Reappraisal of the Negative Impression Cast and the Subtalar Joint Neutral Position Revisited Again

To the Editor:

I have just recently had the opportunity to read the January 1997 issue of JAPMA. It is difficult for me to express the level of chagrin that I experienced while reading the article “Reappraisal of the Negative Impression Cast and the Subtalar Neutral Position” by Drs. Ellen Sobel and Steven Levitz.

Drs. Sobel and Levitz are guilty of using several basic fallacies in their attempt to prove their hypothesis. They casually write off the extensive work of Dr. Merton Root and scores of other investigators and researchers in favor of a single statement in a study by Wright et al, to wit, “The neutral position was the position of the ankle and subtalar joint when the subject was standing relaxed with the knees fully extended, the arms at the side, feet six inches apart and a comfortable (my italics) amount of toeing out.”

As any knowledgeable podiatric biomechanist will attest, this leg position is achieved in the middle of the midstance phase of gait. However, the midstance phase of gait is a single support phase in which only one foot at a time is in contact with the ground. Therefore, the static stance position, certainly the one described by Wright et al by which they describe their impression of neutral position, is totally contrived and unsuitable for the purpose of establishing any valid conclusions about what the feet might do in active locomotion. Clearly, the study of Wright et al is about as factual as the archaic definition of a neutral position of the foot being one in which the foot is at a 90° angle with the leg. In fact, it expresses exactly nothing about a defined neutral position of the subtalar joint, which is best described as a position in which there is total congruency between the head of the talus and the navicular and the subtalar joint is neither pronated nor supinated.

Obviously, if Drs. Sobel and Levitz choose to build the rest of their treatise upon this singularly false premise, then the entire treatise must also be false. Furthermore, they use observations of treadmill gait to reinforce their fallacious conclusions. When it is widely recognized that treadmill gait is generally not comparable to overground gait.

Furthermore, Drs. Sobel and Levitz have not presented any criteria for the selection of patients used in their so-called study. In short, as they rushed to their conclusions relative to neutral subtalar position, casting, and orthoses, their disregard for the basic elements of a clinical presentation is appalling in this instance.

This would seem to place the hard-earned role of custom-made foot orthoses in jeopardy, especially in regard to their acceptance in the so-called “managed care” arena as the therapeutic modality of choice in the management of biomechanically impaired patients. I am certain that if this article had been given to any one or all of your editorial staff or Advisory Board, it would have been soundly rejected. As a matter of fact, I was requested to review Drs. Sobel and Levitz’s article by a well known commercial podiatric publication. I rejected it, and upon my advice, the article was not printed. What a shock it was for me to see the same article published by the official publication of my professional society.

I trust that you will take the appropriate steps to print a critique of the article so as to limit the damage that has already been inflicted on the science of podiatric biomechanics and the validity and efficacy of appropriate orthotic therapy.

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Authors’ Response

To the Editor:

We would like to respond to the comments made by Sheldon Langer, DPM, that pertained to our article. We have previously replied to similar comments made by Dr. Merton Root pertaining to this article.1

Dr. Langer states that we have casually dismissed “... the extensive work of Dr. Merton Root and scores of other investigators and researchers ...” which is in conflict with the definition of the subtalar joint neutral position by Wright et al2 which is the position of the subtalar joint during relaxed stance. Root et al3 defined the neutral position of the subtalar joint as that position in which the subtalar joint is neither pronated nor supinated and the position with maximal talonavicular congruency. It must be empha-
sized that Root et al’s subtalar joint neutral position was purely theoretical and was not based on any empirical research of their own. In fact, the only reference that they cited for their theory that the neutral subtalar joint position was reached during the midstance phase of gait prior to heel off was the study by Wright et al. Wright et al observed that the standing subtalar joint neutral position that they defined was reached during the midstance phase of gait, which is different from the Root subtalar joint neutral position. So, once again, we must restate that the basic theory of Root et al, was based on a misinterpretation of the study by Wright et al.

As to the numerous other investigators to whom Dr. Langer refers, the Root textbook was published in 1977. In the last twenty years, there has not been one empirical study published that has supported Root’s thesis that the Root subtalar joint neutral position is reached during the midstance phase of gait in the Journal of the American Podiatric Medical Association, Journal of Foot & Ankle Surgery, Journal of Biomechanics, Journal of Bone & Joint Surgery, Journal of Prosthetics and Orthotics, Foot & Ankle International, Physical Therapy, Journal of Orthopedic Sports Physical Therapy, or any other scientific journal. However, there are five recent studies in peer-reviewed journals that refute the theory of Root. These studies all report that the subtalar joint remains almost fully pronated throughout the entire midstance period of gait, which is in dramatic contrast to Root’s theory. These studies were all well controlled empirical designs that used the latest gait analysis equipment, and were published in respected academic journals including two reports from the premier journal (Journal of Biomechanics). Furthermore, these studies are in agreement with the original definition of the relaxed subtalar joint neutral position as described by Wright et al. Additionally, the report by Sarrafian that the foot is most stable when the rearfoot is pronated with the foot being “...more rigid and a better lever arm” is also congruent with the Wright et al study and in direct conflict with the Root et al theory. A comprehensive review of foot mechanics by Sims and Cavanagh, and the new second edition of the text book titled Foot Orthoses and Other Forms of Conservative Foot Care by Michaud, have both described basic inconsistencies with the Root theory and the casting of foot orthoses. Finally, experienced clinicians who trained under Root have begun to question the Root casting technique for fabrication of foot orthoses. While there have been many studies proving the efficacy of custom foot orthoses, they have nothing to do with Root’s theory and the method of casting.

Custom foot orthoses were prescribed frequently for patients long before Root wrote his textbook.

Dr. Langer states that Wright’s standing neutral subtalar joint position “...is totally contrived and unsuitable for the purpose of establishing any valid conclusions about what the feet might do in active locomotion...” because it is described in relaxed standing with both feet on the ground, whereas during the midstance phase of gait when the subtalar joint neutral position is reached, only one leg is on the ground. Yet he has no trouble with the validity of making inferences about active locomotion from Root’s neutral subtalar joint position where both feet are off the ground in the air with no body weight. As further evidence of Dr. Langer’s paradoxical comments, he recently recommended semiweightbearing biofoam casting generally not in the neutral position as the best casting technique for fabricating foot orthoses for elderly patients, those with wide, long feet, equinus conditions, for locating and balancing calluses, and for the many patients who cannot tolerate Root functional orthoses.

Our paper in no way implies or is meant to question the well established efficacy and usefulness of custom foot orthoses when indicated medically. Indeed, one of us has recently described the necessary prerequisites for fabrication of a custom foot orthosis. The recent studies that show that the Root subtalar joint neutral position is never reached during the stance phase of gait as Root hypothesized, does have implications about how to cast for custom foot orthoses and have lead us and others to conclude that since the subtalar joint does not intersect the Root neutral position during the stance phase of gait, orthotic devices should not be made from Root neutral position impressions.

Dr. Langer states that he rejected a popularized lay version of an article by us on this subject for a commercial journal. While we do not question the quality of Dr. Langer’s laboratory or his orthotic devices, he would appear to have a strong financial conflict of interest. He should not have been given the article to review in the first place. His real interest is “...acceptance (of custom-made foot orthotics) ... in the ‘managed care’ arena ...” as he states in his letter, not the academic merit of our paper or its true contribution to podiatric biomechanics. In contrast, the advantage of an academic journal is that the acceptance of a paper is not dependent on its agreement with the financial interest of the reviewer and controversial papers are not automatically rejected if they appear threatening to the economic concerns of the reviewer or established commercial interests. Submitted manuscripts are read blindly by peer reviewers.
review or distinguished guest editors with no vested interest in the outcome of a study. Most importantly, an unbiased Editor in Chief ensures that all manuscripts are reviewed in a fair and objective manner and will be accepted or rejected solely on academic merit.

Drs. Root, Sgarlato, Ross, and Langer have responded with written replies to our article.1 Apparently Dr. Langer tried to prevent the problems with the Root theory from becoming known by rejecting our article from a popular magazine. However, numerous studies have now been reported that conflict and refute many aspects of the Root theory and Dr. Langer cannot hope to conceal the results of these studies indefinitely. Attempting to cover up the basic fallacies of the Root theory is neither possible nor the solution to the problem.

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References
11. MICHAUD TC: Foot Orthoses and Other Forms of Conservative Foot Care, 2nd Ed, Williams & Wilkins, Baltimore, 1997.