Teaching Psychology Students to Distinguish Science from Pseudoscience:
Pitfalls and Rewards

PsychTeacher Electronic Discussion List

Teaching Critical Thinking

The Warning Signs of Pseudoscience
Although none of these features is by itself pathognomonic of the "pseudoscience syndrome," each can be conceptualized as a useful warning sign of its presence. The more warning signs a discipline exhibits, the more suspect it should become in the eyes of students and consumers.

Among the central characteristics of pseudoscientific disciplines are:

1. A tendency to invoke ad hoc hypotheses, which can be thought of as "escape hatches" or loopholes, as a means of immunizing claims from falsification
2. An absence of self-correction and an accompanying intellectual stagnation
3. An emphasis on confirmation rather than refutation
4. A tendency to place the burden of proof on skeptics, not proponents
5. Excessive reliance on anecdotal and testimonial evidence to substantiate claims
6. Evasion of the scrutiny afforded by peer review
7. Absence of "connectivity" (Stanovich, 1997), that is, a failure to build on existing scientific knowledge
8. Use of impressive-sounding jargon, whose primary purpose is to lend claims a facade of scientific respectability
9. An absence of boundary conditions (Hines, 2003), that is, a failure to specify the parameters under which claims do not hold

Pseudoscience as a Useful Didactic Tool

The world of popular psychology is rife with pseudoscientific claims. Self-help books, supermarket tabloids, radio call-in shows, television infomercials and "pseudodocumentaries," the Internet, and even the nightly news, provide remarkably fertile ground for unsupported claims concerning a host of topics. A selective sampling of these topics includes unidentified flying objects, "scientific" creationism, crop circles, extrasensory perception (ESP), psychokinesis, satanic ritual abuse, polygraph testing, subliminal persuasion, out-of-body experiences, astrology, biorhythms, graphology (handwriting analysis), the Rorschach Inkblot Test, facilitated communication, herbal remedies for memory enhancement, the use of hypnosis for memory recovery, multiple personality disorder… and well, the list goes on and on. Moreover, surveys (e.g., Lamal, 1979) demonstrate that introductory psychology students frequently harbor misconceptions regarding many of these topics. This finding is hardly surprising given that the lion's share of media coverage of these topics is insufficiently skeptical.

Yet most psychology instructors accord minimal attention to these beliefs (although this trend may gradually be changing), perhaps because they regard them as trivial or as lying outside the boundaries of scientific knowledge. Still others may fear that by exposing students to pseudoscientific claims, they are sending an implicit message that these claims are well supported.

Nevertheless, by neglecting these topics, instructors are forfeiting the opportunity to impart critical thinking skills to students by challenging their beliefs regarding popular psychology. Moreover, these instructors are forfeiting the opportunity to correct students' misconceptions.
Potential Pitfalls of Teaching Students about Pseudoscience
availability, and anchoring (Tversky & Kahneman, 1974), are generally adaptive and help us make sense of a complex and confusing world. Hence, most pseudoscientific beliefs are torn from the same cloth as accurate beliefs.

Fourth, instructors must expose students to both poles of the pseudoscience construct (see Kelly, 1955). Thus, in our classes, it is important not merely to debunk inaccurate claims, but to make students aware of accurate claims. In my own advanced undergraduate seminar, Science and Pseudoscience in Psychology, I have found it helpful to intersperse pseudoscientific material with material that is equally remarkable but true, such as eidetic imagery, subliminal perception (as opposed to subliminal persuasion, which is far more scientifically dubious), and appropriate clinical uses of hypnosis (as opposed to the scientifically unsupported use of hypnosis for memory recovery; see Lynn, Lock, Myers, & Payne, 1997). In addition, it is useful to bear in mind the late Stephen Jay Gould's point that exposing a falsehood necessarily affirms a truth. As a consequence, it is essential not only to point out false information to students, but to direct them to true information. For example, when explaining why claims regarding biorhythms are baseless (see Hines, 2003), it is helpful to introduce students to claims regarding circadian rhythms, which, although often confused with biorhythms, are supported by rigorous scientific research.

Fifth, and perhaps most controversially, I believe that instructors must distinguish pseudoscientific claims from religious claims that are metaphysical. Unlike pseudoscientific claims, metaphysical claims (Popper, 1959) cannot be tested empirically and therefore lie outside the boundaries of science. In the domain of religion, these include claims regarding the existence of God, the soul, and the afterlife, none of which can be refuted by any conceivable body of scientific evidence. Nevertheless, certain religious or quasi-religious beliefs, such as those involving "intelligent design" theory, which is the newest incarnation of creationism (see Miller, 2000), the Shroud of Turin, and weeping statues of Mother Mary, are indeed testable and hence suitable for critical analysis alongside other questionable naturalistic beliefs. But by confusing pseudoscientific beliefs with religious beliefs that are metaphysical, instructors risk (a) needlessly alienating a sizeable proportion of their students, many of whom may be deeply religious; and (b) (paradoxically) undermining students' critical thinking skills, which require a clear understanding of the difference between testable and untestable claims.

The Rewards of Teaching Students about Pseudoscience

Informally, a number of students who have taken my Science and Pseudoscience seminar have told me that this course fundamentally changed their thinking and persuaded them of the value of open-minded skepticism when considering knowledge claims. Needless to say, such feedback is immensely gratifying. But as I have already noted, anecdotal evidence has its limitations. Fortunately, some research evidence supports the efficacy of teaching psychology courses on pseudoscience. For example, Morier and Keeports (1994) found that students enrolled in an undergraduate "Science and Pseudoscience" seminar demonstrated a statistically significant reduction in
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Surely you’re joking, Mr. Feynman! Adventures of a curious character

Pseudoscience and the paranormal: A critical examination of the evidence

The psychology of personal constructs, Vols. 1 and 2

Teaching of Psychology, 6,

Psychology’s occult doubles: Psychology and the problem of pseudoscience

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