Response to Koenig et al. Psychological state estimation from physiological recordings during robot-assisted gait rehabilitation. J Rehabil Res Dev. 2011;48(4): 367–86. Available from: http://www.rehab.research.va.gov/jour/11/484/pdf/koenig484.pdf

Dear Editor:

Thank you for the recent publication of your single-topic issue entitled "The Road Ahead for Rehabilitation Robotics." It was wonderfully inspiring and informative and will be an excellent resource for new ideas and the innovative individuals behind these ideas and concepts.

Psychometric and practicality issues were mentioned on several occasions as potential barriers to advances in rehabilitation robotics, and these barriers are also seen in orthotics and prosthetics (O&P). In many ways, extracorporeal orthotics/prosthetics are a form of robotics, sharing mechanical, conceptual, and practical attributes, as well as the same promulgation and acceptance issues. As a clinical prosthetist, I have struggled with these issues for over 30 years, and it is still very much an uphill struggle.

Psychometry typically refers to measurements. However, it also refers to the capacity to acquire knowledge super-normally by handling objects [1]. This definition opens up all kinds of physical rehabilitation technology possibilities and represents a fascinating and largely unexplored area of rehabilitation science.

I believe the potential rehabilitation value in O&P and robotic rehabilitation can be found in their capacity to engender or facilitate imagination and anticipation in the user. The ability to foster imagination of normality and anticipation of sensorimotor function and the inherent ability of the device to induce or create this "super-normal" state of mind are the very cornerstones and definition of what a biomechanical device (to include robotics) should do and be—it is essentially what makes a mechanical device biological.

This induced state of mind described by Mr. Koenig et al. in their discussion of psychophysiology in the article "Psychological state estimation from physiological recordings during robot-assisted gait rehabilitation" [2] is physically measurable apart from other psychometric and practicality measurements. We should physically measure how well the device inherently lends itself to the acquisition of neuromuscular and neuropsychological skills on which resulting abilities and limitation (as well as psychometric and practicality issues) are assessed.

This is within the professional scope of clinical O&P, and I believe this concept should be more closely associated with and integrated into robotics engineering. I think there is much to be gained from differentiating between the inherent physiological and biomechanical efficacy of the robot (applied technology) and the users' ability and willingness to benefit from this technology (training). As a prosthetist, I believe this would greatly simplify and clarify clinical obligations and expectations of robotics engineering, as well as promote interclinical communication and perhaps coalesce seemingly divergent disciplines. For this reason, I encourage Mr. Koenig, Dr. Scott, and other key contributors to *JRRD*'s single-topic issue to continue in this challenging and worthwhile area of scientific investigation to chart the road ahead.

Sincerely,

Michael Wilson, CPO
Wilson Prosthetics Clinic, LLC, Missouri City, TX

Email: mwpilot1@comcast.net

REFERENCES

1. Taber's cyclopedic medical dictionary. 21st ed. Philadelphia (PA): F. A. Davis Company; 2009.
2. Koenig A, Omlin X, Zimmerlie L, Sapa M, Krewer C, Bollinger M, Müller F, Riener R. Psychological state estimation from physiological recordings during robot-assisted gait rehabilitation. J Rehabil Res Dev. 2011; 48(4):367–86. [PMID: 21674389] DOI:10.1682/JRRD.2010.03.0044