It is hard to measure the impact of any individual in any field of science. While metrics such as publication count and citations serve as tangible benchmarks, the true impact of Michael Turvey (February 14th, 1941 – August 12th, 2023) transcends any numerical measures. Through the reflections of esteemed colleagues and former students gathered in this Special Issue of the Brazilian Journal of Motor Behavior, we gain insights into the profound influence of Michael Turvey, both professionally and personally. In the first part, five well-established scholars and Michael Turvey's colleagues tell us about his impact on the field of motor behavior and beyond. Some also include the influence that Michael Turvey had in their careers. In the second part, four former Ph.D. students of the Center for the Ecological Study of Perception & Action (CESPA) tell us about the experience of being Michael Turvey's student.

The first part starts with Kelso's article, which gives us a perspective of how influential Michael Turvey was. Kelso gives a eulogy, remembering early Michael Turvey's work that brought into light concepts like coalitions, synergies, and many others. He tells us some historical events that yielded the publication of some of Michael Turvey's seminal chapters. Furthermore, Kelso argues that entire fields and scientific approaches would never come to life without the theoretical insights of Michael Turvey.

Latash provides us with a review of both the Referent Control approach and the Synergies approach (from an Uncontrolled Manifold perspective). In particular, Latash describes recent findings in the study of synergies at the neurophysiological level. Michael Turvey was well-known for advocating that biological movements should be studied through the lenses of natural laws, which is not the most usual way of addressing problems in motor behavior. The relevance of both approaches to advance studies in motor behavior was recognized by Michael Turvey in some of his writings [1,2]. Noteworthy, to those unfamiliar with non-computational approaches to biological movements, Latash provides a rich synthesis of the two intertwined research programs of the Referent Control approach and the Synergies approach.

Feldman also focuses on a natural laws approach to motor behavior. First, he lists a couple of actions that Michael Turvey took to disseminate Russian science during the Cold War. Feldman gives us some examples of the incredible work done in Russia in the 1960s and 1970s, including his own work on the Equilibrium-Point Hypothesis published in 1965. The Equilibrium-Point Hypothesis is a type of parametric control that resonates with organism-environment inseparability which is a foundational concept in Michael Turvey's work. A key concept in the Equilibrium-Point Hypothesis is λ, the threshold at which motoneurons begin to be recruited or de-recruited. In his article, Feldman tells us that Michael Turvey suggested to him that λ could be scalable across different hierarchical levels of the motor system. That is, Michael Turvey instigated him to extend the Equilibrium-Point Hypothesis in a broader and more scalable theory. Later, Feldman came out with a more general type of parametric control, the Referent Control Theory.

Rosenbaum reviews his studies that were influenced by Michael Turvey. He highlights Michael Turvey's contribution to the

Information Processing approach as well as his groundbreaking research on perception and action from a Dynamical Systems approach. In the sequence, Rosenbaum provides us with examples of his research program that were influenced by Michael Turvey's work. First, he describes how his skepticism of Dynamical Systems influenced his work on a linear delay-line model to explain results that have been addressed through a coupled oscillator model of timing stability. Second, he describes his studies about how the sudden disappearance of structured visual input from below affects gaze exploratory behavior. Third, Rosenbaum describes two phenomena studied in his lab over the years, namely: the end-state comfort effect and grasp-height effect. In the last part of his article, Rosenbaum tells us about Michael Turvey's generosity.

Whitall and Clark discuss Michael Turvey's conceptual influence on motor development studies. They organized their article into two historical parts, providing us with examples and data to support their position. They argue that Michael Turvey had his greatest influence on motor development studies in the first part [1975-1999], promoting with his colleagues both the Ecological Realism and the Dynamical Systems approach. In turn, Whitall and Clark argue that the conceptual influence of Michael Turvey is reduced in the second part [2000-2024]. Of importance, Whitall and Clark's analysis considers not only Michael Turvey's direct influence on the motor development field but also his indirect influence through the work of colleagues and students.

The second part of this Special Issue starts with Balasubramanian article, which focuses on Michael Turvey's contributions to the advancement of the Dynamical System Approach to motor behavior. Balasubramanian exemplifies Michael Turvey's influence on his research program. First, he shows that it is possible to have steady, synchronized movements without a central pacemaker. Second, Balasubramanian shows that music perception involves the motor system, along with the notion of perceptual systems. Third, he demonstrates that auditory or tactile noise can stabilize posture through stochastic resonance. Fourth, he demonstrates symmetry in bimanual coordination by manipulating viscous and elastic force fields. His results go along with Michael Turvey's demonstrations that anti-phase coordination has larger variability than in-phase. He ends by describing how unstable objects are controlled by assembling synergies to stabilize the interaction between the object and the human controller.

Amazeen highlights how Michael Turvey influenced her in multidisciplinary thinking and her understanding of a systems perspective. She advocates for a systems perspective in science, in which everything is connected. She provides examples to demonstrate the organism-environment inseparability as well as the relevance of history and context for the emergence of observed behavior. Furthermore, Amazeen also talks about a systems perspective in life by describing how Claudia Carello and Michael Turvey mentored her at different levels of her life, namely: academically, financially, and socially. That is, to Claudia Carello and Michael Turvey mentoring goes beyond academia, it requires caring about a student in her entirety. In the last part, Amazeen recognizes the influence of Michael Turvey in her teaching style, but she considers it essential she has found her own voice and style.

Silva tells us about her relationship with Michael Turvey through the *Action Course*. The *Action Course* is one of the core courses that Ph.D. students must take at CESPA. She describes her interaction with Michael Turvey through lessons she learned. Lesson 1 is that Michael Turvey helped her to have a strong foundation to conceptualize motor behavior research. She describes how she had to delve into many difficult readings to understand the fundamental problems of motor behavior and how her experience in the Action Course continues fostering her scientific thinking. Lesson 2 refers to the need for intellectual humility in scientific inquiry. More specifically, Michael Turvey was well-known for defending a natural approach to biological movements. However, during the *Action Course*, he taught the Artificial (Computational) approaches as if he were a supporter of those approaches, recognizing the effort and commitment of those with whom he strongly disagreed. Lesson 3 refers to embracing the discomfort inherent in the learning process. As Silva described it, a necessary comprehension to learn to trust in ourselves as scientists. Lesson 4 refers to being prepared and open to engaging in challenging scientific exchanges. During the *Action Course*, students had to work on their arguments based on their readings while Michael Turvey pushed them to their limits for better comprehension of the theories. Lesson 5 refers to the balance between academic work and life well-being. Silva also thanks Claudia Carello and Michael Turvey for the opportunity they offered to students on Friday evenings to gather at the Sweet Williams Pub, situated in their basement.

In the last article, Wagman focused on Michael Turvey's attitude and principles towards science and life. He started with Faraday's admonition: "Work. Finish. Publish." Michael Turvey took Faraday's admonition seriously, publishing hundreds of papers and several book chapters. He worked, he finished, and he published. However, Wagman argues that Michael Turvey also considered teaching as a fundamental dimension of academic life. His famous *Teaching Course* was proof of how much he valued teaching, at both undergraduate and graduate levels. Furthermore, Michael Turvey also believed that we should celebrate our accomplishments, no matter how small they are. Wagman finishes proposing a revision of Faraday's admonition to make it closer to how Michael Turvey approached his life and scientific career.

I am thankful to all the Michael Turvey's colleagues and former students who collaborated with this Special Issue. I would like to extend my gratitude to Fabio Barbieri, the BJMB Editor-In-Chief, who readily accepted my suggestion of publishing this issue in honor of Michael Turvey.

Michael Turvey was a brilliant researcher, an outstanding speaker, an astonishing professor, and a dear friend of many. I was lucky to have the opportunity to study with him. He was always very generous, listening to my ideas and demonstrating curiosity about the discoveries I was making. Michael Turvey was an example of how to do science and how to foster students' talents.

Thank you, Michael!

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