Subjective vs. Objective Measures:
Here We Go Again

This essay recapitulates a missive by myself and Peter Hancock (Hoffman and Hancock, 2014) in which we channeled pioneer human factors psychologist Alphonse Chapanis (1965), to remind researchers of the importance of being careful about terminology.

I recap that previous work for two reasons. First, it appeared in an outlet not likely to be high on the radar of most technophiles (or applied cognitive scientists, for that matter). Second (and more importantly) the topic at hand is a bit of voodoo thinking that keeps re-emerging like zombie. I see the re-emergence just about every time a paper comes across my desk for reading or reviewing. I find it astonishing that scientists could be so under-educated about core concepts in the philosophy of science.

Cut to chase #1: All measures have both so-called subjective and so-called objective aspects.
Cut to chase #2: Just because a given person might have difficulty in giving you a good window into their thinking, that is not a reason to avoid even trying to open the window.
Cut to chase #3: Cognitive analysis and the analysis of performance (activity, or even neurons) are complementary, with each informing the other.

Let me start with the hardest of hard measures: the measurement of the hardness of a piece of metal. What is hardness? Surely this is a question for physicists, who are objective through and through. It turns out, there are a number of ways of measuring the hardness of an object, such as by dropping a steel ball onto it from a certain height and measuring its resultant deformation, or by trying to twist it, or by scratching it with a diamond. Yes, the different ways of measuring hardness really address different features or dimensions. Which measure is used depends on a number of factors of function and use. These are detailed in the annals of metrology. Hardness is, after all, a concept, conveniently fed to us as a single word by our language.

But that's not the point. Selection of a method for measuring the hardness of a substance, for one or another engineering purpose, depends on human choice. "All measurement is subjective in that human acts and judgments are involved in every step of the process of measurement" (Muckler, 1977, p. 169; see also Collins, 1992; Polanyi, 1958). *There is always a judgment reference group*. In the case of hardness, the reference group consists of many thousands of people, a knowledge base built up over decades, if not centuries. But what it all comes down to is the aggregation of a number of *judgments made by individuals*.

The zombie belief is that subjective measurement is limited, biased, fallible, etc. and *therefore* what one needs for research to qualify as REAL science is objective or behavioral or physiological data. I see this stance painfully often. Naive philosophy of science rules the roost. I blame graduate education. Barely a week goes by when I do not encounter a research report that describes some finding accompanied by an apology in saying that the data are "merely" subjective. For example, researchers might might express a preference for brain measurements rather than subjective evaluations of mental effort.

This is methodolatry: the worship of particular methods or approaches. It has been a zombie since the abdication of the nominally subjective, early in the previous century by Knight Dunlap, John Watson, and others. They argued the "behavioral attitude"—the exclusive reliance on so-called objective measures—would be psychology's entry pass into the Hallowed Hall of Hard Science.

The irony gets picante in perception research. One is hard pressed to find a single hypothesis or theory about some phenomenon (e.g., attention) that was not derived from the task reflections of the experimenters, couched using metaphors such as mental effort, or the paying of attention, or focused attention, or the attentional bottleneck (Hoffman, Cochran, & Nead, 1990). So, the subjective impressions of us degree-laden scientists are believed to be valid science—naturally—but the reflections of our hapless participants are taboo? How quickly both psychology and human factors seem to have forgotten the considerable discussions in the first part of the twentieth century about such crucial distinctions as among introspection, task reflection, and systematic post-experimental retrospection (see Ward, et al., 2019).

We routinely encounter research reports in which the discussion chews hypotheses about the cause of some or another "behavioral" finding, postulating all sorts of notions about what the participants might have thought or how they might have reasoned or what they might have perceived. And yet there is not even the slightest hint that the researchers ever bothered to ask the participants any questions after the experiment was over. This too reflects a lingering hangover from behaviorism as well as the devaluation of the participant.

The complementarity of subjective and objective data perhaps shows most clearly in the literature on cognition and eye movements. To be sure, there are circumstances in which eye movement analysis is informative (e.g., Gerstenberg, et al., 2017). But it is sometimes not entirely clear whether they eye movements inform about cognition, or a cognitive model is used to predict eye movements. Well, it's both. The problem is when researchers express a preference for eye movements over "verbal reports" because they believe that eye movements show what a person is attending to or thinking, whereas subjective reports are undesirable because they are fallible. Researchers pass over the many studies illustrating how the recording of useful eye movement data is, in fact, fallible.

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