

# Learning from Heisenberg

David Pilgrim considers vitalism and other explanations of what it is to be human

In the recent popular morality tale of TV's *Breaking Bad*, its main character, Walter White, starts the script in the role of an earnest science teacher, who tells a student confidently: 'The soul? There's nothing but chemistry here.'

However, within a few episodes we are taken through a series of subplots that are peculiarly human: facing and seeking to evade premature death from cancer; living with physical impairments; the iniquities of healthcare systems; ingenious criminal masterminds; the illicit drug trade and the unending criminality it spawns; elaborate deceit and self-deceit; the casual capacity of people to kill one another; and the role of contingent social conditions in our decision making, which render predictability in human affairs highly problematic. By the time that the conformist chemistry teacher Walter White becomes the Machiavellian 'Heisenberg', all of these aspects of being human and more are explored.

## Religion, Romanticism and reductionism

Heisenberg (the real physicist) was part of a group exploring indeterminacy not long after their colleagues in biology had developed the deterministic orthodoxy of physicalism. The latter had seemingly slain the dragon of vitalism. Vitalists claimed that life was characterised uniquely. Indeed they suggested two

discontinuities: life forms were different from the rest of the world, and human life was peculiar.

By contrast, in the 18th century Julien Offray de La Mettrie had famously argued the physicalist case: all forms of matter and events in the world were governed, and could be explained, by exactly the same physico-chemical mechanisms (Vartanian, 1960). Basically, the notion of 'man the machine' defied pre-Enlightenment religious dogma. The



German theoretical physicist Werner Heisenberg – originator of the 'uncertainty principle'

Abrahamic traditions insisted that God gave and took away life, humans had unique souls and they exercised moment-to-moment free will as autonomous moral agents.

The scientific rationalism of the Enlightenment also met another form of ideological opposition from Romanticism. Although this predominated in artistic circles, it remained influential in the healing trades well into modernity and is present still in 'alternative' medicine and much of the psychotherapeutic tradition (Pilgrim, 2016). Romanticism and religion, apart and together, held a clear line about creative vitality and free will. These attributes required the vehicle of a choosing, purposeful and unique individual soul.

Vitalism then had strong allies. Moreover, whilst antiquarian philosophy might be used routinely to adjudicate on profound metaphysical questions, both the reductionist case of physicalism and the vitalism preferred by the religious and the Romantics, found their supporters.

For example, the ancient Indian and Greek atomists favoured reductionism, whereas Aristotle in his *Metaphysics* offered us vitalism.

A resolution about the vitalism question certainly did not come from natural science itself. One camp, which was the emerging orthodoxy, seemed to be providing the empirical evidence for La Mettrie's physicalism. For example, the doyen of medical anatomy and physiology Claude Bernard was leading the evidence-based charge against vitalism in the mid-19th century (Bernard, 1974). Physicalism was also supported by the emergence of organic chemistry. Attempting the laboratory synthesis of ammonium cyanate, Frederick Wöhler produced urea, a key component of urine (Wöhler, 1828).

However, others associated with progress in natural science remained adamant that a life force given by God

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defined human nature. These included the Swedish chemist Jacob Berzelius, who identified carbon-based compounds, and Louis Pasteur, an admirer and friend of Bernard. These set a trend, still evident today, of scientists who retain a religious faith (Driesch, 1914; Sheldrake, 1991).

### Emergent evolutionism, organicism and holism

However, physicalism was under attack from the non-religious as well. For example, the evolutionary biologist J.B.S. Haldane, though not a vitalist (he was an atheist and Marxist), argued that living organisms were self-regulating and goal-orientated in their development and search for survival. This idea of life reaching forward for itself (teleology) was closely linked to the very logic of vitalism that so offended the physicalists.

In psychology the term 'emergent evolution' was coined by C. Lloyd Morgan (1923) to point up the emergence of reflective consciousness in human beings. The higher mental functions of people meant that for Lloyd Morgan behaviourism was an inadequate and reductive framework to understand human conduct, as were explanations focusing on the neural substrate of the mind.

The latter relationship was also the focus at the time of Sigmund Freud and his revised theory, and yet he still maintained a version of vitalism (Freud 1920). Freud and all of his psychodynamic tradition retained some notion of an inherent living force (the *Id* and then *Eros*), with him adding in the counter-force of *Thanatos* after witnessing the slaughter of the Great War.

In the early 20th century, organicism also provided a new way of thinking about the vitalist vs. reductionist controversy. It supposed the real challenge facing science was how to define life in general, and human life in particular, not by its *source* (purported or proven) but by its empirical *character*, especially if the reality of life is complex, layered and in dynamic flux. The idea that the whole is greater than the sum of its parts was traceable to Plato. However, holism in modern science was emerging because the mechanistic and reductionist assumptions in the laboratory were being questioned by many scientists themselves.

Holism was anti-reductionist and the case for respecting complexity and uncertainty was made in relation to open systems by those scientists who drew attention to the atypical isolated status of



Gaia hypothesis, developed by the chemist James Lovelock and the biologist Lynn Margulis

the laboratory. In the latter, 'variables' were not simply controlled, they were controlled out – a partial account of reality was logically inevitable. By controlling living reality in order to study it, experimentalism was obscuring, not illuminating, its full fluid complexity.

From this primary critical insight about closed or isolated systems, general systems theory was born (von Bertalanffy, 1969). For this theory our material base was a necessary but not sufficient condition for understanding human complexity. Moreover, all living systems contained emergent and dynamic qualities. This insight did not require a supernatural role but could reconcile (multiple) generative mechanisms in principle with indeterminism in practice.

An example of this was the work of Humberto Maturana and Francisco Varela, who elaborated a case for the special features of living systems ('autopoiesis'), while retaining a non-vitalist account (Maturana & Varela, 1980).

Another example of this form of reasoning was the Gaia hypothesis, developed by the chemist James Lovelock and the biologist Lynn Margulis. This opened up for scrutiny the (mal)adaptive role of human action within the world's ecosystem (Lovelock & Margulis, 1974). Holism in human science during this period of the mid-20th century was also

being advocated by Gregory Bateson (1972) and the polymath Arthur Koestler, who offered yet another materialistic account of non-reductionism, when understanding human complexity and creativity (Koestler, 1967).

These anti-reductionist forms of scientific reasoning posed a deeper question beyond that of vitalism. Open systems in practice were found to have patterns that broadly connected through time and space. However, they were also unpredictable. Increasingly *prediction* (the old aspiration of experimentalism) had to be replaced by the more humble, but now realistic *probability*; this brings us back to Heisenberg.

### The legacy and aftermath

If we reflect on the arguments about vitalism and physicalism, with the benefit of hindsight, then some summary points include the following.

First, *the biological bases of our experience and behaviour* reflect a mixture of continuity and discontinuity. For example, we are animate not inanimate beings but physical processes constrain our functioning and viability, culminating in our predictable and quick individual death in the context of world time. During the brief time we are alive we are constituted by cells containing organelles like all living matter, which enable the process of replication or reproduction of both our tissues and our separate offspring. This is a discontinuity from the

"all living systems contained emergent and dynamic qualities"

## Looking back

inanimate world; a fuzzy continuity is that viruses contain nucleic material but not organelles and so they cannot reproduce themselves without the aid of another organism.

Another evident continuity is that basic drives and needs evident in other primates are present as well in humans. Human psychology cannot be conflated with primatology but it still has much to learn from the latter.

Second, there is *our loss of confidence in reductionism*. The latter may have been the scientific orthodoxy at the start of the 20th century, but in more recent times anti-reductionism has held sway in the wake of both organicism and postmodernism. The former of these has left its mark in relation to general systems theory, chaos theory and complexity theory, and the latter in relation to the 'linguistic turn', not just in human sciences but in the arts and humanities in general. However, neuroscience represents the continuation of the physicalist tradition and is now appealing to some psychologists, even though it relies on

isolated, not open, system reasoning (HBP-PS Consortium, 2012).

Third, the notion of *reflexive human agency and intentionality* has remained a concern of moral philosophy but is also evident in cognitive science, where it is reframed as meta-communication: what Gregory Bateson called 'communication about communication'. By codifying the world, social groups produce relatively stable moral orders. Norms, mores and legal codes are understood by those socialised in a particular human society at a particular point in time. These become a framework for conformity and transgression, with language being a particular resource for highly elaborate deceit and self-deceit, as well as the emergence of subtle emotions like guilt and shame.

As for technologies, we are not the only primate with an oppositional thumb to enable a precision grip, and even some birds use tools. However, other species have not produced anything approximating to a wristwatch, a pearl

necklace, a computer, a poem, a concentration camp or a nuclear warhead. These artefacts required imagined futures, not just technical competencies.

Fourth, *we act as if we are agents with free will*. Even if vitalism is dismissed fundamentally as being implausible, and physicalist accounts are preferred, we all still live in a world in which free will and moral responsibility are taken for granted. We are obliged then to take vitalism seriously as a practical psychological question. For example, the moral codes we live by assume the presence of human agency and personal responsibility; otherwise why do we blame ourselves and one another and why do we send criminals to jail? The way we construe our lives has a psychological reality in our inner worlds and can impact on the external world in our practical actions, which can, in large or small ways, change or reproduce our shared outer reality.

It seems that a century ago the death of vitalism was prematurely reported.

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"the way we construe our lives has a psychological reality in inner worlds"

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