Verbal Reports on the Contents of Consciousness

Reconsidering Introspectionist Methodology

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ABSTRACT: Doctors must now take a fifth vital sign from their patients: pain reports. I use this as a case study to discuss how different schools of psychology (introspectionism, behaviorism, cognitive psychology) have treated verbal reports about the contents of consciousness. After examining these differences, I suggest that, with new methods of mapping data about neurobiological states with behavioral data and with verbal reports about conscious experience, we should reconsider some of the introspectionists' goals and methods. I discuss examples from cognitive psychology, including pain researchers' attempts to develop self-reports of pain so that they can be, like other vital signs, reliable indicators of internal states.

1. Introduction: Pain Reports as Vital Signs

Doctors and nurses must now take a fifth vital sign from their patients, a report of their pain. So, in addition to the standard four vital signs of pulse, breathing rate, blood pressure, and temperature: "New standards require that every patient's pain be measured from the time they check in -- just like other vital signs are measured. Patients should expect at least to be asked to rate how they're feeling, from zero, no pain, to 10, the worst pain imaginable. (Small children will use pictures to rate pain)" (Neergaard, 2000). A similar scale was used when my wife, during labor, participated in a pain relief study: she

marked, before and after her epidural, "where her pain fell" on a line from "no pain" to "the worst pain imaginable." (Notice a point I'll return to later -- that the equivalent of a verbal report can be expressed with non-verbal behavior, such as marking the line.)

This new vital sign, the pain report, raises many questions, beginning with: Why was it implemented -- haven't doctors always tried to determine how their patients are feeling? Apparently not enough, since the main reason for the change is not really to help diagnose patients' medical problems, which is the main purpose of the other vital signs, but to secure a new right for the patient, the right to pain relief, which has too often been ignored or under treated: "four of every 10 with moderate to severe pain don't get adequate relief" (Neergaard, 2000). This may explain why these pain reports are so simplistic. Their aim is to inform the doctor or nurse how much pain relief is required, and this is based primarily on how much the patients *feel* they need relief. (Our birthing coach asked her class full of expectant parents, "What is pain?" I thought I might finally get to display some of my philosophical training, but alas, the correct answer was, "Pain is whatever she says it is.")

These decisively subjective interpretations of pain reports suggest more significant questions: Are the pain reports really measured "just like other vital signs are measured"? What are the reported numbers measuring or indicating? What do they refer to? And who is the observer, the patient or the doctor? Finally, how might they be used for more than just pain relief? These questions, of course, instantiate a general problem in the study of the conscious mind: What role can and should first-person verbal reports play in determining the contents of consciousness? To approach these questions, I will first present, in the next section, three caricatures of doctors who treat pain reports in a way suggestive of the three major schools of experimental psychology of the 20th century: introspectionism, behaviorism, and cognitive psychology. Then in section 3, I will discuss the problems and advantages of each of these approaches towards verbal reports. In section 4, I will suggest that, given the tools now at our disposal in studying the mind and brain, we may want to reconsider some of the introspectionists' long-dismissed methods and goals (though not their views about the nature of mind or the scope of psychology). I will return to pain reports in section 5 and discuss some of the ways pain researchers have already reconsidered introspectionist methodology.

2. Three Kinds of Doctors

First, imagine an introspectionist doctor. He is interested in patients' pain reports as indications of their conscious mental states. He sees such mental states as a distinct set of phenomena that can be known directly by introspection and communicated with a precise language. The pain report, if obtained through the method of introspection, thus provides information about the patients' *pain*, about their conscious mental states, just as the thermometer or stethoscope provides information about their temperature and heart rate, their bodily states (see Table 1, 5A). Introspection is observation of mental phenomena just as inspection is observation of physical phenomena, and for scientific purposes, each

type of observation, if practiced reliably, can produce a report of the relevant data, as Titchener (1898, p. 43) suggested with this comparison:

> Introspection = psychological phenomena (vivid experience --> full report)
> Inspection = physical phenomena (vivid experience --> full report).

Table 1

Pain as the fifth vital sign. How one interprets pain reports in relation to the other vital signs depends on whether one views verbal reports about the contents of consciousness more like an introspectionist (5A) or more like a behaviorist (5B).

(1) Heart Rate (pulse)	-> measured by monitor -> observed by doctor -> refers to rate at which heart muscle contracts
(2) Breathing Rate	-> measured by stethoscope -> observed by doctor -> refers to rate at which lungs contract
(3) Blood Pressure	-> measured by BP cuff -> observed by doctor -> refers to elasticity of blood vessels (or blood volume)
(4) Temperature	-> measured by thermometer -> observed by doctor -> refers to body temperature (mean molecular motion)
(5A) *Pain* report ("no pain"-"worst pain imaginable")	-> measured by introspection -> observed by *patient* -> refers to conscious state of patient
(5B) Pain *reported* (0-10)	-> measured by ear and pencil -> observed by *doctor* -> refers to behavior of patient (noises s/he makes)

But the proper method of introspection would require more than just asking the patient to rate her pain on a scale of 0-10, or to mark a line. The introspectionist will not be satisfied with these simplistic pain reports that focus only on the intensity of the sensation -- just as current pain researchers often use more sophisticated and extensive assessments of pain, such as the McGill Pain Questionnaire, which takes into account the emotional and cognitive aspects of pain experiences (see section 5 below). The introspectionist doctor will use the so-called "method of examination" which asks the patient to concentrate on the sensation and describe it in detail, in a phenomenological language she has been trained to use in order to discriminate and locate this experience in relation to

other experiences, including past pains. Of course, since the experience to be observed here is pain, most patients probably would not like the methodology of the introspectionist doctor.<1>

A behaviorist doctor certainly would not like this methodology. She would say that the patients' pain reports do not measure a distinct phenomenon nor refer to internal mental states. Rather, the reports are just another type of objective behavior -- they are what they are, verbally reported numbers (see Table 1, 5B). This doctor might use the reported number in conjunction with other objective signs, such as the numbers she reads off the thermometer or the blood pressure gauge, to detect the objective cause of the medical problem -- to infer the stimuli that caused the behavior. But the problem here is that no doctor would think the *numbers* displayed by his or her instruments are important in and of themselves -- any more than other scientists are interested in what their instruments *display* rather than what their instruments *measure*. The numbers are important only because they do refer to something; for instance, blood pressure gauges measure an internal state -- the elasticity of the blood vessels and sometimes blood volume. The point is obvious if we recognize that nobody cares about the numbers displayed by a *broken* instrument precisely because they no longer indicate what we do care about. Similarly, the pain report number, if it is at all analogous to the other vital signs, is meaningless if it is not taken to refer to something, to measure some internal state, and pain reports, if they measure anything, seem to measure the subjective mental state of the patient. Here too, however, the instruments that "display" the pain report number, the patients, may be seen as defective in some way (for instance, because they don't understand the instructions or they hope to get some good drugs or they are exceedingly stoic or sensitive in regards to pain stimuli). So, it is important not to assume too readily that patients' reports are a reliable indicator of their experienced pain.

For this reason, the behaviorist doctor will see *herself*, and not the patient, as the arbiter of the meaning of the pain report. Whereas the introspectionist doctor views his patients as the authority about their own mental states, the behaviorist sees herself as the authority, interpreting the pain report as an indication of some objective state just as she interprets the meaning of the numbers she records with her blood pressure gauge and stethoscope as indications of some objective, physical condition. Most patients won't like this authoritarian doctor (indeed, she represents the stereotype of the doctor who views patients as *objects* to be treated rather than *subjects* to be healed, a stereotype whose accuracy surely played a role in the need for this new requirement for pain reports).

Enter the cognitive-psychology doctor. In terms of the way she interprets verbal reports about pain, such a doctor falls somewhere on a continuum between the introspectionist and the behaviorist. While the cog-psych doctor is likely to accept that her patients' verbal reports refer to subjectively experienced states to which the patient has direct access, she will also believe that these states correlate to internal physiological (and neural) states. Thus the reports offer useful but not infallible information. They can be compared to data about these internal states (as well as stimuli and behavior), just as the doctor can compare breathing rate and blood pressure to interpret what is going on inside her patients -- and to diagnose the causes of their problems. And such comparisons

between difference sources of data can support or undermine the reliability of the introspective reports. Patients will probably like the cog-psych doctor, because she will take their pain reports seriously as an indication of their mental discomfort but also as information about how to treat the physiological causes of this discomfort, which are unobservable by the subject (after all, we go to the doctor because we know we are in pain but we don't know its cause or the best treatment).

3. A Brief History of Verbal Reports in Psychology

These three caricatures offer us some indication of how different schools of psychology have treated their subjects' verbal reports about conscious mental states. Now I will examine this history more closely to see what lessons we can learn. I will highlight the advantages and disadvantages of each school of psychology, especially in their use of first-person reports, to prepare the way for reconsidering some of the introspectionists' methods.

The introspectionists began with several assumptions about the goals and methods of psychology, which, as we will see, lead to corresponding limitations and problems:<2>

(1) The introspectionists delineated the proper study of psychology as the conscious mind, defined by Titchener as "nothing more than the whole sum of mental processes experienced in a single lifetime" (1898, p. 9). In fact, leading introspectionists distinguished themselves even from psychophysicists, who, according to Titchener, "throw stimuli into the organism, take reactions out, and then, from some change in the nature of the reactions, *infer* the fact of a change in consciousness. Why in the world should one argue and infer, when consciousness itself is there, always there, waiting to be interrogated?" (1913, p. 221). Thus, the boundaries of psychology extend as far as the boundaries of the mind, defined in the Cartesian sense as those phenomena which can be known directly through introspection.

(2) This object of study, the conscious mind, was seen as a phenomenon distinct from physiological (and physical) phenomena; indeed, introspectionists worked from a dualistic philosophical tradition. They are best seen as psycho-physical parallelists, who viewed psychological processes as distinct from physiological processes, though there are regularities between the two realms. Wilhelm Wundt, for instance, writes, "physical causality and psychical causality are polar opposites" (Robinson, 1977, p. 454). Consciousness is an entity observed through introspection; other phenomena are entities observed through inspection by the "external senses."

(3) Given these views, introspectionists believed that the proper, and only, method for observing the distinct phenomena of psychology (conscious experience) was introspection. Titchener writes, "We must remember always that, within the sphere of psychology, introspection is the final and only court of appeal, that psychological evidence cannot be other than introspective evidence" (1898, p. 341). Külpe adds,

"Experiment without introspection is no more than a plaything borrowed from physics" (1909, p. 8). Other areas of study, such as mental pathology, animal and child psychology, and physiology were viewed merely as "external aids" to psychology (see, for instance, Titchener, 1898, p. 21, and Külpe, 1909, p. 16).

(4) Finally, introspection required training. Just like observation in other sciences, improving the introspective subjects' observational skills -- that is, their ability to introspect -- was seen as improving the accuracy of the results. So, just as an astronomer must be trained to differentiate a quasar from a supernova, an introspector must be trained to differentiate and label a sensation's intensity, vividness, and duration: "The training of which I have spoken, as necessary to a systematic introspection, is essentially the same as the training necessary to reliable observation in physics or biology" (Titchener, 1912, p. 446). Introspection, like observation, is a skill that needs careful development to be reliable. But reliable introspection allows access to all mental processes.

We have outgrown these views. Under the influence of Freud, behaviorism, and cognitive psychology, we no longer have such a narrow conception of mental processes (rather, we might say that they are, roughly, those processes which cause purposeful behavior). Hence, we can readily see the introspectionists' assumptions as problematic. Their limited view of the mind and of the scope of psychology led them to neglect the study of behavior and the role of physiological processes, including *unconscious* mental processes, in causing behavior. They were very interested in mapping the relations between various conscious experiences, which they believed could be "arranged in as orderly and systematic fashion as the phenomena dealt with by physics or physiology" (Titchener, 1898, p. 340), but they were not so interested in mapping the relations between conscious experiences and the objectively observable phenomena of physics, physiology, and neurology. One reason may be that, like Freud, some introspectionists believed that these relations, though they exist, could not be usefully studied given the primitive tools for observing neural activity. But another reason was surely their dualistic view towards the conscious mind as an entity to be studied in its own right, using the only method of observation that could access it.<3>

This reliance on introspection limited the subjects for psychological experimentation to normal adult humans -- and only those trained in introspection. Compare this practice to the current convention in psychology of using untrained undergraduates, who are sometimes intentionally misled, and animals (which *are* trained but not to introspect!). The introspectionists' method of training subjects is sometimes blamed for the inconsistent results reported by different labs with their various practices and terminologies. For instance, Titchener's lab found 45,000 discriminately different sensations while Külpe's lab found only 12,000; and Külpe's subjects reported experiences of imageless thought, but Titchener's subjects claimed their thoughts all included some sensory elements (Boring, 1942, p. 10).

An underlying problem here is that the *subjects* were the observers and hence the authority about what their observations meant (indeed, introspective experiments had

"Os" -- that is, "observers" -- rather than the "Ss" or "subjects" of later experiments). Though their verbal reports were not considered infallible measurements of conscious states -- hence, the need for training and repetition -- they were not compared for reliability with many other types of observable data but only with the stimuli and perhaps the verbal reports of other observers trained in the same lab. Ironically, Titchener worried about biases caused by untrained subjects' commonsense expectations about their experiences but not about biases caused by training observers how to introspect or by the occasional practice of informing the observers of the hypothesis under consideration (sometimes the observers were limited to the researcher and his assistants).

Finally, there is, of course, a long history of questioning whether introspection can serve as a type of scientific observation at all. Usually the argument is that the act of introspecting distorts the "object" observed -- the conscious experience itself. This criticism, historically tied to the positivist Auguste Comte, led many introspectionists to turn to the use of *retrospection* rather than concurrent introspection. But retrospection introduces the distortions and inaccuracies of memory. However, much of the training involved in introspectionist experiments was aimed precisely at preventing the act of introspecting from interfering with the conscious experiences observed -- to make subjects able to introspect almost habitually, without effort -- and reports were obtained immediately after the experience to prevent self-conscious reflection. Wundt used the language of "inner perception" rather than "self-observation," and he did attempt to increase reliability by testing for consistency of various reports given identical stimuli (Danzinger, 1980). Külpe describes the method as "attentively experiencing a mental process" (1909, p. 9) and emphasizes that the subject should attend to the conscious phenomena and not the act of introspecting itself. Nonetheless, significant questions remain about the usefulness and reliability of introspection, questions that contributed to the downfall of introspectionism and to the current practice of shunning introspection or masking it behind a different name.

Indeed, the behaviorist movement triumphed in part because it was able to pounce on these problems, rejecting each of the introspectionist assumptions, and filling the gaps left by the introspectionists' narrow view of the scope and methods of psychology. As James Watson scoffed: "we find [in introspectionism] as many analyses as there are individual psychologists. There is no element of control.... There has never been a discovery in subjective psychology; there has been only medieval speculation" (Watson and MacDougall, 1929, pp. 16-17).<4> The behaviorists rejected the claim that the proper study of psychology was conscious experience, which they claimed either did not exist or could not be studied scientifically because it is not objectively verifiable. Hence, they rejected that the proper method of psychology is introspection. Watson began his famous 1913 manifesto: "Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness" (p. 158).

Instead, the behaviorist defines psychology as the study of behavior, and the method for studying this subject is controlled manipulation of stimuli and measurement of behavioral variations. Subjects are not trained to observe -- *they* are observed. And hence the authority in interpreting the observations is the psychologist, not the subject. For the behaviorist, humans are no different from animals as subjects of psychological investigation: "We need to have similar experiments made upon man [as rats], but we care as little about his 'conscious processes' during the conduct of the experiment as we care about such processes in the rats" (p. 166).

But does this mean that verbal reports dropped out of psychology as behaviorism displaced introspectionism in the 1920s and '30s? Edwin Boring writes, "Another answer is that introspection is still with us, doing its business under various aliases, of which *verbal report* is one" (1953, p. 169). Introspection was certainly not practiced as it had been, yet camouflaged forms of the method survived. For instance, subjects still answered directed questions about their experiences, and researchers introspected to form hypothesis (not to mention the use of introspection in psychoanalysis, Gestalt psychology, and psychophysics). Even behaviorist experiments that limited subjects' responses to giving "yes/no" answers, marking number scales, or just pushing buttons are best viewed as involving verbal reports about the subjects' experiences. After all, these responses are, it seems, shorthand for reporting something like, "I understand your instructions and am pushing the button to indicate I am experiencing X now."<5>

However, behaviorists tried to interpret subjects' verbal reports just like their button pressing, simply as one type of behavior among others, to be given an objective measure and compared statistically against other objective measures. Watson, responding to the suggestion that the use of verbal instructions and responses masks introspective reports, wrote: "I should prefer to look upon this abbreviated method, where the human subject is told in words, for example, to equate two stimuli, or to state in words whether a given stimulus is present or absent, etc., as the *language method* in behavior. It in no way changes the status of experimentation" (1913, footnote 5). It was not until Chomsky's (1959) famous review of Skinner's similar analysis of verbal behavior that the tide fully turned against trying to treat language, including reports about conscious experience, just like any other behavior.

Nonetheless, a contemporary neo-behaviorist, John Staddon (2001), tries to rejuvenate this approach towards verbal reports. He offers a distinction between Domain 1, which represents the contents of consciousness or subjective experience, Domain 2, which represents physiological and neurobiological activity, and Domain 3, which includes behavioral data, including verbal reports about experience. In stark contrast to the introspectionist, who sees Domain 1 as the proper domain of study for psychology, Staddon suggests Domain 1 is impenetrable (more radical behaviorists simply rejected its existence), so psychologists should study only Domains 2 and 3. He says Domain 1 is "subjective and *science has nothing to say about it*" (p. 165; see also Tolman, 1922). Hence, the data for behaviorists are the facts of behavior, including verbal reports, as they are observed and interpreted by the psychologist.

But as I suggested above, surely we do not care about the mere sounds uttered by the subject any more than we care about the movement of the finger pressing the button or the numbers on the thermometer or heart monitor. We care about what the sounds uttered in the verbal report *mean*, what the button pressing *indicates*, what the numbers *measure*. And what the reports mean, what the button pressing indicates, involve facts about Domain 1, about the conscious experience of the subject. The behaviorists' "elimination of states of consciousness as proper objects of investigation" (Watson, 1913, p. 177) diminishes the scope of psychology as significantly as the introspectionists' antithetical error.

I should emphasize, however, that many psychologists, in theory and in practice, did not accept the limitations of introspectionism or behaviorism, but saw that both camps were making a mistake in restricting the scope and methods of psychology. For instance, in 1904, James Cattell wrote, "the rather widespread notion that there is no psychology apart from introspection is refuted by the brute argument of accomplished fact," and five years earlier R.S. Woodworth recognized: "We cannot tell from introspection what guides our movements.... We have to rely on a quantitative determination of the degree of accuracy observed under different conditions" (quoted in Danzinger, 1980, pp. 257-258). Similarly, Külpe's student, Ach, recognized that introspection could not uncover the connections between thoughts during problem solving and coined the term "determining tendency" to describe the unconscious processes, hidden from introspection, that guide conscious thoughts (see Lieberman, 1979). After the rise of behaviorism, William MacDougall debating J.B. Watson (1929), stated:

> I, on the other hand, maintain the two sets of data, the facts ascertainable by introspective observation, and the objectively observable facts of behavior, are not data for two distinct sciences, but rather are two classes of data both useful and both indispensable for the one science of human nature properly called 'psychology.'... I insist that the problems of human nature are so obscure and difficult that we cannot afford to neglect, or to throw deliberately aside, any available data. (pp. 43 and 53)

These moderate views offer precursors to the cognitive psychologists, who became interested in the differences between conscious and unconscious processes and correlated data from various sources, including verbal reports, behavior, and physiology. They avoid the flirtation with dualism suggested both by the introspectionist's sequestering of psychology to Domain 1 and the behaviorist's quarantine of psychology to Domain 3.<6> Instead, cognitive psychologists generally identify conscious mental processes with those that are reportable by the subject, so they obviously have an interest in verbal reports, but most also recognize that consciousness is not *equivalent* to reportability and that denying dualism need not entail denying a role for introspection. Indeed, though the behaviorist suggests that introspection of conscious mental states conflicts with a materialist conception of mind (see Watson, 1913), William Alston reminds us that "It is not at all inconsistent with materialism to hold that a human being has some special observational access to certain of his states and processes, which other people, if left to their own devices, could learn about only through complicated inferences" (1972, p. 93). In fact, it

is the assumption of some sort of mental-physical relation that allows introspective reports to enjoy scientific respectability for cognitive psychologists. They can, based on this assumption, treat verbal reports as testable and confirmable, rather than infallible and unverifiable. They can allow that subjects do have a type of authority -- based on their "special observational access" -- over *some* of their mental states, without giving subjects complete authority over *all* of their mental processes.

Ericsson and Simon (1993), for instance, tested the validity of the assumption, discussed above, that introspection necessarily distorts the experiences observed and is thus unreliable. They found that, at least in their experiments on performing calculations, the act of introspection did not affect subjects' mental processes: subjects go through the same steps whether they concurrently describe what they are doing, retrospectively describe it, or do neither. Ericsson and Simon's book *Protocol Analysis* also offers experimental techniques for directing subjects on how to attend to their thought processes and report them, though it stops short of the training suggested by introspectionists. Their results suggest that introspection is not necessarily unreliable and also that it can be practiced in more and less reliable ways.

Other experiments, such as those reported by Nisbett and Wilson (1977), are interpreted to suggest that introspection is unreliable, because they indicate errors in subjects' verbal reports about their experiences (see also Ross and Nisbett, 1991). However, these experiments do not indicate that subjects are wrong about the contents of consciousness, such as perceptions or current beliefs; rather, subjects will mistakenly attribute certain mental states as *causes* to explain why they feel or act as they do. But it is important, when examining the role of introspection, to distinguish between reports about the contents of conscious states (such as perceptions, beliefs, desires, or emotions) and reports about the causes of those states (such as prior thoughts or experiences). To the extent we have direct access to conscious states, it applies to the former, while the latter will involve inferences about which we are often mistaken (see Flanagan, 1991, pp. 194-200, for useful distinctions between different types of self-knowledge). But experimental paradigms like Ericsson and Simon's, as well as Nisbett and Wilson's, demonstrate that the scope and accuracy of introspection is testable (and should be tested).

Advances in cognitive psychology have been fueled not only by giving up the limitations of introspectionism and behaviorism (including their shared view that neural states are generally irrelevant), but also by technological innovations that have allowed the measurement of neural states. EEG, EMG, PET, and fMRI provide measurements of such states that can be correlated and compared both with behavior and with verbal reports about the contents of consciousness. We can better test whether verbal reports, treated as *behavior* (Domain 3) are accurate reports of conscious experiences (Domain 1), by comparing and mapping their relations with biological activity (Domain 2) both between subjects and within the same subject over time. For instance, when blindsight patients report that they are not aware of stimuli they can nevertheless correctly identify when they guess, we can recognize that their reports are not confabulated, as we might suspect without knowledge of their specific neurophysiological damage. We can instead discover how their correct guesses result from unconscious visual processing -- that is, blindsight

(see Weiskrantz, 1997). And in Steve LaBerge's (1985) experiments on lucid dreaming, he can correlate the neurobiological signs that the subject is dreaming with her "reports" -- in the form of controlled eye movements -- that she is, at that time, experiencing a lucid dream.

In Shepard and Metzler's (1971) mental rotation experiments, they offer support for the hypothesis that subjects are consciously visualizing objects rotating by correlating the time it takes them to complete a rotation and the complexity of the given rotation. And a recent fMRI study on schizophrenics asks them to push and hold a button so long as they are hearing voices in their heads. Changes in neural activity correlate with the timing of the button pushing.<7> But again, the interesting results here are not the correlations between the objective measures -- the time reported to rotate the object and the complexity of the rotation, or the button pressing and the fMRI measurements. The interesting results involve what these objective measurements are meant to be measuring -- the subjective *experience* of visually rotating the shapes or of hearing voices in the head.

In these experiments, subjects' reports about their conscious experiences are corroborated with evidence observed by the experimenter, yet they are not interpreted as just another type of behavior observed by the experimenter. They are interpreted as reliable indicators of the experiences. Nonetheless, most cognitive psychology experiments maintain a behavioristic approach towards verbal reports, if nothing else because they usually keep the reports very short and simple (even to the point of button pushing). Often, researchers provide the subjects with a few written descriptions of the experiences from which to choose, such as the 1-7 ratings used in Marks's Vividness Questionnaire: "a rating of 7 = the image is perfectly clear" and "a rating of 1 = no image is present at all" (Lorenz and Neisser, 1985, p. 495). Shepard and Metzler, in their experiments, did not ask the subjects to describe their experiences of visualizing the rotations -- rather, they told the subjects what to do and measured the task objectively, even though the task itself was based on a hypothesis the researchers developed from their own introspections on how they visually rotated objects (below I will discuss hypothesis generation as an oft-overlooked but crucial role for careful introspection).

Cognitive psychologists thus seem to recognize, with the introspectionists, that the conscious mind is a central subject for experimental investigations, but under the influence of behaviorism's strictures on objectively observable measures, perhaps they have restricted their use of introspective reports too much.

4. Reconsidering Introspectionist Methodology

In 1913 Titchener wrote: "As for the ultimate goal of [psychology's] experimental endeavor, I suppose that we may call it the problem of *consciousness*.... The difficulty of this problem is enormous.... It is a problem for which we are not yet ripe.... But it is the problem towards which we are trending" (pp. 218-219). However, only a few years later

H.W. Chase (1917) wrote a summary of the year's work on "Consciousness and the Unconscious" in which he reports,

> There can be no question that consciousness is rapidly losing its standing as a respectable member of the psychologist's vocabulary. Titchener, in the preface to his new text, says: 'I have avoided the term 'consciousness.' Experimental psychology made a serious effort to give it a scientific meaning, but the attempt has failed, the word is too slippery, and so is better discarded.' (p. 7) <8>

Over the next fifty years explicit mention of consciousness (and introspection) did drop out of mainstream experimental psychology. As Titchener suggested, part of this trend (which he did not foresee) likely resulted in part from the "slipperiness" of the concept of consciousness and in part from the lack of knowledge about the brain.

But an interest in conscious processes (especially versus unconscious processes) reemerged with cognitive psychology beginning in the 1960s, and more recently, philosophers, psychologists, and neuroscientists have become fascinated with consciousness, including the "hard problem" of phenomenal consciousness, of how neural processes give rise to our experiences of "what it is like." One might even say, ninety years after Titchener, that many see the "ultimate goal of experimental endeavor" as explaining "the problem of *consciousness*." The problem is still enormous -- after all, a researcher bold enough to call his book *How the Mind Works* still laments, "consciousness is still a riddle wrapped in a mystery inside an enigma" (Pinker, 1997, p. 60). But surely it is a problem for which we are now more "ripe" given our new tools for studying brain and behavior, as well as our willingness to cross disciplinary boundaries to consider evidence from many fields (a practice which was difficult for early psychologists trying to *establish* the boundaries of their new science).

So, the question I want to consider is this: Given the new tools we have to test and correlate the conscious experiences reported by subjects, should we shake off the shackles of behaviorism and reconsider some of the introspectionists' methods and goals? Specifically, might it be worthwhile (1) to try to train subjects to attend more closely to their experiences and describe them more fully and accurately; (2) to try to develop a more precise language with which subjects can report the contents of conscious experience; and ultimately, (3) to try to map out the internal structure of conscious experience to better understand its relations to neural processes?

To approach these questions we should first avoid several potential road blocks. First, we should not assume that the methodology of introspectionism cannot be separated from its problematic philosophy, such as its inherent dualism or its views about the scope of psychology. The necessary correctives of the later schools of psychology can allow us to use introspection without assuming that it is the only method for studying the only target of psychological investigation. Indeed, even in studying consciousness, cognitive psychologists have had great success using animals, children, and subjects with brain damage. Second, we should not assume that, because introspection is not omniscient (we

cannot introspect on *all* of our mental states and processes), it therefore follows that we cannot introspect reliably on *any* of our mental states and processes. As I mentioned above, we should determine experimentally -- in part, by using introspection -- the scope of mental states about which we can become aware and report reliably.

Finally, we should not assume that the unresolved internal debates within the introspectionist movement are irresolvable, including debates about what precisely introspection is. For instance, we can study, rather than simply postulate, whether concurrent verbal reports are more reliable than retrospective reports (as did Ericsson and Simon, 1993). Indeed, I have not tried to offer a precise definition of introspection in part because I think it is a mental process which, like others, must be studied before it can be fully elucidated. For our purposes we can use Külpe's basic definition of "attentively experiencing a mental process" (1909, p. 9) -- that is, having subjects, as they perceive, act, feel emotions, make judgments, etc., pay attention to what it is like to experience these processes.

The first question, then, is whether it makes sense to return to training subjects to introspect for certain kinds of experiments on consciousness. We probably don't want to require, as Wundt did, that subjects practice over 10,000 separate introspections before they can participate in an experiment, nor will we want a 20-minute retrospective report about a 2-second stimulus (see Boring, 1953). These sorts of excesses led to the theory-laden introspection that undermined the project. Nonetheless, I believe the introspectionists were right to think of introspection as a *skill* that can be improved with training and practice. We know that learning to attend to features that otherwise go unnoticed improves our ability to make observational discriminations. Consider how you learn to notice whether a heavenly body is twinkling to determine whether it is a star or a planet. Attending to subtle differences in conscious experiences can similarly allow more precise discriminations among them. Consider how wine tasters learn to augment their gustatory discriminations by attending to their experiences more closely (notice also that they need to develop a vocabulary to describe their increased categories of taste and smell, a point I will return to shortly).

We generally have no need to describe our conscious experiences in detail, so we do not attend to subtle features of it, such as the duration of a stimulus, the contrast between two tones, our proprioceptive experience of muscle tension, or whether we are thinking in words or images. Introspectionists did succeed in demonstrating that our sensory discriminations far outstrip our language. Titchener pointed out, "the sense-organ can draw finer distinctions than are drawn by language: we can discriminate some 550 qualities of simple noise" (1898, p. 51). But why would we want to have subjects who could recognize such fine-grained distinctions?

One answer lies in the Holy Grail of discovering the correlations between conscious mental states and neural states. This task will require mapping the two domains to be correlated; the internal structure and relations *within* each domain must be understood in order to find the relations *between* the two domains. In chemistry, for instance, the elements had to be picked out before they could be arranged in the periodic table

according to their underlying physical structure. In biology the Linnaean system of classification, based on gross similarities, still serves as the starting point for the more accurate and fine-grained classification allowed by molecular taxonomy. We have been working hard to map the functional and structural relations of the nervous system, with incipient success. But since the demise of introspection, little has been done to map the structural relations of conscious experience, or to improve the method of introspection itself.<9>

William James (1892), lamenting that psychology had not developed any laws, wrote that "We don't even know the terms between which the elementary laws would obtain if we had them" (p. 335). Perhaps no such laws will be found. But if they are, they will not relate terms referring to experiences as complex as, say, pain with neural states as simple as, say, C-fiber firing. They will, instead, relate more specific aspects of pain, such as the frequency of the throbbing experience, with certain neural processes, such as the frequency of A-Delta fibers firing.<10> To study these relations, it will be essential to have subjects who can pick out the details of their experiences. Practice, repetitive trials, training to concentrate on certain perceptual features, as well as some assistance in how to describe these features, could be very useful for subjects asked to make these discriminations. Such training, in concert with measurements of neurobiological states and behavior, will improve our ability to map the contents of consciousness to the physical states that underlie them.<11>

Of course, some training and practice already occurs in psychological experiments, in the form of instructions to subjects and practice trials. But this direction of attention and development of skill is minimal. For instance, certain fMRI studies ask subjects to imagine a face or to imagine hearing a song. But why not train them to be more precise; for instance, to imagine the face of their mother in their right visual field to see if familiar faces activate different brain areas than fabricated faces or if visualized images activate the brain contra-laterally? With enough data on a subject (and with better scanning techniques), we could even examine a subject's brain activity and *predict* features of what she imagined to test against her own retrospective report about what precisely she imagined. With confidence that subjects knew what they were doing, we could also study which brain regions are active when they retrospect on a previous experience or when they concurrently introspect during a cognitive task.<12>

Another type of introspective practice already familiar to psychologists is the careful introspection some experimenters practice themselves, primarily when developing their hypotheses or experimental paradigms. I mentioned above that Shepard and Metzler developed their mental rotation experiments based on introspecting on their own experience. Even social psychologists (such as Nisbett and Wilson, discussed above) use their first-personal experiences to develop experiments aimed at showing the errors of first-person reports about the causes of behavior:

> Pick a generic situation; then *identify* and manipulate a situational or contextual variable that *intuition* or past research leads you to believe will make a difference (ideally, a variable whose impact you *think* most

> laypeople, or even most of your peers, somehow fail to appreciate), and see what happens....often the situational variable makes quite a bit of difference. (Ross and Nisbett, 1991, p. 4; my italics of the concepts I see as asking the researcher to introspect on his own experience)

And of course, in many experiments researchers offer subjects choices to describe conscious experiences, and these descriptions must come from somewhere -- presumably, from the researchers' own introspective experience. For instance, in an interesting study on the perspectives we take when we remember our past experiences, Nigro and Neisser (1985) give the subject three choices, which they developed based on their own experiences. The choices are (1) "observer memories," in which "you imagine the scene as an observer might see it. Such an observer would see *you* as well as other aspects of the situation"; (2) "field memories," in which "you imagine the scene from your original point of view, *not* as an external observer would see it"; or (3) "neither of the above" (p. 470). The results confirmed the researchers' three hypotheses, again formed from their own experiences of memory: that in fact people do take these two perspectives in remembering events, that they take the observer perspective more often when remembering emotional (rather than factual) experiences, and that they are more likely to take the observer perspective the more distant the memory is.<13> Perhaps developing subjects' abilities to discriminate and describe the nuances of their memories would allow us to discover differences in the neural processes involved in memory, relationships between visual perspective and what James called the "warmth and intimacy" of memory (1892, p. 25), or even methods for distinguishing veridical and false memories.

Finally, I imagine that subjects trained to introspect would, in the course of performing such experimental tasks, sometimes come up with their own interesting hypotheses to test -- that is, psychology could expand its sample size of researchers. This already seems to occur when researchers use post-experiment interviews (another disguised form of introspection) and subjects' retrospective reports provide details about their experiences that suggest further experiments.

I have offered some reasons to think that training subjects to introspect will improve our ability to understand consciousness and the relationship between conscious experiences, neural activity, and behavior. But such training would be ineffective unless subjects also learned how to report the nuances of their experiences, and this will involve developing a more fine-grained language of experience. Thomas Nagel ends his seminal essay, "What Is It Like to be a Bat?" (1974) with a "speculative proposal":

> It may be possible to approach the gap between subjective and objective from another direction. Setting aside temporarily the relation between the mind and the brain, we can pursue a more objective understanding of the mental in its own right... This should be regarded as a challenge to form *new concepts* and devise a *new method* -- an objective phenomenology.... Apart from its own interest, a phenomenology that is in this sense objective may permit questions about the physical basis of experience to assume a more intelligible form. Aspects of subjective experience that

> admitted this kind of objective description might be better candidates for objective explanations of a more familiar sort. (pp. 449-450; my italics)

Nagel's call for a new method may be answered in part by a return to the dismissed old method of trained introspection.<14> His call to form new concepts to describe "what it is like" to experience phenomena was also a part of this methodology. The introspectionists were interested in the project of developing a more objective and extensive language of the mental. As Titchener stated, "introspection demands an exact use of language. The terms chosen to describe the experience must be definite, sharp and concrete" (1898, p. 36). This is because, "The mental world, no less than the material, comes to us in the gross; mental phenomena are complex, often highly complex; we must reduce them to their elements, we must keep analyzing till we can analyze no further ... and then try to put those elements back again in their places to reconstruct the original experience" (p. 16).

As an example of the need for precise language for introspective reports, let's look at Benjamin Libet's (1985) famous experiments on the role of conscious will in voluntary action (an area that remains ripe for introspective methods).<15> Libet purports to show that, when subjects voluntarily move their fingers, unconscious neural activity (the readiness potential, RP) precedes by about half a second their conscious awareness of the desire to move the finger. Libet recognizes the importance of reliable introspective reports about the exact timing of the experienced "onset of the urge, desire, or decision to perform each such act" (p. 530). Exemplifying the attitudes of cognitive psychology I discussed above, he recognizes that the information provided by subjects' direct access to their subjective experience is "a primary phenomenon [that] cannot be defined in an a priori way by recourse to any external observable physical act" (p. 532). But he also realizes that he must "attempt to evaluate the accuracy of the introspective report ... by applying indirect controls, tests and converging operations" (p. 534).

However, Libet only "trains" his subjects to the limited extent that he tells them what to do and what to pay attention to: they are asked to "let the urge to act appear on its own" and attend to the time (a dot on a revolving clock face) when they experience "the *conscious awareness of 'wanting' to perform* a given self-initiated movement" (quoted in Wegner, 2002, p. 52). But, given the importance of determining the precise timing of the relevant conscious events, it would be helpful to know more about how the subjects experience this "wanting," alternatively described by Libet as an "urge," "desire," "decision," or "intention." What do these words mean for the subjects who are introspecting on their experiences and are their experiences just prior to action relevantly similar? When I discuss and "perform" this experiment with students, they describe quite different feelings, some reporting that they feel themselves initiate the movement, some that the urge comes upon them, and some that they feel the desire to move only *after* they move. To what extent are they experiencing their actions differently and to what extent do they lack the introspective experience and terminology to describe their actions?

Trying to clarify these points is essential given the way many have interpreted Libet's results as challenges to the role of consciousness in voluntary action, even to the

existence of free will (see Wegner, 2002). For instance, it is important to remember that subjects make a decision and form an intention to move their fingers well before they experience any "urge" to move (and well before the RP), because they consciously process and accept the instructions from the researchers. It would be helpful to have better introspective descriptions of the differences between this general intention to move and the specific urges to move and of the relations between them. In any case, Libet's work offers a good example of experiments in which introspection is essential and yet more precise language might help refine the methods and clarify the meaning of the results.

Finally, at this point some would object that the language used in introspective reports taints the "raw data" of the experiences described because the language is the product of a conceptual scheme (or model) used to interpret that data -- and more terms will just make matters worse. The response to this criticism is that there is no alternative. Language will be used one way or the other in experiments on consciousness, in subjects' verbal reports and in experimenters' verbal or written instructions.<16> The best we can do, as I have suggested, is to make the language as precise as possible and the introspection as reliable as possible, as tested against other types of data. I essentially agree with Jack and Shallice (2001), who propose that "the productive scientific use of introspective reports is that of *replacing* or *refining* the subject's model for understanding their own mental states... providing the *subject* with a well specified model for interpreting their own experience [and] *re-interpreting* the subject's reports in terms of testable functional theory" (p. 180). I would only emphasize that the process of refining the subject's model of their own experience should begin, as I think it must, with the subjects' (and researchers') introspections themselves -- just as a doctor's diagnosis of a patient's pain should begin with the patient's pain report.

5. Conclusion: Measuring Pain

I began this paper by discussing the new vital sign of pain reports because it presents us with a concrete example of the problems posed by verbal reports about the contents of consciousness -- and in an area of extreme practical importance. I want to conclude by raising this question: Do my suggestions for reconsidering introspectionist methodology have any practical application to understanding and measuring pain as a subjective conscious experience and to diagnosing and treating the objective causes of pain? The answer, of course, is a qualified yes.

In fact, the past quarter century has seen a burgeoning interest in the assessment and treatment of pain (as demonstrated by the proliferation of recent journals and books devoted to the study of pain).<17> A recurring theme in this body of work is that "there is no simple thermometer that can objectively record how much pain an individual experiences" (Turk and Melzack, 1992, p. 5). The "thermometer" of the 0-10 PPI (present pain intensity) scale, used for the fifth vital sign, offers some guidance for pain relief, but it does not capture many of the nuances of the "personal, subjective experience" of pain.

This is because pain is not a simple sensory state but is "influenced by cultural learning, the meaning of the situation, attention, and other psychological variables ... [and] it is a dynamic process that involves continuous interactions among complex ascending and descending systems" (Melzack and Katz, 1992, p. 152).

The experience of pain does not fit the standard philosophical portrayal of pain as a simple sensory quale, one that may perhaps be identified with one type of neural state (such as C-fiber firing). Rather, experiences of pain have motivational, emotional, and cognitive elements, and they do not correlate directly with nocicepter activity. The McGill Pain Questionnaire, developed in the 1970s, attempts to measure these other aspects of pain experience by using a scale of over 70 words, divided into sensory, affective, and evaluative categories. These words, such as "pulsing," "taut," "tiring," "annoying," and "piercing," were drawn from clinical literature and organized into sixteen categories and five levels of intensity based on surveys of physicians and other graduates. Hence, this questionnaire is much more substantial than intensity scales. But it was developed using only retrospective reports (often of other people's use of pain language) and without mapping the phenomenal categories to physiological measures. Pain researchers have thus relied on verbal reports, questionnaires, and interviews to map out the structure of pain experience, but perhaps they could go farther.

Though it may be asking too much to ask subjects to introspect attentively to repeated experiences of pain, perhaps such methods, again in concert with objective measures of stimuli, behavior, and physiology, could lead both to a more precise subjective language of pain and a better understanding of the relation between pain and its neurobiological causes. Researchers have already found that there are two pathways mediating pain experiences: the notorious C-fibers "identified" with Kripke, and the A-Delta fibers. C-fibers fire slowly and, not surprisingly, correlate with experiences of dull pain. A-Delta fibers fire rapidly and correlate with experiences of sharp pain.<18> A patient's report of pain, if refined according to these still quite vague categories of sharp and dull, instead of being restricted only to intensity, may help indicate what type of neural activity is occurring within him. In the case of pains without obvious causes (for instance, the frustratingly complex chronic back pain), increasingly precise reports could be a useful diagnostic tool for doctors. Despite the annoyance, the introspectionist doctor's method of examination could be more useful than the simplistic pain reports now required. Perhaps pain reports -- specified more fully through introspection -- could then serve as a reliable *instrument* for the doctor to help measure the patient's internal states, more like the other vital signs that serve as reliable instruments and the starting point for diagnoses.<19>

Notes

<1>. Indeed, one contemporary pain experiment involves inserting balloons into the rectums of the subjects (cheerleaders!) and blowing them up until the subject reports unbearable pain. This experience seems bad enough without having to concentrate on its every nuance. Reported by Richard Chapman at ASSC5 conference, Durham, June 2001.

<2>. Note, as I will discuss below, that my generalizations here should not be taken to suggest that all introspectionists worked under exactly these assumptions. I focus on Wundt, Titchener, and Külpe, but even these three disagree about many details. For more detailed discussions of the history of introspectionist psychology, including its diversity of views, see Danzinger (1980) and Boring (1953).

<3>. Compare this view to the behaviorists, who also assumed neurophysiological data was generally irrelevant to psychology, because even if the laws of behavior were subserved by neural events, the laws themselves could be discovered and described just in terms of relations between observable stimuli and observable behavior.

<4>. Though Watson was criticizing introspectionism for being akin to scholastic philosophy, note that the introspectionists were at least attempting to be systematic and scientific, rather than relying on a sample size of one, as do most philosophers who describe the nature of consciousness.

<5>. A series of tests developed in the 1940s and '50s tested the use of visual imagery by asking subjects to visualize objects and rank them on a scale for vivacity or to answer questions about how the objects would look under certain imagined manipulations -- e.g., the Gordon scale (1949) first asks subjects to form an image of a car, then to manipulate its color, position, or location, and then to answer "yes or no" about whether they succeeded in visualizing the manipulation (discussed in Lorenz and Neisser, 1985, p. 495).

<6>. I suggested above that the introspectionists were psycho-physical parallelists -- they see the events of Domain 1 (conscious experiences) as distinct from the physical events of Domains 2 and 3. The behaviorist, like Staddon, who believes consciousness (Domain 1) exists but cannot be studied, also seems to suggest that conscious mental states exist as distinct, epiphenomenal phenomena.

<7>. Reported by Chris Frith at ASSC5 conference, Durham, June 2001.

<8>. Note that between 1913 and the 1917 report, Watson had published his famous 1913 article. In 1904 William James suggested giving up the term "consciousness" in "Does 'consciousness' exist?" But it is important to note that he was arguing only against the substance dualism suggested by those "neo-Kantians" who suggest "consciousness" refers to a distinct entity: "Let me then immediately explain that I mean only to deny that the word stands for an entity, but to insist most emphatically that it does stand for a function.... That function is *knowing*" (p. 478).

<9>. Though I have neglected significant contributions made towards this goal by psychophysicists, phenomenologists, and Gestalt psychologists.

<10>. Similar experiments were discussed by Richard Chapman and Yoshio Nakamura in their talk, "Measuring Pain: An Introspective Look at Introspection" at ASSC5 conference, Durham, June 2001.

<11>. I have remained as neutral as possible in describing the metaphysical relationship between the conscious states and the physical states (e.g., whether it is best described in terms of identity or supervenience). I believe these metaphysical questions will also become more clear as the experimental correlations are improved, in part through using introspection.

<12>. These tests may be particularly interesting to study the growing field of "theory of mind," our ability to represent the mental states of others and ourselves to predict and explain actions, which sometimes involves deliberate introspection on our beliefs and desires.

<13>. I looked for such studies after developing the hypotheses based on my own introspection (and hoping, in vain, no one had studied it). When I asked my students about it, their introspective reports offered support for each for the hypotheses. Some, however, also made it clear that they had not noticed the phenomenon before, and only with my prompting (a mild form of training), did they readily identify it.

<14>. This goal has also been suggested, along with specific proposals, in Velmans (2000) and articles in Varela and Shear (1999), including Vermersch (1999).

<15>. Especially given the view, expressed by some psychologists, that our conscious will plays no conscious role in voluntary actions (see Wegner, 2002).

<16>. Furthermore, observations in other sciences are "tainted" by the language of a theory or model.

<17>. At least 15 journals on pain assessment and treatment are now in print, as well as several volumes on the measurement of pain (e.g. Turk and Melzack, 1992).

<18>. Discussed by Kenneth Sufka and Güven Güzeldere in "The Explanatory Gap and the Neurophysiology of Pain" at the Southern Society for Philosophy and Psychology, April, 2000.

<19>. For helpful suggestions, I would like to thank Güven Güzeldere, Cheryl Kopec Nahmias, and two anonymous reviewers.

References

Alston, W.P. (1972). Can psychology do without private data? *Behaviorism, 1*, 71-102.

Boring, E.G. (1929). *A history of experimental psychology.* New York: The Century Co.

Boring, E.G. (1942). *Sensation and perception in the history of experimental Psychology.* New York: Appleton-Century Co.

Boring, E.G. (1953). A history of introspection. *Psychological Bulletin, 50,* 169-189.

Chapman, R.C. and Nakamura, Y. (1999). A passion for the soul: An introduction to pain for consciousness researchers. *Consciousness and Cognition, 8,* 391-422.

Chase, H.W. (1917). Consciousness and the unconscious. *Psychological Bulletin, 14,* 7-11.

Chomsky, N. (1959). A review of B.F. Skinner's *Verbal Behavior*. *Language, 35,* 26-58.

Danzinger, K. (1980). The history of introspection reconsidered. *Journal of the History of the Behavioral Sciences, 16,* 241-262.

Ericsson, K.A. and Simon, H.A. (1993). *Protocol analysis: Verbal reports as data.* Cambridge: MIT Press.

Flanagan, O. (1991). *The science of the mind.* Cambridge: MIT Press.

Goldman, A.I. (1997). Science, publicity, and consciousness. *Philosophy of Science, 64,* 525-545.

Jack, I. and Shallice, T. (2001). Introspective physicalism as an approach to the science of consciousness. *Cognition, 79,* 161-196.

James, W. (1904). Does 'consciousness' exist? *The Journal of Philosophy, Psychology, and Scientific Methods, 1,* 477-491.

Külpe, O. (1909). *Outlines of Psychology,* E.B. Titchener (Trans.) New York: Macmillan.

LaBerge, S. (1985). *Lucid dreaming.* Los Angeles: Jeremy P. Tarcher.

Libet, B. (1985). Unconscious cerebral initiative and the role of conscious will in voluntary action. *The Behavioral and Brain Sciences, 8,* 529-566.

Lieberman, D.A. (1979). A (limited) call for a return to introspection. *American Psychologist, 34,* 319-333.

Lorenz, C. and Neisser, U. (1985). Factors of imagery and event recall. *Memory and Cognition, 13,* 494-500.

Melzack, R. and Katz, J. (1992). The McGill Pain Questionnaire: Appraisal and current status. In D.C. Turk and R. Melzack (Eds.), *Handbook of Pain Assessment.* New York: Guilford Press.

Nagel, T. (1974). What is it like to be a bat. *Philosophical Review, 83,* 435-450.

Neergaard, Lauran. (2000, December). Easing the pain: Hospitals told to treat patients' pain. *Associated Press.*

Nigro, G. and Neisser, U. (1983). Point of view in personal memories. *Cognitive Psychology, 15,* 467-482.

Nisbett, R.E. and Wilson, T.D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84,* 231-259.

Pekala, R.J. (1991). *Quantifying consciousness.* New York: Plenum Press.

Pinker, S. (1997). *How the mind works.* New York: Norton.

Robinson, D.N. (Ed.) (1977). *Wilhelm Wundt's lectures on human and animal psychology (Significant Contributions to the History of Psychology, 1750-1920).* Washington: University Publications of America.

Ross, L. and Nisbett, R. (1991). *The person and the situation: Perspectives of social psychology.* New York: McGraw Hill.

Shepard, R.N. and Metzler, J. (1971). Mental rotation of three-dimensional objects. *Science, 171,* 701-703.

Skinner, B.F. (1974). *About behaviorism.* New York: Alfred A. Knopf.

Titchener, E.B. (1898). *An outline of psychology.* New York: The Macmillan Co.

Titchener, E.B. (1912). Prolegomena to a study of introspection. *American Journal of Psychology, 23,* 427-448).

Titchener, E.B. (1913). The problems of experimental psychology. *American Journal of Psychology, 24,* 209-224.

Tolman, E.C. (1922). Concerning the sensation quality: A behavioristic account. *Psychological Review, 29,* 140-146.

Turk, D.C. and Melzack, R. (Eds.) (1992). *Handbook of Pain Assessment.* New York: Guilford Press.

Varela, F. and Shear, J. (1999). *The view from within: First-person methodologies for the study of consciousness.* Exeter: Imprint Academic.

Velmans, M. (Ed.) (2000). *Investigating phenomenal consciousness: New methodologies and maps.* Philadelphia: J. Benjamins Co.

Vermersch, P. (1999). Introspection as practice. *Journal of Consciousness Studies, 6,* 17-42.

Watson, J.B. (1913). Psychology as the behaviorist views it. *Psychological Review, 20,* 158-177.

Watson, J.B. and MacDougall, W. (1929). *The battle of behaviorism.* New York: Norton.

Weiskrantz, L. (1997). *Consciousness lost and found.* Oxford: Oxford University Press.

Wegner, D. (2002). *The illusion of conscious will.* Cambridge: MIT Press.

Zuriff, G.E. (1979). Covert events: the logical status of first-person reports. *The Psychological Record, 29,* 125-133.