The Teaching of Courses in the Science and Pseudoscience of Psychology: Useful Resources

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Several authors have increasingly recognized the problem of pseudoscience as a major threat confronting psychology and allied disciplines. We discuss the importance of courses in science and pseudoscience to undergraduate education in psychology and provide (a) a model syllabus for courses in the science and pseudoscience of psychology, (b) a list and description of suggested primary and supplemental texts for such courses, (c) a list of useful educational videos on science and pseudoscience, and (d) suggested Web sites that offer critical evaluations of pseudoscientific claims. Finally, we briefly review the literature concerning the efficacy of courses in the science and pseudoscience of psychology and offer suggestions for future research in this area.

The past decade has witnessed an increasing appreciation of, and concern for, the problem of pseudoscience in contemporary psychology (e.g., Kalal, 1999; Lilienfeld, 1998; McFall, 1991; Tavris, 1998). In recent years, a large number of pseudoscientific or otherwise questionable psychological practices and areas of study have either appeared on the scene or flourished with unabated vigor. Extrasensory perception (ESP), astrology, biorhythms, subliminal self-help tapes, polygraph ("lie detector") testing, projective measures of personality (e.g., the Rorschach Inkblot Test), New Age psychotherapies (e.g., primal scream therapy, Rolfing), unvalidated herbal remedies for enhancing memory and mood, and suggestive therapeutic techniques (e.g., hypnosis, guided imagery) for recovering purported memories of child abuse and alien abductions comprise only a small subset of such domains in contemporary psychology (for discussions of these and other questionable psychological claims, see Hines, 1988; Shermer, 1997; M. T. Singer & Lalich, 1996). Although pseudoscientific thinking pervades many disciplines, the intrinsic difficulties involved in conclusively falsifying claims concerning human behavior (Meehl, 1978) may render many areas of psychology, particularly the so-called "softer" domains of personality, clinical, counseling, and educational psychology, especially vulnerable to pseudoscience. In addition, pseudoscientific thinking may contribute to the uncritical acceptance of unsubstantiated assertions regarding many purported phenomena outside of the domain of traditional psychology, including unidentified flying objects (UFOs), the Bermuda Triangle, the Loch Ness Monster, and Pyramid Power (Hines, 1988; Randi, 1982). Recent polls of the American public reveal that approximately one half endorse beliefs in ESP, astrology, faith healing, and communication with the dead, and that about one quarter to one third endorse beliefs in ghosts and the lost continent of Atlantis (see Shermer, 1997, 1999). There are approximately 20 times as many astrologers as astronomers in the United States, and more Americans believe in ESP than in Darwinian evolution (Gilovich, 1991). Moreover, with the arrival of the millennium, pseudoscientific beliefs concerning a variety of extraordinary claims, including alien visitation, doomsday scenarios, and ancient prophecies (e.g., the prophecies of Nostradamus), have recently come to the fore (Schafer & Cohen, 1998), and there is suggestive evidence that the prevalence of many pseudoscientific beliefs has increased over the past two decades (Shermer, 1998).

Although pseudoscience and science probably differ in kind rather than degree, most pseudoscientific disciplines can be conceptualized as sharing a covarying set of characteristics (Leahey & Leahey, 1983; Lilienfeld, 1998; for a discussion of the features of pathological science, see also Langmuir, 1989). Among these characteristics are (a) unfalsifiability (Popper, 1959), (b) absence of self-correction (Herbert et al., in press), (c) overuse of ad hoc immunizing tactics designed to protect theories from refutation (Lakatos, 1978), (d) absence of "connectivity" (Stanovich, 1998, p. 116) with other domains of knowledge (i.e., failure to build on extant scientific constructs; Bunge, 1967), (e) the placing of the burden of proof on critics rather than on the proponents of claims (Shermer, 1997), (f) the use of obscurantist language (i.e., language that seems to have as its primary function to confuse rather than clarify; Hockenbury & Hockenbury, 1999; van Rillaer, 1991), and (g) overreliance on anecdotes and testimonials at the expense of systematic evidence (Herbert et al., 2000).

We do not wish to imply that all of the claims we discuss in this article will ultimately be shown to be entirely devoid of

scientific value. To the contrary, a scientific approach to these assertions demands an open-minded willingness to consider any and all evidence pertinent to their validity (Swords, 1990). Indeed, in our teaching with undergraduates we frequently emphasize Baron's (1994) point that skepticism is "actively open-minded thinking" as well as aerospace engineer Oberg's dictum that maintaining an open mind is a virtue, "just not so open that your brains fall out" (as cited in Sagan, 1995a, p. 187). What renders these claims largely or entirely pseudoscientific is not that they are necessarily incorrect, but rather that their proponents have typically insisted that they are correct, despite compelling evidence to the contrary.

Why Should Psychology Educators Be Concerned About Pseudoscience?

Psychology teachers should be concerned about pseudoscientific beliefs for several reasons. First, psychology students are almost incessantly bombarded with pseudoscientific claims through their exposure to the entertainment media (e.g., talk shows), the Internet, supermarket tabloids, and "pop" psychology books (Heaton & Wilson, 1995; Lilienfeld, 1998; G. M. Rosen, 1993). Moreover, the increasing accessibility of these information sources makes it likely that undergraduates' pseudoscientific beliefs will continue to flourish in the coming decades. Yet many undergraduates emerge from psychology courses with relatively little ability to critically evaluate pseudoscientific claims (McBurney, 1996).

Second, pseudoscientific psychological beliefs are harmful in several ways (Gilovich, 1991). For example, such beliefs can render individuals vulnerable to the dangers posed by inadequately validated treatments. Psychotherapists who unwittingly implant memories of satanic ritual abuse and alien abduction, for instance, may be creating analogues or even full-blown variants of posttraumatic stress disorder in their clients (Chu, 1998). Therapists who use facilitated communication (Mulick, Jacobsen, & Kobe, 1993) in an effort to elicit language from autistic children are instilling false hopes in parents.

Third, pseudoscientific thinking is a slippery slope (Sagan, 1995a; for a somewhat different view, see B. Singer, 1977). An inability to critically evaluate claims regarding astrology and ESP, for example, may ultimately render individuals incapable of critically evaluating scientific assertions concerning more dire threats to the welfare of the planet, such as environmental hazards (e.g., global warming) and overpopulation (Nickel & Shelton, 1996; Sagan, 1995c).

This heightened concern with the problem of pseudoscience has been paralleled by an increased interest in the teaching of critical thinking skills in undergraduate psychology courses. *Teaching of Psychology,* for example, devoted a special issue to the topic of critical thinking (Nummedal & Halpern, 1995), and has since featured a number of other articles concerned with the teaching of critical thinking skills (e.g., Griggs, Jackson, Marek, & Christopher, 1998; Marek, Jackson, Griggs, & Christopher, 1998). Although we believe that imparting such skills is extremely valuable, we contend that a fundamental understanding of the differences between science and pseudoscience represents a crucial, yet often neglected, component of critical thinking. As Lawson (1999) noted,

> Psychology students should be able to think critically or evaluate claims, in a way that explicitly incorporates basic principles of psychological science … psychology majors should be able to judge claims based on a lack of empirical evidence, testimonial or anecdotal evidence, unfalsifiable theories, biased samples, or simple correlational data as weak claims. (p. 207)

Moreover, there is evidence that critical thinking skills are best learned within the context of a specific discipline rather than in the abstract (McBurney, 1996; Resnick, 1987). As a consequence, teaching students critical thinking skills within the context of specific pseudoscientific claims (e.g., ESP, subliminal persuasion, lie detection) affords them a valuable opportunity to acquire and hone such skills while gaining exposure to topics that they find intrinsically interesting and engaging.

A final advantage of educating students about the differences between science and pseudoscience stems from the theorizing of G. A. Kelly (1955), who observed that many phenomena can be fully grasped only by understanding their opposites. From a Kellyian perspective, students' comprehension and appreciation of science can be enhanced by a thoughtful examination of pseudoscience and its characteristics (see also Wesp & Montgomery, 1998).

Courses in the Science and Pseudoscience of Psychology: A Model Syllabus

Largely as a consequence of the renewed interest in the problem of pseudoscience and its importance to education in psychology, a number of instructors across the country, including us, have developed undergraduate courses devoted to science and pseudoscience (Jones & Zusne, 1981; McBurney, 1976; B. Singer, 1977; Swords, 1990; Wesp & Montgomery, 1998). Based on our syllabi and those of several faculty members across the country who have taught closely related courses (see note 1), we present a model syllabus for undergraduate psychology courses in science and pseudoscience (see Table 1). Interested readers can find an excellent set of resources for such courses in B. Singer (1977), who described guidelines for teaching courses focusing on the scientific examination of paranormal phenomena.

This article goes beyond previous articles dealing with the teaching of psychology courses in science and pseudoscience in several ways. In contrast to the courses outlined by B. Singer (1977) and by authors who have outlined psychology courses relevant to pseudoscience in the pages of this journal (e.g., Jones & Zusne, 1981; McBurney, 1976; Wesp & Montgomery, 1998), the course described in this article examines potentially pseudoscientific claims in general rather than paranormal claims per se. Both B. Singer's course and the pseudoscience courses described in this journal, for example, did not focus on such issues as lie detection, subliminal persuasion, questionable assessment procedures, invalidated

Table 1. A Model Syllabus for Psychology Courses in Science and Pseudoscience, Including Representative Primary Readings

Class 1	Basic issues in philosophy of science, the nature of science and the scientific method, differences between science and pseudoscience, characteristics of pseudoscience (Bunge, 1984; Sagan, 1979, 1995c; Staff of *Scientific American*, 1997; Strange Science, 1999)
Class 2	How our thinking can go wrong (I): Heuristics and biases (Falk, 1981; Gawande, 1999; Gazzaniga, 1998; Gilbert, 1991; Gilovich & Savitsky, 1996; Kruger, Savitsky, & Gilovich, 1999)
Class 3	How our thinking can go wrong (II): Confirmatory bias, logical errors, and fallacies (Lett, 1990; Pratkanis, 1995; Sagan, 1995b; Shermer, 1994)
Class 4	Parapsychology (I): The history of extrasensory perception, spiritualism, psychic detectives, out-of-body experiences (Blackmore, 1991b, 1992; Rowe, 1993)
Class 5	Parapsychology (II): Laboratory research on extrasensory perception (Bem & Honorton, 1994; Frazier, 1988; Hyman, 1994, 1996; Milton & Wiseman, 1999)
Class 6	Astrology (Ertel, 1992; I. W. Kelly, 1997; Randi, 1982; Stewart, 1997)
Class 7	Biorhythms, the lunar lunacy effect (Hines, 1998; I. W. Kelly, Rotton, & Culver, 1985; Raison, Klein, & Steckler, 1999; Rotton & Kelly, 1985)
Class 8	Brain myths: Subliminal perception and persuasion, speed-reading courses, sleep-assisted learning, transcendental meditation (Byrne & Normand, 2000; Holmes, 1984; Moore, 1992, 1996; Pratkanis, 1992; Swets & Bjork, 1990)
Class 9	Polygraph testing, "truth serum" and other purported methods of truth and lie detection, self-report "honesty" tests (Ekman, 1992a, 1992b; Iacono & Patrick, 1997; Lilienfeld, 1993; Lykken, 1984; Piper, 1993)
Class 10	The uses and abuses of psychological assessment: Questionable or pseudoscientific assessment methods (e.g., graphology, palm-reading, the Rorschach, Draw-A-Person Test, and other projective techniques, enneagrams), the P. T. Barnum effect, "cold reading" techniques (Chapman & Chapman, 1967; Furnham, 1988; Hyman, 1976–1977; Lilienfeld, 1999; Thiriart, 1991; Wakefield & Underwager, 1993)
Class 11	Questionable or unsubstantiated psychotherapies: Facilitated communication for infantile autism, eye movement desensitization and reprocessing for anxiety disorders, "New Age" therapies (e.g., Rolfing, rebirthing, primal scream therapy), lucid dreaming (Blackmore, 1991a; Lilienfeld, 1996; Mulick, Jacobsen, & Kobe, 1993; G. M. Rosen, 1993; R. D. Rosen, 1977a, 1977b; M. T. Singer & Lalich, 1996)
Class 12	The reconstructive nature of memory, false memory syndrome and potentially suggestive memory recovery techniques, alien abduction reports, multiple personality disorder (Acocella, 1998; Blackmore, 1998; Loftus, 1993; Lynn, Lock, Myers, & Payne, 1997; Nash, 1987; Spanos, 1994)

psychotherapies, controversial psychiatric diagnoses (e.g., multiple personality disorder), or the fallibility of human memory, although these issues are of considerable import and relevance to psychology undergraduates. In addition, this article goes beyond B. Singer's superb contribution and that of other authors by offering an explicit course syllabus along with suggested readings and videos coordinated around each class topic. Because information concerning the teaching of psychology courses in science and pseudoscience is not widely available to potential instructors, we have provided detailed suggestions for readings and other useful resources. To minimize our overlap with B. Singer's monograph, this article consists almost exclusively of reading materials that have appeared over the past two decades.

As shown in this model syllabus, we recommend beginning the course with a general introduction to science, the scientific method, and the differences between science and pseudoscience (e.g., falsifiability, self-correction; Class 1), followed by a detailed discussion of issues concerning the fallibility of human reasoning processes (e.g., heuristics, biases, logical errors, and fallacies; Classes 2, 3). The remainder of the course focuses on critically examining specific topics in psychology (e.g., parapsychology, astrology, subliminal persuasion) that illustrate pseudoscientific claims and methods of inquiry. When exposing students to these topics, we recommend making particular efforts to (a) encourage students to maintain an open mind toward the claims in question, but to insist on high standards of evidence before accepting them and (b) evaluate these claims with explicit reference to the issues discussed at the beginning of the course. With respect to the latter, we place particular emphasis on the differences between science and pseudoscience, the ways in which otherwise rational individuals can be led to adopt erroneous beliefs, and logical errors and fallacies.

Although we based this syllabus on a 12-week course that meets once a week for 3 hr, it can be readily modified for courses with diverse schedules. In addition, we have provided (in parentheses following each topic) three to six representative articles, chapters, or both, for each class. These suggested articles illustrate only the types of readings that instructors may wish to assign in conjunction with each topic and do not constitute an exhaustive set of recommended readings. Suggested primary and supplemental texts, which we have generally used in conjunction with a number of the articles listed in the model syllabus, appear in the following section. In addition, a list of more than 50 suggested term paper and presentation topics is available from the first author on request. We should emphasize that we do not view this model syllabus as set in stone. Instead, we offer it as a flexible template from which instructors can tailor their own course syllabi and readings.

Instructors can also tailor this model syllabus for many content courses in the undergraduate psychology curriculum. For example, one of the authors of this article (Jeffrey M. Lohr) teaches a psychology research methods course in which he contrasts scientific methodologies with pseudoscientific practices in terms of analytical reasoning and critical thinking, the importance of open-minded skepticism, the role of falsifiability, and the methods by which claims are promoted to the general public. This course also incorporates student-run laboratory projects that involve descriptive research on the measurement of paranormal beliefs and replications of experimental research on pseudoscientific practices, such as the use of subliminal self-help tapes

(Pratkanis, Eskenazi, & Greenwald, 1994). Topics in abnormal and clinical psychology courses can include the research methods necessary to validate novel assessment and psychotherapeutic techniques. In social psychology courses, instructors can examine the heuristics and biases that can lead individuals to embrace pseudoscientific beliefs (Gilovich, 1991) and interpersonal influence processes and tactics used in the promotion of pseudoscientific goods and services (Pratkanis, 1995).

Useful Primary and Supplemental Texts for Psychology Courses in Science and Pseudoscience

We list 15 primary and 8 supplemental texts that we believe to be useful for the teaching of psychology courses in science and pseudoscience, along with a brief description of the content of each text. In selecting these texts, we have focused primarily on sources published within the past 15 years to ensure coverage of recent topics. We recommend using one or more of these texts (particularly the primary texts) in conjunction with articles, book chapters, or both (see representative references in the previous section) to provide students with an overarching framework for the principal issues addressed in the course. Because Marek et al. (1998) recently evaluated general critical thinking texts in this journal, we examine only primary texts and supplements that focus largely or exclusively on pseudoscientific claims. The recent *Teaching of Psychology* review by Marek et al. (1998) featured only four of these texts: Gray (1991), Gilovich (1991), Schick and Vaughn (1999), and Stanovich (1998). Following the description of each text, we list in parentheses the lecture(s) from the model syllabus in which instructors can most profitably use each text.

Primary Texts

Cardena, Lynn, and Krippner (2000) is an edited volume containing a number of interesting and well-researched chapters on a variety of anomalous psychological phenomena, including lucid dreaming, synesthesias, hallucinations, out-of-body experiences, alien abduction memories, and past life memories. Although several of the chapters (e.g., Targ's chapter on ESP) reflect a less skeptical approach to the subject matter than that found in most other texts reviewed here, this book offers a refreshing and open-minded overview of scientific research on many mysterious and purported paranormal experiences (Classes 4, 5, 8, 11, 12).

Carey (1998) provides a succinct and readable introduction to the scientific method and basic principles of scientific thinking, including the use of proper controls and the differences between correlation and causation. The final two chapters ("Extraordinary Claims and Anecdotal Evidence" and "Fallacies in the Name of Science"), which comprise approximately one third of the book, contain entertaining discussions, examples, and exercises focusing on pseudoscientific claims (e.g., graphology, backwards subliminal messages) and their differences from scientific claims (Classes 1–3).

Della Salla (1999) is a good although slightly uneven edited volume that contains interesting chapters focused on myths concerning brain functioning. The chapters on the "People Only Use 10% of Their Brains Myth" and brain tuners (both by Beyerstein) are highly informative and engaging, as are the chapters on near-death experiences, repetition and memory, and myths concerning the differences between left and right hemisphere functioning (Classes 4, 8, 11, 12).

Friedlander (1995) focuses on pathological science and its characteristics. Although much of the book deals with questionable claims in physics and chemistry (e.g., cold fusion, polywater), the volume devotes considerable space to astrology, ESP, and other issues relevant to psychology students. Although this book is more advanced than most other texts on pseudoscience, we recommend it for instructors wishing to provide students with a broad perspective on the nature of pathological science in general (Classes 1, 5, 6).

Gilovich (1991) is a superb and highly readable introduction to social cognitive heuristics and biases, their impact on everyday thinking, and their implications for beliefs in ESP, alternative medicine, and other questionable claims. Gilovich draws heavily on examples from sports, interpersonal relationships, and other issues of interest to undergraduates (Classes 2–5).

Gray (1991) provides a succinct, well-written, and highly accessible introduction to 16 common logical fallacies (e.g., genetic, bandwagon, appeal to ignorance), the differences between science and pseudoscience, and inferential and empirical issues relevant to various purported paranormal phenomena (e.g., ESP, the Bermuda Triangle; Classes 1–5).

Hines (1988) is a classic, although now slightly dated, review of the scientific evidence pertinent to a broad spectrum of paranormal and other extraordinary claims, including spiritualism, ESP, psychoanalysis, astrology, the lunar lunacy effect, biorhythms, and faith healing. Chapter 12 ("Current Trends in Pseudoscience") features brief summaries of 15 other dubious scientific assertions, such as dowsing, firewalking, and Kirlian photography (Classes 1–11).

Neher (1990) provides readers with an open-minded but appropriately skeptical and critical introduction to paranormal, mystical, and occult experiences. It contains good analyses of ESP, psychic healing, out-of-body experiences, transcendental meditation, possession phenomena, ghosts and apparitions, astrology, Pyramid Power, and other extraordinary and unusual claims. Chapter 2 features a good discussion of how humans create psychological meaning even in its objective absence (Classes 2, 4–6, 8, 10–12).

Piatelli-Palmarini (1994) is a solid introduction to cognitive illusions, heuristics, and biases and their implications for odd and erroneous beliefs. The author covers much of the same ground as Gilovich (1991), but this book is somewhat more advanced and difficult (Classes 2, 3).

Sagan (1995a) is the penultimate book by the late Cornell astrophysicist, who spent much of his career educating the public about both the wonders of science and the dangers of pseudoscience. It contains detailed discussions of UFO abduction reports, false memories, and the value of scientific education and critical thinking. Chapter 12 ("The Fine Art of Baloney Detection") is a must for science and pseudoscience courses. Overall, this book is an eloquent and impassioned manifesto for clear thinking (Classes 1, 3, 6, 12).

Schick and Vaughn (1999) provides a thoughtful and interesting introduction to issues in philosophy of science (e.g., relativism) and social cognition (e.g., selective attention) relevant to evaluating pseudoscientific and extraordinary claims. The text is sprinkled liberally with numerous interesting examples drawn from the annals of the odd and unusual. It is slightly more advanced than similar texts (e.g., Gray, 1991), but somewhat more relevant to pseudoscience per se and *au courant* with respect to recent issues in science and pseudoscience (Classes 1–6, 11).

Shermer (1997) provides an excellent and highly readable discussion of the problem of pseudoscience and pseudohistory in modern America. Among the featured topics are perceptive and engaging analyses of ESP, astrology, creationism, Holocaust revisionism, and other unusual belief systems (Classes 1–5, 12).

Stanovich (1998) is a standard text in critical thinking courses in psychology, although it is also an outstanding introduction to philosophy of science, the differences between science and pseudoscience, and common misconceptions regarding psychology. The chapters on placebo effects, Clever Hans, and probabilistic reasoning are especially relevant to courses in the science and pseudoscience of psychology. On balance, this book is a delight to read (Classes 1–5, 10, 11).

Vyse (1997) was the recipient of the 1998 William James Book Award from the American Psychological Association. This book offers the best available general overview of superstitious thinking and its psychological and sociological origins. In addition, it contains good discussions of the sources of paranormal beliefs in general (Classes 2–5).

White (1999) consists of well-written, engaging, and highly readable critiques of unusual beliefs in many areas of science, including psychology. Like Friedlander (1995), this book is especially well suited for general courses on pathological science. The chapters include critical discussions of telepathy, remote viewing, faith healing, pain control, near-death experiences, voodoo, cults, and alien abductions (Classes 4, 5, 8, 12).

Supplemental Texts

Frazier (1986) is a superb anthology of *Skeptical Inquirer* articles featuring discussions of parapsychology, misperceptions and illusions, palm reading, astrology, UFOlogy, creationism, and other topics (Classes 1–7, 10).

Frazier (1991) is another anthology of *Skeptical Inquirer* articles consisting of critical discussions of alien abduction reports, past-life hypnotic regression, alpha consciousness, graphology (handwriting analysis), recent ESP research, spontaneous human combustion, astrology, and chiropractic. The articles by Hyman and others on critical thinking skills are particularly instructive (Classes 1–7, 10, 12).

Frazier (1998) is a superb edited compilation of articles dealing with such topics as polygraphy, self-report honesty tests, parapsychology, near-death experiences, lucid dreaming, facilitated communication, satanic cults, and recovered memories. The opening article by Sagan, "Wonder and Skepticism," is a superb and inspiring introduction to scientific skepticism (Classes 1–5, 8–12).

Gardner (1991) is a delightful and thought-provoking collection of essays focusing on parapsychology. Among the topics addressed are the exploits of Israeli "psychic" Uri Geller, psychic surgery, psychokinesis, the reincarnation claims of Shirley MacLaine, the peculiar relationship between Sigmund Freud and Wilhelm Fleiss, and the importance of debunking in science (Classes 1, 4, 5).

Gardner (1992) is another highly informative and engaging anthology of articles on pseudoscience. It includes commentaries on ESP, levitation, channeling, Wilhelm Reich's orgone therapy, glossolalia (speaking in tongues), and the role of astrology in the Reagan administration. Gardner's discussions of relativism and realism in science are especially provocative (Classes 1, 4–6, 11).

Nickell, Karr, and Genoni (1998) is a succinct edited volume featuring articles on UFO hoaxes, firewalking, hypnotic age regression, and the "cold reading" techniques used by palm readers, astrologers, and crystal ball readers, among other paranormal topics (Classes 1, 4, 6, 7, 11).

Tavris (1995) is an engaging collection of short opinion pieces on a wide variety of controversial psychological topics, including astrology, psychoanalysis, illusory correlation, codependency, and premenstrual syndrome. Instructors who wish to generate lively discussion and debate in small seminars will find this brief book especially useful (Classes 2, 3, 6, 11).

Youngson (1998) is an entertaining collection of succinct vignettes regarding classic errors in science, such as Lamarck's theory of the inheritance of acquired characteristics, N-rays, cold fusion, and the use of magnets to cure medical ailments. One chapter focuses on erroneous or overblown claims in psychology, including phrenology, Jung's theory of the collective unconscious, and the Rorschach Inkblot Test. This book also contains a brief but useful discussion of "How to Detect Pseudoscience" (Classes 1, 10–12).

Useful Videos for Psychology Courses in Science and Pseudoscience

A number of videos, many of them commercially available, offer excellent illustrations and demonstrations of a variety of issues relevant to pseudoscientific psychology and the paranormal. We have found such videos to be valuable supplements to the readings recommended in the previous section and to be helpful springboards for class discussion and debate. In this section, we present 11 video programs that we recommend highly for instructors teaching psychology courses in science and pseudoscience. As in the previous section, we list the classes on the model syllabus most relevant to each video in parentheses following each description.

Beyond Science (Scientific American Frontiers; Huntley & Angier, 1997–1998) is a superb show, hosted by Alan Alda, that features critical discussions of water dowsing and other apparent psychic powers; graphology; the purported crash of a flying saucer in Roswell, New Mexico; and other paranormal claims. It is an excellent vehicle for generating discussion in the initial classes of the course (Classes 1–6, 9, 11).

Case of the Bermuda Triangle (Nova; Massey, 1976) is somewhat dated, although it provides excellent illustrations of pseudoscientific thinking and the systematic debunking of

a paranormal claim. It is useful for generating class discussions of social cognitive errors and biases, including the use of "variable windows" (for a discussion, see Gilovich, 1991), confirmatory bias, and illusory correlation (Classes 2, 3).

Divided Memories, Parts 1 and 2 (Frontline; Bikel, 1995) is a powerful and disturbing two-part program focusing on the scientific evidence regarding the existence of recovered memories of sexual abuse and on the impact of suggestive therapeutic procedures, such as hypnotic age regression and past-life therapy, on clients. It offers a first-rate psychological and sociological analysis of the recovered memory controversy (Class 12).

Exploring the Unknown (Fox Family Channel; Kropnick & Schreiberg, 1999–2000) is a multipart program featuring segments hosted by Consulting Producer Michael Shermer, editor of *Skeptic* magazine. Students benefit from balanced but appropriately skeptical segments on cold reading, astrology, remote viewing, polygraph testing, and related topics (Classes 4–6, 9–12).

Kidnapped by UFOs (Nova; DiIanni, 1996) offers a good introduction to the alien abduction phenomenon and features thoughtful analyses by Elizabeth Loftus, the late Carl Sagan, and other experts. Although this program does not provide as extensive a discussion of the psychology of memory as might be desired, it illustrates a number of important issues concerning the reconstructive nature of memory and the perils of suggestive questioning (Class 12).

Liar (A & E Voyages and BBC TV; Claxton, 1996) is an entertaining program offering an excellent introduction to scientific controversies regarding the polygraph test and other purported lie-detection methods. Also featured are intriguing demonstrations of autistic children's apparent incapacity for genuine deception and a possible instance of lying in chimpanzees (Class 9).

Multiple Personality Disorder (The Fifth Estate, 1993) provides a first-rate discussion and critical analysis of the controversial issues surrounding the diagnosis of multiple personality disorder (now referred to as dissociative identity disorder). Experts interviewed on this program place particular emphasis on the potentially iatrogenic effects of suggestive questioning, hypnosis, and other questionable therapeutic practices. They also call into question much of the commonly held wisdom regarding multiple personality disorder and its causes (Class 12).

The Power of Belief (ABC News; Ellis, Golden, & Matthews, 1998) is a highly engaging and informative video narrated by John Stossel. Along with Nova's *The Secrets of the Psychics* and Scientific American Frontier's *Beyond Science,* this program is the best general introduction to issues in pseudoscience and the paranormal available on video. Among the issues investigated are ESP, astrology and tarot card reading, firewalking, voodoo, faith healing, and the placebo effect (Classes 1–6, 9, and 11).

Prisoners of Silence (Frontline; Dalfreman, 1993) is an outstanding and provocative video that provides a critical evaluation of facilitated communication, a technique widely claimed in the 1980s and early 1990s to permit autistic children to communicate effectively with others. This program almost invariably has a profound impact on students. We regard this video as a must for instructors wishing to instill critical thinking in their students concerning psychotherapy and psychotherapy research design (Classes 1, 2, 11).

Secrets of the Psychics (Nova; Charlson, 1993) is a superb and highly entertaining video featuring the exploits of magician James ("The Amazing") Randi, who for the last several decades has been a tireless debunker of pseudoscientific claims. This program highlights critical evaluations of ESP, astrology, faith healing, palm reading, and other ostensible paranormal phenomena. We highly recommend this video as an introduction to issues concerning pseudoscience in general and parapsychology in particular (Classes 1–6, 10).

The Skeptic's Guide to the Paranormal (Discovery Channel; McCabe & Burns, 1999) provides first-rate critical discussions and demonstrations of several purported paranormal phenomena. The segments feature James Randi debunking psychics and revealing some of the secrets underlying simple magic tricks, aircraft and space experts providing mundane explanations for UFO reports, and photographic experts explaining otherwise mysterious images of ghosts and apparitions. In addition, this program contains a thoughtful discussion of placebo effects and their role in the apparent effects of therapeutic touch and other dubious medical treatments (Classes 2–6, 11).

Useful Web Sites for Psychology Courses in Science and Pseudoscience

Over the past several years, a large number of Web sites providing critical evaluations of potentially pseudoscientific claims have appeared. These sites vary widely in quality, with some offering impartial and research-based analyses of these claims and others offering little more than subjective opinions. Many of the high-quality sites are excellent resources for students researching topics in pseudoscience, as well as useful jumping-off points for class discussion and debate. Table 2 provides a list of 12 Web sites that we recommend to both instructors and students.

Will Teaching Courses in Science and Pseudoscience Make a Difference?

One final but crucial question that must be addressed is whether psychology courses in science and pseudoscience accomplish the goal of facilitating students' critical thinking regarding paranormal and other extraordinary claims. One source of evidence derives from student evaluations of teaching (SETs). Wesp and Montgomery (1998) reported that SETs following a course entitled Experimental Investigation of the Paranormal were generally quite positive. We have similarly found that students evaluate courses in science and pseudoscience very positively. One of the authors of this article (Scott O. Lilienfeld), for example, recently taught an advanced undergraduate seminar entitled Science and Pseudoscience in Psychology: Thinking Critically About Human Behavior for three semesters at Emory University. Across all three semesters (*N*s = 9, 8, and 13, respectively), the mean responses to the question "How much did you learn from the course?" on a scale ranging from 1 (*nothing*) to 9 (*a lot*) were 8.78 (*SD* = 0.66), 8.63 (*SD* =0 .52), and 8.23 (*SD*

Table 2
Useful Web Sites Relevant to Science and Pseudoscience in Psychology

www.csicop.org	The Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) Web Page. In addition, it is the home page of CSICOP's journal, the *Skeptical Inquirer*, which is an invaluable resource for articles concerning pseudoscience. This site features full-text versions of a number of *Skeptical Inquirer* articles as well as other CSICOP publications.
www.skeptic.com	The Skeptics Society Web Page. In addition, it is the home page of *Skeptic*, the Skeptics Society journal, an excellent resource for articles on pseudoscience and pseudohistory. This site features full-text versions of some *Skeptic* articles and links to many other useful Web sites focusing on pseudoscience.
www.cs.man.ac.uk./skeptic	The home page of *The Skeptic*, Great Britain's primary journal devoted to the study of pseudoscience and the paranormal. This site contains news updates and links to numerous pseudoscientific and paranormal terms.
skepdic.com	The Web page for the Skeptic's Dictionary, an excellent resource for definitions and explanations of paranormal terms. Readers should be warned, however, that this highly entertaining dictionary occasionally crosses the fine line separating open-minded skepticism from cynicism (particularly with regard to psychological terms and concepts).
www.theness.com/encyc/html	The New England Skeptical Society's "Encyclopedia of Skepticism and the Paranormal." This site is another useful resource for definitions of pseudoscientific terms and concepts.
physics.syr.edu/courses/modules /PSEUDO/pseudo_main.html	The home page for Resources for Selected Areas of Pseudoscience and Paranormal Phenomena, and for Skeptical Perspective. It is an excellent resource for Web sites relevant to the scientific evaluation of ESP, astrology, UFOs, cryptozoology (the study of the Loch Ness monster, Big Foot, and other mysterious creatures), homeopathy, therapeutic touch, and other extraordinary claims.
www.pseudoscience.org	The home page of the Science and Pseudoscience Review Special Interest Group of the Association for Advancement of Behavior Therapy. This site features useful articles and resources concerning questionable and potentially pseudoscientific psychological treatment procedures, including eye movement desensitization and reprocessing, facilitated communication for infantile autism, aromatherapy, thought field therapy, and psychomotor patterning.
www.junkscience.com	The Junk Science home page. This site features stories dealing with questionable science in medicine, psychology, environmental policy, and other domains. It is more focused on flawed science than on pseudoscience per se, however.
www.randi.org	The home page of James Randi and the James Randi Educational Foundation. This site contains entertaining essays concerning investigations of the paranormal and online versions of *Swift*, Randi's skeptical newsletter dealing with ESP and related topics.
www.skepticnews.com	The Skeptics News Web Page. It provides daily updates on events and news pertinent to pseudoscience and related topics.
www.hcrc.org/sram/index.html	The home page of the *Scientific Review of Alternative Medicine,* a journal devoted to the scientific evaluation of alternative and complementary medicine techniques, including alternative (and in some cases largely unvalidated) psychotherapies.
www.quackwatch.com	A useful guide to medical fraud, inadequately substantiated or blatantly ineffective medical and psychological treatments, and potentially misleading medical claims and advertisements.

= 1.01), respectively. The mean responses to the item "How much did the course challenge and stimulate thinking?" on scale ranging from 1 (*not at all*) to 9 (*a lot*) were 8.67 (*SD* = 0.71), 8.00 (*SD* = 1.41), and 8.23 (*SD* = 1.24), respectively. Although such evidence is encouraging, it is important to note that the construct validity of SETs remains highly controversial (e.g., see Greenwald & Gillmore, 1997; Williams & Ceci, 1997) and that correlations between SETs and objective indexes of course learning tend to be relatively modest (Abrami, d'Appollonia, & Cohen, 1990). Thus, it is necessary to examine more systematic evidence for the efficacy of science and pseudoscience courses. Several investigators have reported that courses emphasizing the use of scientific reasoning skills in general, and the distinction between science and pseudoscience hypotheses in particular, result in greater skepticism concerning the paranormal. Banziger (1983) found that a class focusing on psychology and the paranormal resulted in decreases in paranormal beliefs over a 6-month period (for comparable findings using a pre–posttest methodology, see McBurney, 1996; Swords, 1990). Because Banziger did not include a control group, however, these results must be interpreted with caution. Along with a colleague, the third author of this article (Morier & Keeports, 1994) found that undergraduates in a Science and Pseudoscience seminar based on a course template similar to that we have outlined demonstrated a statistically significant reduction in paranormal beliefs relative to a quasi-control group of students enrolled in a psychology and law class over the same time period. This effect was demonstrated over a 2-year period for two separate sections of the course, providing strong suggestive evidence that science and pseudoscience courses based on the template presented in this article can yield lasting effects. Wesp and Montgomery (1998) reported that a course on the critical investigation of paranormal claims resulted in a statistically significant improvement in the evaluation of reasoning flaws in scientific articles relative to comparison participants.

Thus, courses that address paranormal claims appear to result in greater skepticism regarding extraordinary claims and in stronger reasoning skills, although further controlled studies of this issue are warranted. We should point out, however, that the critical thinking literature in education has reported mixed results concerning the relation between belief in the paranormal and critical thinking in general (e.g., Morgan & Morgan, 1998). Thus, the extent to which psychology courses in science and pseudoscience generalize to critical thinking skills in other domains remains a critical but largely neglected topic of investigation. In addition, the

degree to which the skills acquired in such courses generalize outside of the classroom to the critical evaluation of pseudoscientific claims in everyday life will be essential to ascertain in future research. These unresolved questions notwithstanding, the extant literature suggests that classes similar to those outlined here can produce greater levels of critical thinking regarding at least some unsubstantiated psychological claims. Such critical thinking, especially if it includes an open-minded willingness to consider such claims in an impartial fashion, should be regarded as an indispensable component of the psychology major's intellectual toolbox.

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Asterisked references are recommended readings listed in the model syllabus (see Table 1).

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Notes

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