The experimental psychologist’s fallacy

Geoff Bunn introduces a special issue marking the 150th Anniversary of Gustav Fechner’s Elements of Psychophysics

Considered by some psychologists to be the ‘founding father’ of experimental psychology, Gustav Fechner (1801–1887) was, to some extent, an uncompromisingly hard-nosed materialist. Yet there was also a more conciliatory and spiritual side to his thinking. In 1835, for example, in his Little Book on Life After Death, Fechner argued that consciousness can be sustained by different ontological systems. The work of many of the great psychologists has subsequently incorporated similarly antagonistic dualisms. But these ineradicable tensions are ultimately a function not of the idiosyncrasies of individual biography but of the highly ambiguous nature of psychological knowledge itself.

What are the implications of conceptualising psychological phenomena as having more in common with ‘marriage, money, or the monarchy’ (Kusch, 1999, p.1) than with bones, stones or hormones?

http://psychclassics.yorku.ca/Fechner/wozniak.htm

of having to confront practical problems during times of war and peace.

Barnard’s conclusion that psychology must always look ‘at how real minds behave in real domains of life’ is a sentiment that Frederic Bartlett (APU Director 1945–1951) would have vigorously agreed with. We publish in this issue, for the first time, extracts from an interview the late British Psychological

said Bartlett. ‘Or who fails to connect his psychological research and reflection with these other interests.’ Fechner and Wundt both embodied this sentiment, having deep philosophical commitments that went well beyond the severe confines of the experimental laboratory. Wundt devoted the last 20 years of his life to ‘Völkerpsychologie’, the study of language, myth and culture – entities that he considered to be too complex to be amenable to experimental manipulation (Danzig, 1990; Dinswahcher, 2004). And with his work on art, aesthetics and the ‘golden section’, Fechner founded another subdiscipline of psychology that is still exercising the creative imaginations of experimentalists.

Wundt and Fechner would both have agreed with Bartlett’s assertion that a good psychologist ‘has to be able to distinguish strongly between problems of process, which are causal, and problems of state which are analytic and descriptive. In particular the statistics adequate for the latter are not sufficient for the former.’ Alan Costall provocatively argues that one half of Bartlett’s balanced approach has lately been lost as a result of an increasingly restrictive ‘set of practices, rituals, and unexamined assumptions’ that have come to dominate experimental work. To counteract this regrettable state of affairs Costall proposes a rethinking of what a psychological experiment is, suggesting that experimental psychology could be enriched by a renewed emphasis on the role that subjectivity plays within the dialectic of the experimental encounter between investigator and participant.

An unusual science

Scholarship in the history of science has shown that the scientific revolution cannot be understood without taking human subjectivity into account (Shapin, 1994, 1996). By the end of the 17th century, an incredibly fecund mixture of metaphysical beliefs, experiments, social roles and embodied habits had enabled Kepler, Boyle, Hooke, Newton and others to formulate the scientific laws that are today associated with their names. The epistemological power of experimental methods was repeatedly demonstrated over subsequent centuries as natural philosophers progressively decoded nature’s secrets. André-Marie Ampère, Lord Kelvin and James Watt may never have met in person, but their eponymous units of measurement allowed different branches of empirical inquiry to coordinate and standardise their activities and together produce a profound knowledge of how the universe is put together.

The first generation of aspiring psychologists were rightly impressed with experimental philosophy’s ability to amass an increasingly precise knowledge of nature’s substances and properties. Would psychology be able to follow suit, perhaps by creating a psychological periodic table of elements classifying human attributes? Although the phrenologists had produced an extensive personological lexicon useful to the character-building ethos of the Victorian era, many mid-19th-century psychologists considered the association of ‘human kinds’ such as ‘amativeness’ or ‘self-esteem’ with bumps on the surface of the skull to be somewhat absurd. Psychology’s many subsequent attempts to base psychological categories on genetic, hormonal or neuronal foundations have proved repeatedly unsuccessful (Brown & Stenner, 2009). Why is this? The answer appears to be because ‘natural kinds’ and

Gustav Fechner

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Fechner's great achievement was to show how psychology could inaugurate a programme of systematic empirical inquiry without possessing either any standard units of measurement on the one hand, or without committing the psychologist's fallacy on the other. The task did not at all originally present itself as one of finding a unit of mental measurement; 'Fechner wrote, 'but rather as one of searching for a functional relationship between the physical and the psychical that would accurately express their general interdependence.' E.H. Weber (1795–1878) had recorded the amount of change in a physical stimulus that became noticeable to an experimental subject (the 'just noticeable difference'). Fechner proposed that sensation is proportional to the logarithm of the stimulus intensity. It is perhaps ironic that this promissory discovery (that is itself only true under certain circumstances) remains psychology's singular claim to having formulated a scientific law. Nevertheless, as Daniel N. Robinson explains in these pages, psychophysics remains the 'gold standard' for experimental psychology because the principles it has elucidated support mutual investigations across a variety of scientific disciplines.

Psychophysics very quickly became immensely influential as it provided a significant impetus to the establishment of psychology as an experimental science (Hornstein, 1988). The initial enthusiasm with which psychology took up psychophysical methods was perhaps matched only by its naivety. In 1898, British psychologists Charles Myers, W.H.R. Rivers and William McDougall embarked on the famous Cambridge Anthropological Expedition to the Torres Strait (see Herle & Rouse, 1998). One of the aims was to test the islanders' perceptual abilities using the latest psychophysical apparatus. In his analysis of the expedition's reports, Graham Richards shows that psychological experiments are embedded within often unarticulated frameworks of understanding. That experimenters and subjects rarely share the same assumptions is of secondary importance compared to the fact that the subjectivities of all the participants in any psychological experiment can never be entirely eliminated. As Saul Rosenzweig perceptively put it nearly 80 years ago, the experimental situation itself is a psychological problem (Rosenzweig, 1933).

The Torres Straits researchers learned the hard way how difficult it is to control for situational and intentional factors when experimenting on the human mind. But whether experimenters should aim to systematically eliminate subjectivity is a moot point. In his work on the history of psychology's engagement with magic Peter Lamont concludes 'that experimental methods do not compensate for a superficial understanding of an enormous range of situational practices, and that even the most up-to-date technology does not necessarily provide better knowledge in matters of complex human interaction’. As Bartlett put it: 'There are no psychological experiments in which the conditions are all under control. In which one condition can be varied independently of the rest, or even in which the concomitant variation of two specified conditions alone can be arranged and considered. This means that every good psychologist must be wise as well as technically efficient.' Needless to say, while the establishment of efficiency may be a matter of employing the appropriate methods, the acquisition of wisdom may be more elusive.

Fechner was efficient and wise in equal measure. His ‘epoch-making work’ cast a long shadow over psychology. A glance at Charles Myers' *Text-book of Experimental Psychology* (Myers, 1900) shows that 50 years after the publication of the *Elemente der Psychophysik*, psychology in some quarters was virtually synonymous with the tight focus of ‘brass instrument’ psychophysics. But this is not to say that the momentary triumph of psychophysics was unequivocal. Conceptual confusion over the meaning of sensation proved troublesome to the nascent discipline. By the time Wundt had opened his famous psychological laboratory at Leipzig in 1879 it was widely argued that psychophysical measurement referred to mental judgements, not to sensation per se (Smith, 1997, p.505). As late as 1913 the British Psychological Society, the Aristotelian Society and the Mind Association held a joint meeting in London to ask an apparently rather fundamental question: ‘Are the intensity differences of sensation quantitative?’ (Myers et al., 1913). Although Myers argued that ‘a thorough familiarity with the practice of psychophysical methods is essential for reliable systematic psychological investigations of any kind’, he also believed that ‘introspection should never be omitted in a psychological experiment’ (Quoted in Hearnshaw, 1964, p.174). On the eve of the centenary of the publication of the *Elemente*, a somewhat defensive Bartlett stated that there was ‘no compelling reason why all experiments should be shaped to the conventional forms of the psychophysical methods’. In fact, not only were Fechner and Wundt also both extremely ambivalent about psychology’s use of the experimental method but neither wanted to create an independent discipline of psychology. Wundt considered the experimental method to be useful only for elucidating very basic psychological mechanisms; more complex psychological capacities he suggested required investigation by essentially qualitative methods. William James touched on Fechner’s binary sympathies when he described him as being ‘at once simple and shrewd, a mystic and an experimentalist, homely and daring, and as loyal to facts as to his theories’ (quoted in Flugel, 1933, p.161). Obsessed with the dialectical relationships between *Nachtansicht* (night view) and *Tagansicht* (day view), and between ‘inner psychophysics’ and ‘outer psychophysics’, Fechner’s philosophy encapsulated the tension between the
mind and the body. He invoked an analogy of two clocks telling the same time, not to illustrate psychophysical parallelism (the doctrine that the mind and the body operate in parallel) but to argue for panpsychism (mind is ubiquitous in nature). Body and mind according to Fechner cannot but be synchronised because both are powered by a profound universal animism.

By 1830 Fechner had published over 40 articles on physics, including important work on the quantitative measurement of electric current. He was appointed professor of physics at Leipzig when he was only 33. But after losing his sight as a result of studying afterimages by staring at the sun, he suffered what William James later diagnosed as a ‘habit neurosis’. In 1843, after three years of living with his eyes wrapped in bandages, he found his vision restored and claimed to be able to see flowers’ souls (Green Musselman, 2006, p.124). Following his recovery he became even more convinced of the limitations of scientific materialism. Over the course of his life he returned again and again to numinous themes, writing mystical tracts under the pseudonym ‘Dr Mises’. In 1825 he had argued that angels must be spherical beings because the sphere was the most perfect geometrical form. In 1851 he published Zend-Avesta, Or Concerning Matters of Heaven and the World to Come, a book that ‘bears an ancestral relation to experimental psychology’ (Boring, 1950, p.279).

This all too brief survey of the history of psychophysics has revealed psychology to be a rather unusual science. It has no units of measurement of its own – no ‘Fechner’s’, ‘Wundts’ or ‘Edgells’, for example (Trendler, 2010), although Clark Hull in his Principles of Behavior (1943) proposed the war and the pay as measures of ‘reaction potential’ and ‘inhibition’ respectively; nor has it any scientific laws to speak of, even in the experimental-dominated field of memory research (Roediger, 2008). Thanks in part to Fechner, psychology’s idiosyncratic definition of measurement is quite unlike the traditional one used by the physical sciences (Mitchell, 1997). And if it is the case that psychological categories are internalised ontologically historical (i.e. social, cultural and political) entities as opposed to being part of an external universal nature (Danziger, 1997; Smith, 2005), then it is surely not meaningful to speak of psychology being in the business of scientific ‘discovery’. Despite these eccentricities, Psychology continues to advance a systematic knowledge of what it means to be human.

More than any other area of psychology, psychophysics has confronted our chief conundrum: the nature of the relationship between the mind and the body. The history of psychophysics demonstrates, perhaps more starkly than any other area of our science, that the subjective is an ineradicable element in all psychology. As psychologists, we will always have to face an irreducible and irresolvable set of essential tensions between the mind and the body; between process and structure, between efficiency and wisdom, between the empirical and the hermeneutic, and between the quantitative and the qualitative. The way to avoid committing the ‘psychologist’s fallacy’, as all the great psychologists knew, is to accept them.

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