Science is by no means limited to the professional scientist; it represents an attitude that can function in any area of experience, an attitude of free and effective intelligence. (Geiger, 1941/1999, p. 20, as cited in Stricker & Trierweiler, 2006)

Kamhi (2011) suggests that science progresses when scientists balance certainty (skepticism) with uncertainty (openness). He contends that having a healthy level of uncertainty is vital for changes in science and clinical practice to occur. He believes that when individuals are uncertain about the mechanism(s) that causes change, they are more open to studying or implementing new procedures or strategies that may be different than the status quo. Because of this perspective regarding uncertainty, Kamhi argues that clinical practice is not scientific. His argument is based on three main points: clinicians’ less than optimal openness to uncertainties, the lack of external verification of clinical practice, and the spontaneous nature of clinical interactions that generally precludes implementation of the scientific method. I have a different perspective on clinical practice, believing that clinical practice can be, and often is for many clinicians, scientific. In the first portion of this response to Kamhi, I provide counterarguments for the three main points supporting his argument that clinical practice is not scientific.

Kamhi (2011) also argues that clinical decision making is likely affected by professionals’ ability to think rationally, and that evidence-based practice (EBP) or patient-based evidence (PBE) approaches may be tools to help clinicians develop strong clinical decision-making skills. In the last section of my essay, I respond to this latter notion by proposing that it is the educators of future researchers and clinicians, and not EBP or PBE, who must be the mechanism for helping future clinicians develop scientific clinical decision-making skills.

Openness to Uncertainty

Although it is important for clinicians to have some level of certainty about the clinical practices they provide, Kamhi (2011) argues that they also must have some uncertainty so that they are open to new ideas. However, he suggests that clinicians, not unlike some researchers, may be unwilling to acknowledge and/or share their uncertainties with others; in the case of clinicians, this may be particularly true in their discussions with clients. Kamhi argues that clinicians are less likely to question the clinical procedures they use because of their confidence in these procedures, especially after several years of what seems to be successful remediation. He also proposes that clinicians may be unwilling to question their practices because by doing so, at least openly, they may cause clients to have negative feelings about the services provided. In
other words, clients may lose confidence in clinicians who question their clinical practices. Besides, Kamhi argues, seeking evidential support for what one believes would be contrary to the basic principles of EBP.

Although I agree with Kamhi (2011) and others (Stricker & Trierweiler, 2006) that clinicians and researchers alike may be equally unwilling to express uncertainties about their work, I have a concern about Kamhi’s last stated perception about clinicians and their search for evidence. I would argue that seeking evidence for what one believes is not contrary to EBP. Indeed, clinicians may be just as prone as researchers to seek experimental evidence for what they believe “works,” simply because they understand the importance of external evidence and desire scientific validation of what they already believe. This desire is actually one of the driving forces behind current efforts to increase the research base needed for evidence-based clinical decision making. As a case in point, the National Center for Evidence-Based Practice in Communication Disorders recently initiated several evidence-based systematic reviews of clinical practice topics (e.g., use of oral–motor exercises for speech development; McCauley, Strand, Lof, Schooling, & Fymire, 2009) based on a survey of 225 clinicians’ perceived need for evidence of current clinical practices (Mullen, 2005). Clinicians are seeking and are open to external evidence for the procedures they use; this search is very much in line with EBP principles.

**External Verification**

Kamhi (2011) asserts that scientific progress occurs because scientists have a built-in policing system: external verification and validation through peer review and scientific discourse. Scientific progress occurs when fellow scientists question theories, explain a phenomenon differently, or find alternative means for achieving desired outcomes. Kamhi suggests that because clinical practice lacks a mechanism for external verification, it cannot “operate like science” or contribute successfully to scientific discovery.

Kamhi’s (2011) suggestion may be misguided. First, in today’s culture of accountability, there are several external forces holding clinicians responsible for client changes, such as insurance agencies looking for client progress or school boards looking for enhanced scores on state benchmark tests. These agencies and boards are seeking client improvement; if that improvement does not occur, they expect clinicians to change their practices to obtain the desired growth in a reasonable amount of time. Second, as mentioned above, clinicians who systematically monitor their own clinical practice and outcomes are essentially providing their own personal accountability as they seek external verification of their clinical practices (Mullen, 2005). Ultimately, this accountability of personal practices contributes to scientific discovery.

Perhaps most importantly, Kamhi’s (2011) assertion seems to be based on a general view of science rather than a local view, which is needed when discussing clinical practices (Stricker & Trierweiler, 2006). Like researchers, clinicians must engage in verification of their services. However, in clinical practice, the verification is typically internal, or client based. That is, internal verification often occurs when clinicians are responsive to the needs of a particular client. Indeed, this is one of the basic tenets of EBP. Clinicians who are attuned to their clients’ specific needs and values and who integrate this information into the clinical decisions they make are engaging in EBP (e.g., American Speech-Language-Hearing Association [ASHA], 2004, 2005). Clinicians do engage in verification of their practices, but it is at the local or internal level, not the global or external level.

According to Kamhi (2011), without dissemination of research findings that have undergone peer scrutiny, changes to scientific orthodoxy will not occur. I do not disagree with this statement; without dissemination of findings, others do not learn of possible advancements in science. Most scientists and clinicians rightfully realize that findings that have been vetted by other scientists are more highly regarded than those that have not. What Kamhi’s statement leaves unsaid is the contribution that clinicians, and their clinical practices, can make to this process. Clinical practice can inform research. Scientists can be informed about possible practices that have led to changes in particular clients (local science) and then attempt to examine that phenomenon with larger populations (general science). Science is not, or should not be, a unidirectional process. Clinicians observe improvements in their clients’ communication skills that appear to be due to the clinical practices they employed. These observations can serve as the basis for future research endeavors, leading to changes in science.

**The Compatibility of Clinical Practice and Science**

Kamhi (2011) states that the flexible and dynamic nature of clinical practice precludes clinicians from “doing science.” He argues that careful study of potential agents of change cannot be investigated easily because clinicians must be flexible, spontaneous, and dynamic in their clinical interactions. I do not deny him this latter point: I, too, believe that clinicians should interact naturally and responsively to their clients. But I would argue that it is exactly this behavior of being highly responsive to clients’ needs that demonstrates clinicians’ scientific efforts. The difference between my perspective and Kamhi’s view may be due to our interpretations of the scientific method and our definitions of a scientist.

Science is not static. At its core, science involves observations and, often, modification of activities in a systematic way when those observations suggest that a change is required (i.e., the scientific method). For quite some time, experts in the field have discussed the role of the scientific method in clinical practice (e.g., Backus, 1957). Clinicians observe a behavior, develop a hypothesis for what might change that behavior, test that hypothesis, and observe the results to determine whether the hypothesis was confirmed. Thus, the same scientific mechanism used in research laboratories is, or should be, used in clinical settings. A difference between the two settings may be in the time taken to complete the scientific method. Researchers may implement the scientific method across weeks or months; clinicians may apply the scientific method within one clinical session. It is the same method, but it differs in its time span.

Scientists are inventive thinkers. Chong (2009) suggested that “productive scientists have a distinctive creative capacity that is a mixture of exceptional cognition and personality and that they perceive and think differently from less creative people when confronted with the same event” (p. 261). Scientists, then, are creative individuals who are not tied to one or two ideas for a specific situation; instead, they generate many possible ways to confront the condition. Scientists have the ability to think in divergent ways (Chong, 2009). Given this definition, scientists are known by their attitude for solving problems and how they think about those problems. This definition of scientist is akin to Stanovich’s (2009) view
of rational thinking, as discussed by Kamhi (2011). Scientists, or rational thinkers, are known for their attitude toward solving problems, whether it is in laboratory or clinical contexts (Stricker & Trierweiler, 2006).

The shift away from differences between researchers and clinicians to a focus on rational thought, or creative and scientific thinking, is a good one. The question, as posed by Kamhi (2011), is how clinicians become rational thinkers or, in my terms, scientists. Kamhi put forward the idea that EBP and PBE models of clinical decision making may be tools for developing clinicians’ rational, scientific thinking. I see this relationship differently. Rather than viewing EBP and PBE as tools to develop scientific, creative minds and clinical decision making, I view EBP and PBE as tools used by professionals who already are flexible, creative, and intelligent scientists. If we value a scientific, rational approach to clinical decision making, we must develop these skills in students who are learning to be researchers or clinicians.

Developing Scientific Clinical Decision-Making Skills

Kamhi’s (2011) essay, at its core, is a treatise on clinical decision making and the role of science in that process. When we view science as an activity that is conducted by certain individuals, we end up talking about differences between scientists and clinicians (Stricker & Trierweiler, 2006). This discussion does not help us determine how good clinical decisions are made. However, when we focus on science as an attitude, as represented in the introductory quote to this essay, we move much closer to the issue of how clinicians will be good clinical decision makers. Good clinical decision making occurs because scientific (i.e., creative) thinking is employed, or as Kamhi suggests, rational thinking is exercised. Thus, the question becomes, how do we encourage scientific thinking in clinical practice? I propose that we must do this during the initial stages of educating future clinicians and researchers.

Clinicians and researchers typically are the product of their educational programs. Traditionally, education programs for researchers differ notably from programs for clinicians. To some extent, this is necessary and is likely the reason why clinicians and researchers may value different aspects of the EBP or PBE process (Dollaghan, 2007; Kamhi, 2011). Typically, we educate researchers to develop and test research hypotheses, often based on missing or incongruous evidence in the literature. At times, we may encourage developing researchers to investigate clinical issues based on their personal clinical experiences. How often do we encourage these student researchers, however, to develop research questions by sitting down with clinicians who are “certain” about their clinical practices yet are seeking validation for those practices (Yanos & Ziedonis, 2006)? Clinicians have ideas (Mullen, 2005), but we may not be encouraging future researchers to listen to those ideas. For example, it is rare to find public face-to-face venues that allow clinicians to share with researchers their hypotheses about why specific clinical practices are successful. Educational programs could create these types of interactions between scientific clinicians and future researchers. Not only would this create a better bridge between research and practice (Yanos & Ziedonis, 2006) and likely lead to the development of clinically important research agendas, but it also may begin to address Kamhi’s (2011) contention that there is poor external verification in clinical practice. Clinicians will have a venue to present their clinical practices and inform research, and thus, local science may inform general science.

Current educational practices for future clinicians also may require modifications to increase the likelihood that new clinicians are scientific, rational thinkers. It seems to be the norm that initial clinical experiences occur early in educational programs, often before student clinicians have a solid understanding of the disorder exhibited by the clients they are serving. Clinical education programs may require student clinicians to complete forms documenting the evidence for the assessment or treatment procedures they intend to implement, but realistically, this often is done without the student clinicians’ solid understanding of the communication skill or process. When a student clinician engages in clinical practice without a solid understanding of the topic, that student cannot be creative and intelligent (i.e., scientific) in his or her clinical decision making. By maintaining this traditional clinical education model, there is a good chance we actually are educating clinicians to be nonscientific in their clinical endeavors; we are helping them acquire the wrong attitude. Without solid knowledge of the communication area, creative thinking is stifled (Chong, 2009).

How do we rectify this traditional model of clinical education? A new and creative model is needed, one that is noticeably different from the methods used in the past. Course work in the content of the discipline, along with course work that educates students on the scientific method as it applies to the clinical setting, is needed before these students begin their clinical work. Likewise, student clinicians need to be provided with models from clinical scientists who understand the importance of creative or rational thinking in clinical decision making. With this model, it seems more likely that future clinicians will develop the scientific mind and rational thinking needed to carry out EBP and PBE models of clinical decision making.

Conclusion

As usual, Kamhi (2011) has written an essay that stimulates great thought and discussion. It seems to me that his final remarks, about creating rational thinkers or creative scientists, is the ideal for which we all should strive. However, I am not so naive to think that all clinicians and all researchers will be good scientists—creative and intelligent thinkers who solve problems in the clinic and the laboratory. I realize there likely are degrees of each type of professional: researchers who are more or less scientific and clinicians who are more or less scientific. It seems to me that we should strive to have research scientists who understand clinical practices and clinical questions, and clinical scientists who are open to discussing and exploring their uncertainties and certainties in research venues. These types of individuals may readily build the bridge and break down the preconceived barriers between research and practice. I believe our field already has these professionals. For these individuals, science is an attitude. We need to learn how to promote these scientists as role models as we educate our future researchers and clinicians.

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