Methods Courses and Texts in Psychology: “Textbook Science” and “Tourist Brochures”

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Two studies examined the possibility that instruction in psychological methodology is committed to a philosophy of science, logical positivism, that is not adequately acknowledged and is empirically problematic. Study 1 suggested that psychology departments had more courses in methodology than corresponding physics departments, and psychology departments were far more likely to offer an introductory course in general methodology. Study 2 suggested that psychology had more introductory general methods textbooks than did physics. Both studies suggested psychology still presents itself as the kind of science that was defined by logical positivism. Study 2 suggested psychology does this only implicitly in its texts and without acknowledging problematic features of that philosophy. Psychology methods texts commonly justified the importance of the scientific method by describing human cognitive fallibilities without cautioning that these same fallibilities could be seen alternatively as showing the problematic nature of the positivistic conception of scientific methodology. In several regards, texts conformed to Fleck’s notion of “textbook science” and to Kuhn’s description of science texts as “tourist brochures.” It was cautioned that an implicit appeal by psychology to logical positivism contradicts its claim that its methods and data are objective, transparent, and little influenced by philosophy, logic divorced from data, or authority.

Keywords: psychological methods, implicit logical positivism, methods textbooks

C. S. Peirce’s (1877/1934) 19th century arguments for the superiority of scientific knowledge over other forms of knowledge are still used in psychology today in instruction on the scientific method. He argued that the scientific method generates a special, objective form of knowledge unlike that generated by other methods of fixing belief such as through sheer repetition (that he called “tenacity”), by appealing to authority, or by philosophical or logical a priori reasoning without empirical support. Peirce’s advocacy of the scientific method was, however, inconsistent in the sense that he advocated its use to establish belief yet he advocated for belief in the method itself instead through tenacity, authority, philosophy, and logic. We suggest in this paper that instruction in psychological methods can still today reveal this same inconsistency, and we describe consequences of this inconsistency for the instruction in, and practice of, psychological science.

Peirce may have been aware that his argument in favor of the scientific method was based on tenacity, authority, philosophy, and logic when he wrote: “The test of whether I am truly following the method is not an immediate appeal to my feelings and purposes, but, on the contrary, itself involves the application of the method” (Hartshorne & Weiss, 1877/1934, p. 245). Thus, he implied that understanding the scientific method required applying it to itself. In his advocacy of this reflexive use of the scientific method, Peirce was ahead of his time; neither he nor any of his contemporaries implemented his recommendation to apply the scientific method to study science itself.

More recently, however, such a metascience has emerged. There are now research programs using the empirical methods of anthropology, history, psychology, and sociology to inform our understanding of science, of how science practice is learned, and of the scientific method (e.g., see Diener, 2009; Faust, 1984; Feist,
2006, 2008; Gholson, Shadish, Neimeyer, & Houts, 1989; Gopnik & Schulz, 2007; Gorman, 1992; Gorman, Tweney, Gooding, & Kincannon, 2005; Guba & Lincoln, 2005; Klahr & Nigam, 2004; Kuhn, Amsel, & O’Loughlin, 1988; Mahoney, 1976; Mendelsohn, Weingart, & Whitley, 1977; Merton, 1938/1970/1980; Price, 1961; Ravetz, 1971; Rozin, 2009; Shimp, 2001; Simon, 1986; Slife, Reber, & Richardson, 2004; Smith, Harre, & Langenhove, 1995). Empirical work of these types is facilitating a new metascience more than a hundred years after philosophers like Peirce observed, if only in an inconsistent and nonempirical way, the need for science to be directed at itself. For example, one founder of this new metascience used archival methods to describe growth patterns in scientific publications and resulting implications for the practice of science (Price, 1961), and another used archival methods to examine how science could be viewed as a cultural practice (Merton, 1938/1970). More recently, Winston (2004) has used archival methods to empirically examine the language psychology textbooks use to describe research methods and experimental design. The present paper uses archival methods to examine how contemporary instruction in general psychological methodology depends on the very methods of fixing a person’s belief, including tenacity, authority, philosophy, and logic that Peirce (1877/1934) suggested were inferior to the scientific method.

Logical Positivism and Psychology

Now that this curiously long delay between the rise of the social and behavioral sciences in the late 19th century and their application to the study of science has ended, explanations have arisen to explain it, with the dominant explanation focusing on a once-prominent philosophy of science, logical positivism (Feist, 2006; Koch, 1992a; Kuhn, 1996; Toulmin & Leary, 1992). In this paper, we describe a critical way in which that philosophy’s impact on psychology is far from over. To describe this persistence of logical positivism and its contemporary effects, it is necessary first to summarize its basic tenets, its historical development, and philosophical and practical criticisms of it. Its tenets involved an ahistorical, cumulative-growth image of science, the purpose of which was to remove to as large a degree as possible the human condition, with all of its fallibilities, from the scientific method in order to give scientific knowledge a privileged status over other forms of knowledge. Logical positivists argued on behalf of their view of science by appealing to logic as developed by Whitehead and Russell (1910), by resorting to authority (Carnap, 1936, 1937), and by tenaciously repeating their views (Bridgman, 1927; Pratt, 1939; Stevens, 1935). They did not appeal to empirical science itself to justify their position on the grounds that scientific knowledge changes and is therefore an unreliable foundation for a stable science. In this manner, logical positivism elevated discussions about the scientific method above empirical science itself, and thereby delayed empirical investigations of the scientific method.

The logical positivism of the 1920s, 1930s, and 1940s developed methods by which it was proposed to discriminate scientific from nonscientific knowledge (Bridgman, 1927; Carnap, 1936, 1937; Feigl, 1970; Hempel, 1966; for discussion, see also Benham & Shimp, 2004; Feyerabend & Maxwell, 1966; Laudan, 1990). These methods included operational definitions, hypothesis testing, and means by which one could identify causal relations and the cumulative growth of reliable knowledge. Operationalism (Bridgman, 1927) was adopted, for example, as a way to transform ambiguous, intuitive, natural language terms such as “length,” “speed,” or “weight” into empirical, objective, unambiguous, standardized methods by which the concepts were defined and measured. An operational definition was claimed to have the virtue of expunging subjective qualities such as perception, judgment, and memory from scientific concepts. In this sense, operationalism captured an idea latent in the name “scientific method” itself; it was a special method that defined and legitimized science (Mertens, 2005). While logical positivism’s view of science was not identical to Peirce’s, it was similar in the sense that it based its claim that science provided a special and superior form of knowledge through its use of a special kind of method: the scientific method.

From its earliest laboratory efforts, psychology explicitly claimed to model its methods on the methods of the physical sciences, on the grounds that doing so would facilitate its becoming a legitimate science (e.g., Fechner, 1860/1966; Watson, 1913). Thus, when logical
positivism appeared, it was welcomed by many psychologists, especially experimental psychologists who viewed their research as putting psychology on a sound, rigorous empirical footing and who were looking for what they felt was a compatible philosophical foundation (e.g., Estes, 1959; Hull, 1943; Pratt, 1939; Stevens, 1935). Features of logical positivism therefore quickly came to govern how many psychologists evaluated the extent to which any psychological research program was scientific (for discussion, see Capaldi & Proctor, 1999; Cohen, 1981; Koch, 1992a; Lacey, 2005; Laudan, 1990; Pratt, 1939; Skinner, 1938; but see also Skinner, 1945; Smith, 1986; Toulmin & Leary, 1992).

At about the same time many psychologists were accepting the philosophy of logical positivism, it became the object of increasing criticism from within philosophy itself. Criticism was aimed at its claims about the logic of hypothesis testing and its verification theory of meaning. Quine (1951) especially challenged its claim that individual theoretical assumptions could be empirically tested; he suggested instead that any test can examine any one assumption only within a broader theoretical context, so that a test of any one assumption is actually a test of the broader theoretical context within which that assumption has meaning. Criticism was also aimed at its assumption that observation is objective on the grounds that observation is theory laden (Hanson, 1958). Moreover, historians and philosophers of science criticized logical positivism because it failed to accurately describe how science has actually been conducted (Feyerabend, 1975; Hanson, 1958; Kuhn, 1993, 1996) thereby perhaps implying that it was a vision of science that could not be actually implemented. Nonetheless, psychology still found itself committed to this flawed philosophy of science, leaving Koch (1999a; pp. 55–56) to note: “Psychology is thus in the unenviable position of standing on philosophical foundations which began to be vacated by philosophy almost as soon as the former had borrowed them.” Similarly, Meehl (1970, p. 403) wrote how “...many psychologists” were “espousing a philosophical position that is some 30 years out of date.” This position is not just unenviable because its tenets involving operational definitions, the logic of hypothesis testing, and the objectivity of observation have become problematic; it is unenviable also because it shares the same inconsistency as did Peirce’s argument by justifying empirical methods by nonempirical means.

This brief review of logical positivism and its historical development suggests that contemporary psychology may still be in an “unenviable position” in which it is beholden to a former philosophy that grounded empirical science in nonempirical philosophical arguments, and is isolated from contemporary philosophy of science. A concrete example of this unenviable position is the current status of an operational definition. Bridgman (1927) originally promoted this idea as a way to turn an abstract, ambiguous concept into an empirical method and thereby presumably to give it objective meaning. Bridgman (1959) later qualified and softened his original view, perhaps in part because of rising criticisms of logical positivism, and he specifically criticized how behavioral psychology had adopted it (see also Koch, 1999b). We show below that students of psychological methods are often introduced even today to Bridgman’s original meaning of operational definition as part of instructional efforts to legitimize psychology’s status as an objective science grounded in the scientific method.

Logical positivism’s outdated tenets persist, we suggest, because psychology adopted its ahistorical picture of science. Why should psychology, if it has adopted such a view of science, historically analyze its relation to philosophy? The view we empirically examine here is that logical positivism’s impact on psychology persists in part because psychology curricula and methods textbooks advocate it, but in a way that discourages awareness of that advocacy, let alone historical and philosophical analysis of its origins. Our position is not uncommon among philosophers, historians, and sociologists of science. For example, Fuller (1997, p. 80) wrote that:

While it is now widely conceded that the most persuasive accounts of the history of science—those found in science textbooks and science popularizations—are misleading to the point of being self-serving, few have stepped back to wonder what this might mean for an activity that advertises itself as unique in its quest for some ultimate, singular and unified truth.

If Fuller’s analysis is correct, then at the undergraduate instructional level, academic psychology might often ironically argue on be-
half of a scientific psychology different from pseudo science and folk psychology but might do so by using unscientific methods, including, to use Peirce’s (1877/1934) terms, authority (in the form of textbooks and instructors), logic (in the description of methods such as “double-blind” methods that are said to logically prevent certain specific forms of confounds), and tenacity (in the form of repeated exposure in psychological curricula to descriptions of scientific methodology and its virtues). According to this view, psychology curricula and textbooks might give students a self-contradictory picture of psychological science; they might advocate one set of methods compatible with logical positivism while justifying them via another, incompatible set, without acknowledging or explaining the contradiction. This possibility seems to pose a threat to teaching scientific standards of objectivity, transparency, and empirical validation.

“Textbook Science” and “Tourist Brochures”

Similar possibilities have been described before. Kuhn (1996, pp. 1) suggested that the conventional image of science is derived in large measure from “the textbooks from which each new scientific generation learns to practice its trade.” He called their aim “pedagogic and persuasive,” and he likened them to tourist brochures, which are well known to present their subject in glowing terms without mentioning any undesirable social, economic, or political problems. Tourist brochures describe and market a vacation destination from a particular perspective to highlight only its charms. Kuhn’s view of science texts implied they similarly aim to persuasively argue the charms of a science and to suppress conflicting information. In a similar vein, Fleck (1935/1979) used the term “textbook science” in his description of how textbooks present a vision of a science that has been conceptually tidied up, made more coherent, and generally made more palatable than the complex empirical literatures that the texts purport to describe really are. Both Fleck and Kuhn suggested that texts present a scientific discipline in the context of an ahistorical, cumulative growth interpretation of science to justify ignoring the discipline’s complex development and to protect its basic assumptions from critical theoretical objection or empirical examination.

According to these two perspectives, which we find to be in uncomfortably close agreement with more of our own academic experiences than we would wish were the case, instruction in psychological methods tends to present, knowingly or unknowingly, the charms of scientific psychology without its empirical and conceptual ambiguities, without the arbitrariness of its definitions, and without mention of its unresolved theoretical problems. On this view, a young science like psychology, struggling to present itself as a legitimate science, might especially wish to suppress that some of its critical assumptions stem from a problematic philosophy of science. This suppression may serve to sustain logical positivism’s unexamined influence and by doing so may hinder efforts to improve methodological practices in scientific psychology.

Two Studies of “Textbook Science” in Psychology

Undergraduate psychology curricula in the United States commonly include courses in general methodology to teach students how to conduct psychological experiments, how to interpret the resulting data, how to discriminate science from pseudo science, and how to apply the scientific method. These courses are often core courses required for a major in psychology. On the basis of our brief summary of the tenets of logical positivism, of how it was adopted in psychology, and of how it persisted in psychology after it was largely abandoned in philosophy, and after reviewing the notions of textbook science and texts as tourist brochures, we speculated that psychology curricula and textbooks would show a commitment to logical positivism, but without explicit philosophical analysis and without empirical support. That is, we conjectured that crucial courses and texts in psychology might portray psychology in Peirce’s inconsistent manner; curricula and introductory texts on research methods might promote logical positivism’s vision of the scientific method, and might do so by unscientific and unacknowledged means.

An implicit advocacy of a philosophy merits empirical investigation because if such advocacy is pervasive, then students are taught a
vision of empirical science that rests upon empirically unverified philosophical assumptions. Accordingly, we conducted two studies using archival research methods that examined the possibility that psychology curricula and textbooks have an unacknowledged commitment to logical positivism. We hypothesized that instructional curricula and methods texts in psychology would differ from those in the natural sciences, specifically physics, because psychology, an example of a “soft science” might make claims about its scientific legitimacy based on the standards logical positivism set for scientific methodology. The American Psychological Association (APA) recently developed its first strategic plan, with one of its three “top priorities” being “increasing recognition of psychology as a science” (Anderson, 2009, pp. 9). In the philosophy of logical positivism, methodology is assumed to be not only separable from theory but to have priority over theory. Thus, if logical positivism affects how psychology sees itself, then it might use methodology to justify its position as a science. Advocacy for psychology as a science by APA, by curricula, and by texts all might conform to logical positivism’s view of science and argue psychology is a science because its methods are scientific (also see Mertens, 2005; Proctor & Capaldi, 2006). We expected that in contrast, physics, perhaps the archetypal example of a “hard science,” would have less need to look beyond itself to convince other scientists and the public to accept it as a science, would have less need to accept logical positivism’s sharp distinction between objective method and speculative theory, and would show less interest in promoting its methodology as the key to its scientific legitimacy. Indeed, one prominent philosopher/sociologist of science wrote (Fuller, 2003, p. 46):

Perhaps I am focusing unfairly on the lack of impact that the positivists have had on the physics agenda. Subtle readers of the history of science know that positivism was always a “made for export” philosophy. In other words, positivists have wanted to spread what they took to be the secret of physics’ scientific success to the more backward disciplines. . . To imagine what positivism looks like to a physicist, consider how the zeal of a missionary or an imperialist appears to an enlightened believer or citizen at home: what causes the domestic market to cringe may just impress the overseas market.

Others have expressed similar opinions about psychology and its wish to emulate physics by conforming to the scientific standards of physics (e.g., Bayer, 2004; Koch, 1992a).

Study 1: Methods Courses

To emulate physics, psychology would have to have a vision of what physics is. If that vision were similar to how Fuller, Koch, and others described it, psychology might attribute to physics a greater commitment to logical positivism than physics actually displays. Specifically, psychology might display a greater tendency to adopt the language and terminology of logical positivism and might assign greater instructional resources to features of it than physics does. The chief feature we examined in Study 1 was the use of positivistic terminology in undergraduate course titles, specifically, terminology involving general “methodology.” We asked if psychology placed greater weight on instruction in general methodology, which according to the tenets of logical positivism was the key to achieving reliable, factual, objective scientific knowledge that was not contaminated by theoretical speculation or by dependence on specific theoretical assumptions. Thus, Study 1 examined whether psychology offered more methods courses than physics did and more specifically, whether psychology offered more general, introductory level methods courses.

Method

Sample. We surveyed course catalogs in psychology and physics departments of the top 25 national universities and top 25 liberal arts colleges as rated in 2009 by U.S. News & World Report (USNWR; U.S. News & World Report, 2009), a popular ranking system often utilized by prospective students and cited by the universities and colleges themselves for publicity purposes. We hasten to acknowledge that any ranking of the top universities is controversial and depends on the evaluative criteria. However, the rankings of USNWR have the virtues for present purposes of being widely disseminated, of conforming to well articulated standards published in the magazine, and of being generated independently from the present study so that selection bias on our part is unlikely. Furthermore, the colleges and universi-
ties in the sample may be assumed to be among the most nationally and internationally influential in terms of their instructional impact on future academics who themselves will be involved in curriculum design. Table 1 lists the colleges and universities included in the sample. (Note that 52 colleges and universities actually were included because of ties in the 25th rank in the USNWR survey.) We defined a psychology department as one with “psychology,” “psychological,” “behavior,” or “behavioral” in its name. Thus, departments named “psychological science” or “psychology and brain science” were included, but those with titles such as “cognitive science” or “neural sciences” were not included because they did not have “psychology” in their name. Forty-nine of the 52 institutions had qualifying psychology departments. All 52 institutions had qualifying physics departments.

**Procedure.** For each institution included in the sample, we examined the publicly available, online version of the general course catalog for the 2009–2010 academic year. First, we tallied the overall number of psychology and physics courses at each institution. Courses were defined as any listing that had an independent course number. Multiple sections of a course (e.g., PSYCH 101a and PSYCH 101b or PSYCH 101–1 and PSYCH 101–2) or affiliated laboratory sections of a course (e.g., PHYSICS 101 and PHYSICS 101 Lab) were not counted as separate courses. The number of methods courses in each department was then tallied, with a “methods” course defined as any listing that had “method” or “methodology” in its name. Words such as apparatus, techniques, laboratory, procedures, instrumentation, experimental design, or research (without the word “method”), were not counted as methods courses. We then compared the frequency of methods courses in physics and in psychology departments in the sampled liberal arts colleges and universities.

Second, we examined those courses that met the above criteria to determine how many departments offered general, introductory level methods courses. Advanced courses (with “advanced” or “graduate” in their names) were excluded from this analysis, as were courses for specific applications and/or content (e.g., statistical or mathematical methods, theoretical methods, methods for quantum physics, methods of developmental psychology, methods of clinical psychology, etc.), as we were interested only in how psychology and physics allocated curricular space to the teaching of general, introductory level methodology. The number of departments that offered introductory level general methods courses was then tallied for each discipline.

**Results**

Overall, 5,295 courses across 52 colleges and universities were identified in our sample: 3,044 in psychology and 2,251 in physics. We found that 145 out of 3,044 (4.8%) psychology courses and 69 out of 2,251 (3.1%) physics courses were methods courses by our definition. Thus, the percentage of psychology courses that were methods courses was about 50% greater than the corresponding percentage in physics.

Most importantly, investigation of the course catalogs revealed that 23 of the 49 psychology departments offered an introductory level general methods course while only 2 of 52 physics departments did. Therefore, about 47% of the psychology departments offered introductory general methods courses while only about 4% of physics departments did. We feel this result identifies a fundamental difference between psychology and physics departments in their respective commitments to instruction in introductory level general methodology.

**Discussion**

The results of Study 1 showed that psychology offered more methods courses than physics and in that sense showed a greater commitment than physics to logical positivism’s emphasis on methodology. More specifically, psychology was more committed to the concept of general methodology that is free of constraints by specific theory or content; that is, to method that is not “theory laden” (Hanson, 1958). Therefore, we interpret Study 1 to show that psychology has in this sense a stronger commitment to logical positivism than physics does, because it was logical positivism that argued for theory-free, perhaps even universally applicable, methodology. Both psychology and physics had methods courses that applied to specific areas of research, but psychology had a far greater number that were designed to be generally applica-
Table 1

*Institutions in the Sample for Study 1 and Course Data*

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<th>Institution</th>
<th>Total # psych. courses</th>
<th># Psych. &quot;methods&quot; courses</th>
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<th>Total # physics courses</th>
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† indicates no online course catalog available; course data extracted from departmental website. — indicates no course satisfied the column heading. * indicates no qualifying Psychology department.
These data empirically supported the metatheoretical views expressed by Bayer (2004), Fuller (2003), Koch (1992a), and others, and encouraged us to examine further the nature of this commitment by psychology to logical positivism’s notion of methodology. We next examined the textbooks written for these general, introductory courses in methodology.

**Study 2: Methods Texts**

Study 1 showed that psychology emphasizes methodology in its curricula, especially a general, theory-free methodology, more than physics. We speculated that psychology does so to conform to a vision of the scientific method that it inherited largely from logical positivism. Study 2 further examined this commitment to logical positivism by evaluating the textbooks used in these introductory general methods courses. This examination is important because textbooks (along with instructors) are authorities that pass the knowledge base of a discipline on to undergraduate students. We asked whether psychology methods textbooks tended to use concepts and terminology from logical positivism and whether any such tendency would be greater than in physics, where the residual impact of logical positivism seemed smaller, based on opinions of Fuller, Koch, and others, and the empirical results of Study 1.

Should these texts present methodology from the perspective of a problematic philosophy of science, logical positivism, without acknowledging doing so, they would exemplify Fleck’s (1935/1979) notion of “textbook science” that does not reveal the philosophical commitments or assumptions that the texts make, and of Kuhn’s notion of science texts as “tourist brochures” that do not acknowledge the implicit marketing aspect of their material. Textbooks might tend to suppress the contradiction that psychological science derives from the use of a scientific method that itself does not derive from, or is not justified by, empirical results. Therefore, we also examined whether a commitment to logical positivism might be only implicit.

**Method**

**Sample.** We used the search terms “methods of psychology” and “methods of physics” in an electronic search of the University of Utah’s J. Willard Marriott Library general catalog. We conducted the search on April 6, 2009 and limited it to entries from 1990 to the present. It should be noted that newer editions of sampled texts may have been published since our search.

The University of Utah library electronic search algorithms yielded nearly identical total numbers of methods texts for psychology and physics: 238 in psychology and 235 in physics. We next narrowed the search to include only introductory level, general methods textbooks by examining the title of each entry. Those texts having “handbook” in their title and those that were edited compilations of contributions on specialized or advanced topics were excluded because they were not written for beginning students. Guides for teachers of methods classes were also excluded. If a book had more than one edition, we used only the latest.

For psychology, if a title contained the words “method,” “methods,” or “methodology,” and “psychology,” “psychological,” “behavior,” or “behavioral,” it was accepted for further scrutiny. Specialized books with “clinical,” “developmental,” “experimental,” “social psychology,” and so on in their titles were excluded; only books aimed at a general introductory student audience were included. Specialized books that were exclusively either entirely quantitative or qualitative in nature were excluded but if a title included both, it was judged to be sufficiently general to be included, provided it met the above criteria. In summary, we included introductory texts in general psychological research methods and excluded specialized and more advanced texts.

Ten textbooks from the total of the 238 library search results that met these above criteria were found. We considered the possibility that the Web search might not identify all texts satisfying our criteria and therefore examined the stacks in the Marriott Library where the 10 identified by the search were located and found 9 more texts that met our criteria as described above and which upon examination proved to be conventional introductory general psychological methods textbooks. As with the electronic search, if multiple editions of a text were found in the library’s stacks, we only sampled the most recent available edition. We were not able to ascertain, after consultation with relevant library staff, why the library’s
search algorithms did not identify these additional texts. Table 2 displays the 19 psychology methods textbooks in our sample.

For physics, we used criteria analogous to those described above for psychology. If a title had “method,” “methods,” or “methodology,” and “physics,” or “physical science” it was accepted for further scrutiny. Just as we excluded psychology texts whose titles involved only “statistical methods,” rather than general research methods, we excluded specialized physics texts whose titles involved only “statistical,” “mathematical,” or “computational” methods. Similarly, specialized texts in methods of magnetism, nuclear physics, theoretical physics, quantum physics, and so on were excluded because they were not general, introductory textbooks. No physics text satisfying the above criteria was identified via the Web search. Moreover, as in the case of psychology texts, we examined the stacks for physics texts that would satisfy our criteria and found no text

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written after our cutpoint date (1990) that had a title that met our criteria. This absence of any such text corresponded to our finding in Study 1 that only about 4% of physics departments in our sample offered the kind of general introductory methods course for which such a text would be relevant.

**Procedure.** According to our analysis described above, some psychology methods texts could be expected to be written from the perspective of logical positivism and therefore should use and emphasize its terminology in the form of operationalism, the logic of hypothesis testing, and how the scientific method identifies causal relations. These terms should be sufficiently emphasized that they should appear in the textbooks’ Indexes. Therefore, we searched the Indexes or Subject Indexes of texts in our sample for the terms “operational definition” or “operationalism,” for “hypothesis” or “hypothesis testing,” and for “causal relation” or “causation versus correlation.”

According to the textbook science and tourist brochure views of texts, it could be hypothesized that some texts might not acknowledge the philosophical origins of these terms. That is, the Indexes of some texts should show usage of logical positivism’s terminology and concepts but not identify logical positivism as the origin.

Furthermore, some texts might be expected to adopt, either implicitly or explicitly, logical positivism’s position that its use would overcome human fallibilities. That is, some texts might propose operational definitions, the logic of hypothesis testing, and ways to identify causal relations as ways to overcome limitations in human perception such as illusory correlations (e.g., Chapman, 1967, 1969; Redelmeier & Tversky, 1996), or biases in human judgment (including use of statistical information and judgment in the face of social pressure or authority), human memory (including eyewitness memory; e.g., Loftus & Hoffman, 1989), or top-down or knowledge-driven processing such as confirmation bias (e.g., Wason, 1960, 1968) and of cultural bias. Therefore, we defined a category of texts that appealed to scientific literature on these limitations. These texts encouraged students to see why scientific methods are needed because of the mistakes that can be made if scientific methods are not used. We categorized a text as motivating scientific methods by demonstrating human fallibility even if it failed to explicitly state why it demonstrated human fallibility. That is, even if it gave examples of experimenter bias, biased observation, and so on, but did not state why it did so, we still categorized the text as one that used scientific literature to motivate the methods it described based on the assumption that the implicit message was that humans are fallible without the use of scientific methodology.

**Results**

For ease of discussion, we describe the results using the numbers for the textbooks assigned in Table 2 instead of referencing textbook titles or author names. The introductory psychology methods texts that support a need for scientific methods by citing empirical data to demonstrate human fallibility in cognitive processing were: 1, 3, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, and 19. Only the texts numbered 2, 4, 6, 10, and 14 did not. Thus, 14 textbooks supported a need for scientific methodology by citing empirical data on human fallibility and 5 did not. In short, it was common for introductory psychology methods texts to cite empirical literature to show human fallibility in processing a wide variety of information. Recall that these are the results to be expected if introductory psychology methods texts appeal to empirical evidence to show that basic human cognitive activities such as seeing, deciding, and remembering are fallible, and that human fallibility therefore must be overcome by objective scientific methodology if psychology is to be considered a legitimate science.

We next searched the Index or a separate Subject Index if available of each of the 19 texts for positivistic terminology defined above; that is, we searched for “operational definition” or “operationalism,” “hypothesis,” “hypothesis testing,” and “causal relation” or “causation versus correlation.” The results were striking; 18 of the 19 texts referenced all three terms, and the remaining text referenced two of the three.

Finally, we asked whether these commitments to positivism were acknowledged in the texts that displayed them. We examined the 19 texts that used positivistic terminology, to determine whether positivism was explicitly cited and specifically the 14 texts (1, 3, 5, 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, and 19) that cited empirical literature on human fallibility to mo-
tivate the need for scientific methodology. Of the 19 texts’ Indexes, seven (1, 2, 3, 4, 7, 13, and 15) contained the word or words “positivism,” “post positivism,” “logical empiricism,” and/or “logical positivism” in their Indexes. Thus, overall, 7 of 19 referenced positivism in one way or another. Of the 14 texts that used human fallibility to justify scientific methods to overcome them, 1, 3, 7, 13, and 15 referenced positivism. Thus, only 5 of 14 that appealed to empirical data on human fallibility to justify a need for scientific methodology explicitly acknowledged positivism in their Indexes. In summary, virtually all texts depended on logical positivism by using its terminology and concepts, yet fewer than half made this dependency explicit.

Discussion

Most introductory psychological methods texts in our sample used language and concepts compatible with logical positivism. By itself, this result would not necessarily imply a commitment to that philosophy because some texts also used these same concepts and terminology and explicitly described its shortcomings and described alternatives to it. Agnew and Pyke (2007), Breakwell, Hammond, Fife-Schaw, and Smith (2006), and Mertens (2005), for example, described historical and philosophical contexts in some detail such that students could see how the development of empirical methods depended on the historical and philosophical contexts in which they were derived, as well as on specific experimental requirements.

We suggest that it constitutes an implicit commitment to logical positivism when a text used both concepts and terminology of positivism and did not explicitly acknowledge doing so. Why does it matter if a psychology methods text is implicitly committed to logical positivism? Why does it matter if a psychology methods text is implicitly committed to logical positivism? By itself, this result would not necessarily imply a commitment to that philosophy because some texts also used these same concepts and terminology and explicitly described its shortcomings and described alternatives to it. Agnew and Pyke (2007), Breakwell, Hammond, Fife-Schaw, and Smith (2006), and Mertens (2005), for example, described historical and philosophical contexts in some detail such that students could see how the development of empirical methods depended on the historical and philosophical contexts in which they were derived, as well as on specific experimental requirements.

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Our personal experiences agree with these historical and philosophical analyses of Klee (1997), Koch (1992a, 1992b), Toulmin and Leary (1992), and others: behavioral scientists can frequently be seen to display positivistic optimism about the power of scientific method without showing a great deal of knowledge about the role philosophy of science plays in their daily practice of psychological science. In our experience, such scientists ironically resist learning about philosophy of science in the belief that it demands that they conform to a vision of science developed by philosophers who they believe do not understand how science actually works. This belief leads these scientists unknowingly and ironically to accept and to put into practice a philosophy of science that is one which many philosophers now see primarily as outdated. We speculate that these scientists have succumbed to the views of Kuhn (1996) and Fleck (1935/1979) who described a textbook vision of science as one having the allure of being more coherent, logically convincing, and generally appealing, than the highly complex and sometimes contradictory literatures upon which the textbooks are based. Textbook science and texts viewed as tourist brochures have been used in explanations of the self-propagating nature of “normal science,” the mode of science that, according to Kuhn (1996), most scientists practice most of the time; he speculated that normal science tended to protect itself from potentially threatening contradictions, unexplained complications, and revolutionary ideas simply by largely ignoring them, thereby preserving the current paradigm.

Study 2 suggests that textbook science may explain, at least in part, why logical positivism serves as the philosophical foundation for empirical methodology in psychology more than it does in physics. While we found that the total numbers of methods texts in psychology and physics were very similar, we found no introductory physics general methods texts corresponding to the introductory psychology general methods texts in our survey. In our sample, recommended psychological methods were not qualified in terms of the empirical content or psychological theories to which they were said to apply. For example, one does not read that a double-blind method, random sampling, a t test, or the analysis of variance, is applicable only to specific content such as peer pressure, teaching effectiveness, experimenter bias, the perception of color, or to the analysis of data from experiments in human categorization. This instruction that presents methodology as though it were independent of theory or content is common in introductory level psychology. A principal goal of logical positivism was to advocate for precisely this kind of methodology that it claimed was objective because it was independent of specific content or theoretical assumptions (Carnap, 1936, 1937; Hardcastle & Richardson, 2003; Stevens, 1935). Our results showed very little evidence that instruction in physics advocates for this same sharp contrast between general methodology and theory. In this way, current instruction in psychological methodology tends, more than instruction in physics methodology, to display a commitment to logical positivism’s advocacy of a “theory free” methodology as the key to turning a discipline into an objective science (Feyerabend, 1975; Koch, 1992a; Kuhn, 1996; Lacey, 2005; Laudan, 1990; Longino, 1990; Slife, Reber, & Richardson, 2004; Toulmin & Leary, 1992).

General Discussion

We empirically examined whether the philosophy of logical positivism impacts instruction in psychological research methods, and if so, how. Before summarizing our results and describing what they imply for how psychology sees itself as a science, we would like to make explicit some qualifications imposed by our specific empirical method. First, we used archival research methods by examining published literature, in our case, textbooks and Web-based course catalogs. Such descriptive methods can give important insights (Merton, 1938/1970; Price, 1961), but they lack logical positivism’s standards for determining causal relations through the use of experimental control. We are sufficiently persuaded by empirical, philosophical, and historical scholarship that identify problems with these standards (Guba & Lincoln, 2005; Hanson, 1958; Koch, 1964, 1992a; Livingston, 2003; Rozin, 2009; Slife, Reber, & Richardson, 2004; Winston, 2004) to be untroubled by this lack, but we wished to make this feature explicit.

Second, our samples of academic institutions and of texts are not random so again, inferential statistics are not applicable here. We hope our
results are sufficiently clear and interesting that they speak for themselves, especially in the sense of inducing in a reader’s mind the question of whether our results in fact do apply at his or her institution and in the textbooks he or she uses. If the institution is American, the present data suggest that they likely do.

Third, whether our results apply to curricula or texts designed for students in other cultures remains an open question for future research to determine. We think this qualification points to important future extensions of our archival work because the positivistic methodology texts in our sample sometimes recommended the universal use of their methods; some texts see their methods as not only theory free, but culture free as well. Consider the following view:

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Scientific statements are rational in the sense that they are the result of an explicit process of reasoning that follows the rules of logic and can thus, in principle, be followed by anyone. This means that scientific knowledge is trans-cultural—a scientific statement carries the same information in any part of the world (Dyer, 2006, p. 3).

Note no data are provided to support this claim, only authority, logic, and philosophy. The philosophy is the same one which we have shown persists in psychology methods texts and curricula, logical positivism, in its guise as a rational, logical, universally objective authority. From this perspective, cultural and gender differences are biases that can be removed from objective scientific knowledge the way other biases and confounds can be removed, by careful logical, sophisticated statistical, or other methodological means. Being biases, they should be removed. In contrast to this position, others see cultural differences as critical to understanding what science is; cultures constrain how scientists perceive methods and concepts, how they frame them, and therefore can redefine them. We recommend Fuller (2003, pp. 106–136) on the view from Islam and Japan, Agnew and Pike (2007) who include a chapter entitled “Sex and Science” (pp. 406–431) in their methods textbook, and Livingstone (2003, p. 1) who wrote that “Scientific knowledge is made in a lot of different places. Does it matter where?” In our opinion, the methods texts we examined too often imply that the answer is no. Livingstone wrote that the answer is yes, and described how Darwinism was interpreted and received differently in New Zealand versus the American South for cultural reasons. We think these varying opinions on the role of culture in science suggest that it would be important for future empirical research on how philosophy impacts instruction in psychological methodology to examine how the methods they describe and recommend depend on cultural traditions and religious beliefs (Merton, 1938/1970). The assumption that science and methodology are culture- and gender-free is similar to logical positivism’s notion that methodology is “theory-free.” In contrast, the emerging science of science redefines this assumption as an empirical question. We suggest empirical methods be used to understand and address such questions about science, instead of merely presenting arguments derived from tenacity, logic, or authority, to justify such claims about science to students.

A critical issue facing not just science but society as a whole is how to coordinate what is seen as objective science with human values. Science’s customary discourse about one physical reality and hence one scientific truth, and about objectivity and rigorous methodology that is impervious to human fallibilities, sometimes seems at odds with society’s pressing need to adopt a more tolerant attitude about diverse views that may seem fundamentally incompatible (Shimp, 1999). We hope our present results suggest how archival and other empirical research methods might facilitate future research to make cultural and scientific beliefs and attitudes that are now only implicit more nearly explicit, so that their social roles in science and society may be better understood.

Fourth, we do not provide an historical analysis of the impact of philosophy on the development of instruction in psychological methods. FitzGerald (1979) developed an illuminating analysis of the impact of the history of American culture on the development of American history texts, and Fuller (1997) discussed, without supporting data, however, the historical development of science texts in general. A corresponding analysis of the specific impact of the history of philosophy on the history of instruction in psychological methods would be, we think, of corresponding importance. The present work gives only a contemporary snap shot of the impact of the history of philosophy on instruction in psychological methods. We hope that our methods may be expanded to facilitate
an analysis of the historical development of texts in psychological methodology, and of the impact of philosophy, religion, gender, and other cultural influences on them. For the moment, however, our more limited goal was simply to show that an outdated philosophy of science does influence contemporary instruction in psychological research methods and that it is common for these texts not to acknowledge any such influence at all.

With these qualifications made explicit, let us now summarize the overall results. Study 1 surveyed course offerings in psychology and physics departments in top colleges and universities and found that there were more psychology methods courses than physics methods courses, relative to the respective total numbers of courses. Study 1 showed further that many more psychology than physics departments in our sample offered introductory general methods courses. Correspondingly, Study 2 showed that there were more introductory psychology general methods texts than introductory physics general methods texts, and the psychology methods texts tended to promote language and concepts derived from logical positivism, a philosophy of science that arose in the 1920s that advocated the use of concepts and terminology of operational definitions, hypothesis testing, and a particular view of causal relations. Study 2 also showed that this commitment is often presented only implicitly, so that students are unlikely to see it and critique it. We interpreted all these results in terms of there being a greater tendency in psychology than in physics to emphasize features of logical positivism, especially its emphasis on methodology as the key to scientific legitimacy. So far as we know, these are the first empirical studies to show the greater impact of logical positivism on instruction in methodology in psychology than in physics.

Furthermore, Study 2 found that several of the psychology texts in our sample advised using scientific methods in a manner consistent with positivism by empirically demonstrating human fallibilities that intrude into methods of investigation other than the scientific method. Virtually all of the texts in our sample used key terms, essentially defining terms, of logical positivism, a philosophy of science that argued that the scientific method, correctly employed, enabled scientists to overcome these fallibilities by discovering empirical methods that are theory free. However, despite conforming in this functional way to logical positivism, most did not explicitly acknowledge doing so.

Why might psychology persist in presenting itself in curricula and texts in a manner consistent with a philosophy of science seen by many as problematic, often without acknowledging doing so? We suggest that an answer lies in Fleck’s (1935/1979) proposal that science texts present science from what he called a “textbook science” perspective and in Kuhn’s (1996) similar proposal that they present science in a manner that resembles how tourist brochures present tourist destinations. There are several reasons why psychology might use “textbook science.” For example, consider that the APA recently developed strategic plan has one of its three “top priorities” being “increasing recognition of psychology as a science” (Anderson, 2009, p. 9). Consider also the following from a recent article by the current president of APA (Bray, 2010, p. 365), “STEM (science, technology, engineering, and mathematics) is the term used to refer to basic science disciplines. Although psychology is a STEM discipline and contributes to STEM education in other science disciplines, it is not always considered a core STEM discipline.” Anderson (2009) and Bray (2010) view psychology as a science not adequately recognized as such. We are concerned that APAs efforts to promote greater recognition of psychology’s scientific legitimacy may resemble and contribute to how psychology’s curriculum and methods textbooks often promote psychology’s legitimacy, that is, by tenaciously emphasizing that psychology is scientific because its methods are scientific. We are concerned that these public relations efforts will not show any greater awareness than do present psychology methods texts that psychology’s mainstream methodologies may conform to those compatible with the outdated and flawed philosophy of logical positivism.

Our results support the suspicions of others (Bayer, 2004; Fuller, 1997, 2003; Koch, 1992a) that psychology as a discipline believes in the importance of legitimizing itself in terms of its methods to a greater degree than physics would. We are therefore hopeful that when APA or other authoritative organizations in the discipline advertise that psychology is a science because its methods are scientific, they will make
explicit the dependence of their claims on the fragile contemporary status of logical positivism, and that logical positivism itself was developed through the use not of empirical science but through philosophy, logic, and authority (Bridgman, 1927; Carnap, 1936, 1937; Pratt, 1939; Stevens, 1935). A minority of authors of psychological methods texts already acknowledges these issues, and we hope their approach becomes more widely adopted. Otherwise, if APA advocates for the legitimacy of psychological science the way our data suggest psychology’s curricula and methods textbooks do, then we predict other more established sciences, and hence ultimately the public too, could remain skeptical.

We see an opportunity for APA and other psychological professional organizations to become more impactful in influencing national science policy by promoting psychology’s role in the development of a science of science, rather than by implicitly promoting logical positivism. Much psychological work is now being directed to psychology’s role in this new discipline (e.g., Feist, 2006, 2008; Klahr & Nigam, 2004; Newcombe, Ambady, Eccles, Gomez, Klahr, & Mix, 2009) and we hope that psychology curricula, methods texts, and professional organizations will in the future give more attention to this work in how they advocate for psychology as a science.

There are potential contradictions and ironies in phrases such as “the science of science.” This may be especially the case here because the psychology of science suggests that the scientific method may be flawed, yet we are advocating the use of empirical methods to inform our understanding of how science is practiced. This irony clearly warrants some discussion. Analogous ironies involving reflexive statements have been known since philosophy’s inception. For contemporary examples, consider Kuhn’s (1996) argument that all scientific paradigms are context dependent, except for his scientific paradigm for the development of scientific paradigms. This irony has nevertheless not prevented Kuhn’s work from being useful. Also, Shimp (2001) argued for the reflexive application of dynamic, computational theories of behavior to the behavior of behaviorists themselves, and yet he argued that application might even be essential to the understanding of behavioral science. So, we concede there is ambiguity in the emerging science of science, but we do not think that ambiguity should stop empirical and theoretical work. Instead, we think it should be acknowledged and empirically examined, as our two studies do here. The emerging science of science is an iterative process according to which research on human fallibilities, for example, is used to inform how psychological research, including research on fallibilities, is conducted. Irony arises when unnecessary logical, philosophical, or authoritarian claims are made, or implied, such as that science involves methods that overcome human fallibilities to achieve impersonal objectivity, culture-free truths, observation that is not theory laden, methods that apply across any possible theoretical context, and so on. These are the claims that seem to us to be inherent, or even explicit, in introductory psychological methods texts. We make no such claims. We do claim, nevertheless, that empirical methods provide tools by which our understanding of what it means to develop and use empirical methods can be informed. One need look no farther than contemporary research on the science of science to see evidence in favor of this argument. To results like our own archival data on how philosophy impacts instruction on method, we would add results of research on peer review, confirmation bias, experimenter bias, theory laden observation, irrational aspects of decision making, irrational neglect of base rate information, and so on. We anticipate that future work along all these lines will show the utility of cross cultural psychological science of the science of psychology, given the certainty that non-Western science will play an increasingly important role in determining the nature of science. In short, at the present time there does not seem to be any irony involved in the use of science, broadly conceived, to study science itself, in part because so much remains to be known about what science is, and in part because the emerging science of science seems more motivated to explicitly describe the qualifications that pertain to its methods, so that they may be more easily critically examined. It would go a long way to remove the irony that can be seen in Peirce’s work from some introductory psychological methods texts if they explicitly revealed the historical, philosophical, and cultural assumptions behind their methods, and revealed also how empirical investigations
of those assumptions might clarify the nature of
the scientific method and thereby reveal ways to
improve the methods of psychological science
(see also Feist, 2006, 2008; Feyerabend, 1975;
Fleck, 1935/1979; Hanson, 1958; Klahr &
Nigam, 2004; Proctor & Capaldi, 2006;
Mertens, 2005; and Slife, Reber, & Richardson,
2004).

In our sample of texts, less than half of those
that presented scientific methods in terms of a
positivist perspective actually acknowledged
doing so. Therefore, many students will not
learn that their texts present science only from
the perspective of logical positivism and most
will not learn about the philosophical origins of
the material in their methodology texts or the
subsequent philosophical debates that have
made positivism seem problematic. Students
therefore are at risk for assimilating a philo-
sophical perspective without realizing they do
so. Instruction in methods in this way again
corresponds to Fleck’s (1935/1979) and Kuhn’s
(1996) descriptions of science texts as market-
ing tools. We see this as problematic because
methods texts claim objectivity to be their goal,
yet many of them fail to describe how this claim
depends on unstated and unevaluated assump-
tions, or how there might be a difference be-
tween science as they describe it and science as
it is actually practiced. The lack of awareness
with which this intellectual attitude appears to
be acquired suggests to us it is likely to be
passed on from academic generation to aca-
demic generation without participants under-
standing their own assumptions and without
understanding the possibility of empirically ex-
amining them.

We also speculate that introductory psycho-
logical methods courses might be more appeal-
ing to students than they sometimes now are if
their implicit philosophical content were made
more explicit. We suggest that one reason why
instructors often face a difficult challenge in
courses on methodology is that the implicit pre-
sentation of psychology as a science from the
perspective of logical positivism requires a
sharp line between rigorous method and specu-
lative theory to be drawn, and that in turn,
requires them to omit the work of many of the
most influential psychologists in history, about
whose work many students are often eager to
learn. That is, student interest in rigorous meth-
odology might be improved if such an interest
did not require a student to suppress interest in
theorists such as Freud, Luria, Piaget, and Ge-
stalt psychologists. Several of the methods texts
in our sample referred to work by highly influ-
ential psychologists such as Freud only as
pseudo science relying on improper methodol-
gy. We think it is pedagogically problematic to
describe the work of some of the most influen-
tial psychological theorists only as examples of
how not to do science. This conveys the posi-
tivistic message that method is vastly more im-
portant than speculative theory, but leaves un-
explained or even unacknowledged why these
psychologists have been so influential. That is,
leaves the role of speculative theory in science
unmentioned or dismissed. We feel that ac-
knowledging the impact of these and other like
scholars might accomplish three things. First,
because they have influenced how professional
scholars view psychology, they presumably
would be of interest to students as well. Second,
acknowledging how influence depends on the-
ory as well as on rigorous method would let
students more clearly understand how logical
positivism’s perspective on the primacy of
method does not explain how science actually
works. According to Kuhn (1996) and Feyer-
bend (1975), for example, as theory changes so
must method. In that sense, theory has primacy
over method, as opposed to method having pri-
macy or method being theory-free. Finally, we
feel that speculative theory might drive future
empirical work, as is often the case in the field
of theoretical physics and, according to Lakatos
(1978), as it does in “progressive” research pro-
grams in general.

We see little or no evidence that promoting
the scientific legitimacy of psychology by
means of “textbook science” and “tourist bro-
chures” encourages students to form a healthy,
sophisticated, realistic and critical attitude to-
ward the role of methodology in psychological
science. At the very least, we think methods
texts that present their content from the perspec-
tive of a philosophy of science should explicitly
acknowledge that they do so. We see such a
“truth in advertising” statement as serving mul-
tiple purposes, including reminding instructors
as well as students that philosophy still plays a
crucial role in psychology and encouraging stu-
dents to critically examine the philosophical
and methodological assumptions of a discipline
to better understand the nature of science. We
understand the complex costs and benefits of introducing students in introductory general methods courses to complex, abstract philosophical issues, and we sympathize with the pedagogical goals of authors who have wished to bypass these issues on behalf of efficiency and other practical constraints. We think, however, that the literatures on the teaching of psychology, on the metascience of the psychology of science, and on how to present psychology to the public (Davis & Buskist, 2002; Koch, 1992a; Proctor & Capaldi, 2006; Saville, 2008; Smith, Harre, & Langenhove, 1995; Toulmin & Leary, 1992) suggest numerous constructive alternatives to “textbook science” or “tourist brochures,” that would better serve both students and scientists.

References


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