

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.

It apparently came to him in a dream. On the morning of 22 October 1850, a middle-aged German professor of physics was lying in bed worrying about the mind–body problem. He had only recently recovered from a nervous collapse that had lasted three years and had temporarily blinded him. His most recent work had been an examination of the mental life of plants. Now he was about to publish a book called *Zend-Avesta, Or Concerning Matters of Heaven and the World to Come*. As he later recalled, he now realised that the thing to do was to make 'the relative increase of bodily energy the measure of the increase of the corresponding mental intensity'. This was this insight that inspired Gustav Fechner to initiate the paradigm-shifting programme of work that became known as psychophysics.

'One may call him the 'founder' of experimental psychology', wrote historian of psychology E.G. Boring of Fechner (1801–1887), 'or one may assign that title to Wundt. It does not matter. Fechner had a fertile idea which grew and brought forth fruit abundantly.' (Boring, 1950, p.295). As we shall see, not only have some of these fruits proved difficult to harvest but their taste might be described as bittersweet.

In this special issue of *The Psychologist* we celebrate the 150-year anniversary of the publication of that 'epoch-making work' (Boring, 1950, p.295), the *Elements of Psychophysics*. Although many psychologists will know his famous law and the three basic experimental procedures he devised, few perhaps will be aware of what an intriguingly complex

person Fechner was. The empirical and philosophical issues he grappled with are still very much with us. In this special issue, expertly assembled by Julie Perks, we offer a variety of perspectives on Fechner's legacy to psychology. Daniel N. Robinson explains how some of the philosophical and practical difficulties Fechner overcame led to the fulfilment of Kant's prophecy in the *Critique of Pure Reason* (1787) that psychology would eventually have 'an establishment of its own'. David K. Robinson shows how Fechner's work in turn inspired Wundt's own experimental programme. Whereas for Fechner psychophysics was nothing less than a method for discerning the relationship between matter and mind, Wundt believed that it was merely a useful way of undertaking sensory physiology. Peter Lamont revisits research by Jastrow, Binet and Triplett to recount a little-known but telling story about psychology's entanglements with magic. In his account of the 1898 Cambridge anthropological expedition to the islands of the Torres Strait, Graham Richards reflects on psychology's loss of innocence and draws nine methodological lessons about the performance and write up of psychological experiments.

Liz Valentine describes the work of three female British psychologists – Beatrice Edgell, Victoria Hazlitt and May Smith – during the first half of the 20th century. At a time when it was considered unnatural for women to pursue independent careers, these women made what can be appropriately described as heroic contributions to the development of experimental psychology in Britain. What is striking about many of the essays in this special issue is the repeated finding that experiments cannot be properly understood without a knowledge of the wider social, cultural and historical contexts in which they were undertaken. In his overview of some notable triumphs of the Applied Psychology Unit in Cambridge for example, Philip Barnard shows how experimental and theoretical work has always thrived on the challenge

question

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?

resources

www.psychology.heacademy.ac.uk/networks/chip/resources.asp
<http://psychclassics.yorku.ca/Fechner/wozniak.htm>

references

- Boring, E.G. (1950). *A history of experimental psychology*. New York: Appleton-Century-Crofts.
- Brown, S.D. & Stenner, P. (2009). *Psychology without foundations: History, philosophy and psychosocial theory*. London: Sage.
- Brinkmann, S. (2005). Human kinds and looping effects in psychology: Foucauldian and hermeneutic perspectives. *Theory & Psychology*, 15, 769–791.
- Danziger, K. (1990). *Constructing the subject: Historical origins of psychological research*. Cambridge: Cambridge University Press.
- Danziger, K. (1997). *Naming the mind: How psychology found its language*. London: Sage.
- Diriwächter, R. (2004). Völkerpsychologie: The synthesis that never was. *Culture & Psychology*, 10(1), 85–109.
- Flugel, J.C. (1933). *A hundred years of psychology, 1833–1933*. London: Duckworth.
- Green Musselman, E. (2006). *Nervous conditions: Science and the body politic in early industrial Britain*. Albany, NY: State University of New York Press.
- Hearnshaw, L.S. (1964). *A short history of British psychology, 1840–1940*. London: Methuen & Co.
- Herle, A. & Rouse, S. (1998). *Cambridge and the Torres Strait: Centenary essays on the 1898 anthropological expedition*. Cambridge: Cambridge University Press.
- Hornstein, G.A. (1988). Quantifying psychological phenomena. In J.G. Morawski (Ed.) *The rise of experimentation in American psychology* (pp.1–34). New Haven, CT: Yale University Press.
- Kusch, M. (1999). *Psychological*

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 (Danziger, 1990; Diriwächter, 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 structure, 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

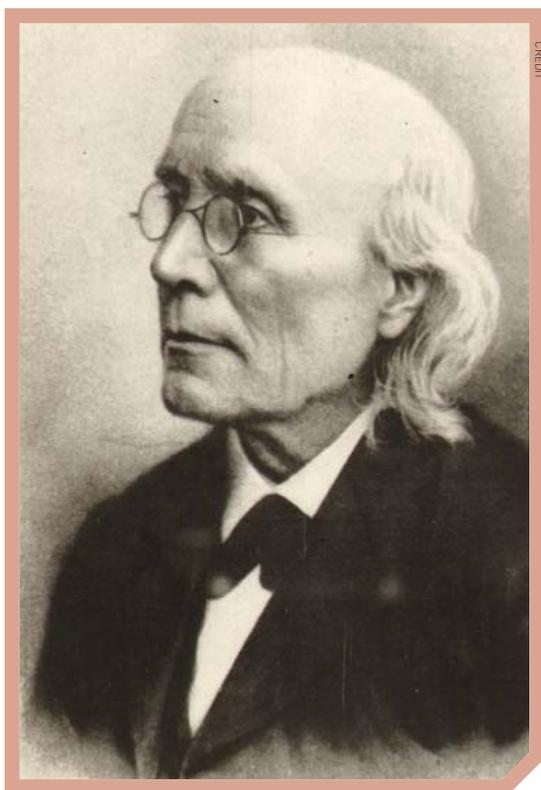
state of affairs Costall proposes a rethinking of what a psychological experiment is, suggesting that experimental psychology could be enriched by a renewed emphasis on the

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 scientists considered the association of 'human kinds' such as 'amateness' 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

Society archivist Jack Kenna conducted with Bartlett in 1959. 'There never has been and there never will be a good psychologist who has not got a number of lively interests outside of psychology itself'

knowledge: *A social history and philosophy*. London: Routledge.
Leary, D.E. (1990). The psychologist's dilemma: To subject the self to science – or science to the self? *Theoretical & Philosophical Psychology* 10(2), 66–72.
Martin, J. & Sugarman, J. (2001). Interpreting human kinds: Beginnings of a hermeneutic psychology. *Theory & Psychology*, 11, 193–207.

Michell, J. (1997). Quantitative science and the definition of 'measurement' in psychology. *British Journal of Psychology*, 88(3), 355–383.
Myers, C.S. (1909). *A text-book of experimental psychology*. London: Arnold.
Myers, C.S., Dawes Hicks, G., Watt, H.J. & Brown, W. (1913). Are the intensity differences of sensation quantitative? *British Journal of Psychology*, 6, 137–189.

Roediger, H.L. (2008). Why the laws of memory vanished. *Annual Review of Psychology*, 59, 225–254.
Rosenzweig, S. (1933). The experimental situation as a psychological problem. *Psychological Review*, 40, 337–354.
Shapin, S. (1994). *A social history of truth: Civility and science in seventeenth-century England*. Chicago: University of Chicago Press.
Shapin, S. (1996). *The scientific revolution*.

Chicago: University of Chicago Press.
Smith, R. (1997). *The Fontana history of the human sciences*. London: Fontana.
Smith, R. (2005). The history of psychological categories. *Studies in the History and Philosophy of the Biological & Biomedical Sciences*, 36, 55–94.
Trendler, G. (2009). Measurement theory, psychology and the revolution that cannot happen. *Theory & Psychology*, 19, 579–599.

'human kinds' are ontologically dissimilar entities (Brinkmann, 2005; Martin & Sugarman, 2001; Smith, 2005). Comparing human kinds with natural kinds is less like comparing apples and oranges than it is akin to comparing apples with unemployment. To confuse the analysis of subjective experience with that of objective reality is to commit what William James called 'the psychologist's fallacy' (Leary, 1990).

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

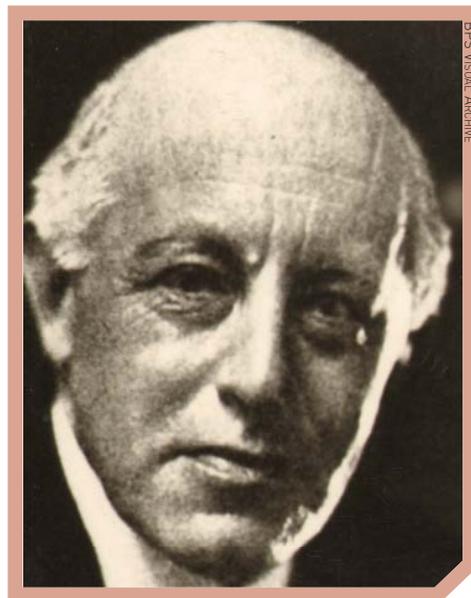
subjects rarely share the same assumptions is of secondary importance compared to the fact that the subjectivities of all the participants in any psychological experiment can never be entirely eliminated. As Saul Rosenzweig perceptively put it nearly 80 years ago, the experimental situation is itself 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

"Fechner's philosophy encapsulated the tension between the mind and body"

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, 1909) 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 Aristotelean



Charles Myers

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 *Nachtsicht* (night view) and *Tagesansicht* (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 'Fechners', 'Wundts' or 'Edgells', for example (Trendler, 2010), although Clark Hull in his *Principles of Behavior* (1943) proposed the *wat* and the *pav* as measures of 'reaction potential' and 'inhibition' respectively; nor has it any scientific laws to speak of, even in the experiment-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.

Dr Geoff Bunn is Senior Lecture in Psychology at the Manchester Metropolitan University and Chair of the BPS History & Philosophy of Psychology Section

Supervision Skills for Complex Cases

Royal Hampshire County Hospital

Winchester – 3rd Dec 2010

Teaching Clients to use Mindfulness Skills

British Psychological Society – London

15th Jan 2011

Cardiff University

12th Feb 2011

Leeds University

12th March 2011

(early booking advised as this workshop has sold out at London, Glasgow and Winchester)

These workshops are aimed at Mental Health Practitioners and contribute towards **BABCP CPD**

Brought to you in partnership between

Stanton Psychological Services Ltd and Grayrock Ltd

For details visit

www.stantonltd.co.uk or www.grayrock.co.uk

Programme from April 2011

16.04.11	Birmingham	Mindfulness Skills
23.05.11	London	Emotion Tolerance
18.06.11	Winchester	Mindfulness Skills
23.06.11	Glasgow	Emotion Tolerance
25.06.11	Edinburgh	Mindfulness Skills
19.09.11	London	Mindfulness Skills
22.10.11	Cambridge	Mindfulness Skills
18.11.11	Newcastle	Emotion Tolerance
19.11.11	Newcastle	Supervision Skills
02.12.11	Winchester	Emotion Tolerance