Yesterday, I had the opportunity to experience a dose of reality in the clinic. I was mentoring a neurologic physical therapy resident in an outpatient neurologic rehabilitation setting. We were co‐treating a 26‐year‐old man who had an acute onset of quadriplegia 4 months earlier with a confirmed diagnosis of Guillain‐Barré syndrome. He is beginning to get some motor return in his legs; however, he is on a ventilator and has no head control. He is completely dependent for all of his health care needs. What theoretical basis will guide our practice today?

As in physics, a field that has more than one theory (eg, Theory of Relativity, Theory of Quantum Mechanics), physical therapy will need more than one theory or conceptual framework to unify assessment and therapeutic management for patients with movement dysfunction. I commend Allen for her efforts in providing a theoretical framework (MCT) to test a multidimensional model of movement. In addition, she proposes the use of the MAM as a measurement tool to empirically test the 6 movement dimensions of the model. We have been provided a theory and a movement construct that can be tested through experimental observation. Clearly, many hypotheses can be generated from this series of articles.

KJ Sullivan, PT, PhD, is Assistant Professor of Clinical Physical Therapy, and Director, Entry‐Level Program, Division of Biokinesiology and Physical Therapy, University of Southern California, 1540 E Alcazar St, CHP 155, Los Angeles, CA 90089‐9006. Address all correspondence to Dr Sullivan at: kasulliv@usc.edu.


References

My thanks to Cott, Finch, Martin, and Sullivan for their comments on the 3 articles about the 6 dimensions of movement and the Movement Ability Measure (MAM). Their insights make a commendable start for the discussion that I hope will ensue with the publication of these articles. In responding to their comments, I will address some of the issues they raise regarding the 6‐dimensional extension of the Movement Continuum Theory (MCT) and the development and evaluation of the MAM.

Response to the Commentary by Cott and Finch
Cott and Finch advocate for theoretical development in physical therapy. In 1995, they proposed the MCT1 as a grand theory of physical therapy, with movement as the focus and purview of physical therapists.

In the current series of articles, I propose a subdivision of the construct of movement into 6 dimensions—flexibility, strength, accuracy, speed, adaptability, and endurance. The logic and elegance of the original MCT should have ensured its wide reception in the profession. With these articles, I hope to facilitate greater application of a newly extended MCT to clinical practice and research. For example, with movement dimensions and the MCT, clinicians have a theoretical basis for approaching decision making with their clients: they can assess the current and preferred movement capability of their clients along the defined movement dimensions, focus intervention toward the dimensions showing dysfunction, and determine whether capabilities in those dimensions change with physical therapy intervention. Likewise, researchers can examine a clinically relevant theory through which they might link past and future hypotheses. They might test whether an effective intervention for improving strength, for example, also changes the theorized relationship between preferred and current movement capability in that dimension, as the extended MCT predicts. Such applications may help to support, refute, or modify the MCT and the 6 dimensions of movement and lead to additional discussion and debate to develop theory further.

In the spirit of advancing debate as suggested by Cott and Finch, I will clarify my intention regarding some of the issues they mention. First, the MCT and the 6 dimensions of movement may prove applicable for movement specialists in other professions besides physical therapy. Cott and Finch present the MCT as a theory that delineates how physical therapy...
therapists conceptualize movement and approach clinical problem solving. The 6 dimensions of movement that extend the MCT can help facilitate these purposes. However, many professions have an interest in movement science, movement capabilities of individuals, and interventions that can affect movement, all of which are addressed by the extended MCT. With specification of the 6 dimensions of movement, researchers might assess movement with performance-based or other instrumented measures of movement, as well as the MAM or other self-reported measures, and thereby add to the development of theory in their own professions.

Second, I expect users of the extended MCT to apply the 6 dimensions of movement to any movement that a person makes at any level. The original MCT describes movement at various levels of the human organism, from the molecular or cellular levels up to the person acting in society. These levels can be merged to align with the body parts, whole person, and whole person in the environment levels of functioning identified in the International Classification of Functioning, Disability and Health (ICF)2. As Cott and Finch point out, the 6 dimensions of movement in this series of articles were tested primarily at the ICF levels of the body part or whole person, with specification of the person in the environment when asking about adaptability. At each level, movement is complex enough to require categorization via multiple dimensions. Each movement or series of movements should be conceptualized as including some combination of the 6 dimensions. Flexibility, strength, and speed may apply to all movement, accuracy applies specifically to purposeful movement, adaptability applies whenever encountering unexpected obstacles or changes in the environment, and endurance applies at the limits of a person’s capacity. When adding the 6 dimensions of movement to the 4 factors that the MCT delineates as influencing movement—the physical, psychological, social, and environmental factors—even complex movements should have a unique identity. The complexity of movement we see in a gymnast or the limitations we see in someone after a stroke should be uniquely identifiable using various combinations of the dimensions of movement and the factors that influence each particular movement at any level.

Third, although the MAM tests the MCT and the 6 dimensions of movement and is a self-report instrument dependent on the client’s perspective, the theory itself delineates the clinician’s and not the client’s perspective. The theory is about movement. Client-centeredness does not mandate that we look to our clients to define the principles or dimensions of movement for us. Instead, client input can help us communicate better about movement so that we can test preferred and current movement capabilities and identify gaps and goals in ways that make sense to our clients.3 In developing the MAM, I chose to create a self-report instrument in order to capture self-perception of current movement on the same scale as self-reported preferred movement ability. I included clients’ perspectives through structured interviews, item panels, pilot tests, and discussion with physical therapy patients to help phrase the item responses for easier interpretability.4 Because a theory of movement should apply to normal as well as dysfunctional movement, the sample chosen for evaluating the MAM was appropriately representative for an initial study. With a mostly healthy population, however, it is all the more interesting that more than half of the respondents did not see their movement as a single capability, but differentiated between dimensions in their perception of their own movement ability.

Fourth, the MAM has the capability of collecting data on the differential or gap between preferred and current movement capability, but none of these articles reports on these data. Further work to assess the gap between “now” and “would like” responses on the MAM is forthcoming. Assessing this gap and any changes with intervention will be an important test of the MCT. I agree with Cott and Finch that obtaining the clients’ perspective in the form of preferred movement ability may help clinicians to understand the meaningfulness of changes in outcome to clients. In the concepts of current and preferred movement capabilities alone, the MCT is a rich source of hypotheses and propositions relevant to clinicians and the profession’s search for an evidence base for practice.

Response to the Commentary by Martin
Martin provides a measurement background against which to assess the development and evaluation of the MAM. Like Cott and Finch, he raises some interesting issues. Like Martin’s intent with his comments, my intent in responding to some of his points is to encourage further research with the MAM.

Although Martin delineates discriminative, predictive, and evaluative types of instruments, it is common for instruments to be used for more than one of these purposes. The restriction for use for one purpose or another is not inherent in the instrument but in the evaluation that has occurred for a particular purpose.5 Martin is correct in stating that the conditions for use of the instrument should match the conditions for evaluation of the instrument. Failing an exact match in the literature, how-
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However, users of an instrument have an obligation to collect their own evidence of validity, reliability, and responsiveness appropriate for their purposes. In this series of articles, I reported a rationale for collecting various pieces of evaluative evidence for the MAM. Future users will have the choice to report this evidence where their conditions match or to collect new evidence, perhaps based on some of the procedures reported here, when a different population or purpose requires it.

The MAM's basic purpose is evaluative, although discriminative and predictive evidence also were obtained to explore the functioning of the instrument and the construct of movement underlying it. Martin contends that evidence supporting an evaluative instrument should include a “useful description of the applicable test conditions,” involving subjects’ characteristics, the timing of data collection, and a construct of change. In this series of articles, I reported subject characteristics only on the basis of age and movement problems or general health. Although sufficient for initial evaluation of the MAM in a general population or a generic outpatient population, future users will want to specify clinical populations more particularly if they want to describe those populations rather than evaluate the measure.

My timing of the second data collection for the responsiveness study was set at about 2 weeks to make the conditions for the clinical group and the nonclinical test-retest group more similar. Future users will want to use timing that makes sense for their interventions and have a “no intervention” group retested at a similar time for comparison. My construct of change was related to the variability in respondents’ interpretation of the items and the number of items needing a different score to represent a theoretical change in level of movement ability. Future users may choose to define change as having responses that are above a certain cutoff related to discharge from physical therapy or another external criterion.

Martin contends that test-retest reliability, although commonly reported with an intraclass correlation coefficient, may have little clinical interpretability. He advocates use of the minimal detectable change (MDC), which provides a clinician with the minimal score difference between test sessions that exceeds measurement error. Martin also advocates use of the “minimum clinically important difference” (MCID) derived from the receiver operating characteristic (ROC) curves to determine whether an individual’s score on an instrument has changed following intervention. Unfortunately, the literature has multiple definitions and formulations of these and other responsiveness indicators.

Instead of exploring the merits of different formulations, this series of articles relates the rationale for reporting 2 varieties of indicators for change. One variety of change indicator communicates how large a difference must be to indicate change and not just measurement error; the other variety indicates change that relates to some external standard or criterion. In Martin’s comments, these varieties relate to MDC and MCID, respectively. The terms I used are defined and referenced in the articles for those who want to compare them. Specifically, the MCID used in the article on responsiveness of the MAM was derived using a different source than the ROC curves that Martin advocates. Receiver operating characteristic curves depend on experience with a measure sufficient to set a criterion of change or a cutoff by which to define sensitivity and specificity. The absence of experience with a new measure such as the MAM results in the absence of a basis for such a criterion. Subsequent research might accumulate enough data with the MAM for a user to establish criteria for these purposes.

Martin points out that subscale scores on the 6 dimensions might provide useful information for clinicians to direct intervention toward dimensions that are most problematic. He further notes that certain dimensions might change more with intervention in people with different diagnoses and impairments. I agree with these important insights. Further work to investigate these issues is forthcoming.

Response to the Commentary by Sullivan

Sullivan asks some elemental questions about how theory affects practice. With the MCT and the 6 dimensions of movement, I contend that theory can affect practice in the most fundamental activities. The extended MCT has the potential to add cohesion to multiple strands or lines of movement research and clarify clinical concepts for students.

Like Cott, Finch, and Martin, Sullivan raises some interesting issues. As she indicates, a self-report measure should contain the patient’s perspective in its creation and resulting data. As specified in my response to Cott and Finch, clients’ and patients’ perspectives were obtained in addition to the perspective of professional informants when generating items for the MAM. The discussion with “professional informants” to which Sulli-
Guided by the ICF, the extended Movement Continuum Theory (MCT) and the Movement Activity Measure (MAM) have the potential to help move theory development forward for physical therapists and other movement specialists. Theory development will involve discussion and debate of many issues, including those presented in the commentaries to this series of articles. Theory development also will involve generation of hypotheses and propositions and scientific testing of basic principles as has been described with development and evaluation of the MAM. As Cott and Finch contend, development of a theoretical framework is an important indicator of a clinical science that evolves rather than stagnates. As Sullivan states, physical therapists will need more than just one theory or framework. As theories and frameworks inspire additional assessment instruments, Martin reminds us that providing evidence of psychometric soundness requires ongoing research. The challenge to the profession is to continue the discussion and debate, to continue evolving through development and testing of multiple theories and frameworks, and to continue research to provide evidence of the effectiveness of our measures and our interventions. If we meet this challenge, we can help ensure that our patients and clients continue to receive the highest-quality care and to attain their maximum achievable movement potential.

**Conclusion**

The extended MCT and the MAM have the potential to help move theory development forward for physical therapists and other movement specialists. Theory development will involve discussion and debate of many issues, including those presented in the commentaries to this series of articles. Theory development also will involve generation of hypotheses and propositions and scientific testing of basic principles as has been described with development and evaluation of the MAM. As Cott and Finch contend, development of a theoretical framework is an important indicator of a clinical science that evolves rather than stagnates. As Sullivan states, physical therapists will need more than just one theory or framework. As theories and frameworks inspire additional assessment instruments, Martin reminds us that providing evidence of psychometric soundness requires ongoing research. The challenge to the profession is to continue the discussion and debate, to continue evolving through development and testing of multiple theories and frameworks, and to continue research to provide evidence of the effectiveness of our measures and our interventions. If we meet this challenge, we can help ensure that our patients and clients continue to receive the highest-quality care and to attain their maximum achievable movement potential.

**References**


