Reclaiming a Life of Quality

Brian Goodwin

This article by Brian Goodwin summarises his views on the importance of a science of qualities, to which he devoted much thought. It has an interesting resonance with the previous article and could readily be translated into these terms. See also his last book, ***Nature's Due****.*

The disappearance of organisms from contemporary biology and the absence of mind from neuroscience are, I believe, both connected with a deep conceptual and methodological feature of Western Science. Cartesian dualism and a reductionist methodology contribute to the replacement of organisms by genetic networks and minds by neural networks. However, these divide-and-conquer strategies that are so effective at revealing the component parts of complex systems are themselves related to a more profound axiom that is often not even recognised as an assumption. This relates to the status of subjective experience in the study of natural processes. Galileo assumed that reliable data for scientific statements about natural phenomena are restricted to measurable quantities such as mass, velocity, temperature, volume, and so on. Such 'primary qualities', as John Locke was later to call them, contrast with 'secondary qualities' such as the experience of colour, odour, pleasure or pain, which were considered to be purely subjective aspects of human experience, arbitrarily variable between individuals and therefore unsuitable as descriptors of real natural process.

However, primary qualities originate in human experience of force, weight, motion, etc., and so are also initially subjective. They become 'objective' only by a process of intersubjective consensus whereby subjects compare systematically the results of specific observations which become known as measurement. Once such a methodology has become established within a community of practitioners, the role of subjective experience tends to recede into the background, replaced by measuring devices which substitute for human judgement and turn observation into something regarded as real and reliable. Experience is thus withdrawn from the objectively real and the world of scientific enquiry takes on the characteristics of non-sentient matter in motion, defined as activity without experience. The result is the real world posited in modern science.

The resulting metaphysics and methodology work well in the study of non-living processes, up to a point. However, they run into severe difficulties in the study of life. Simply put, we know that we humans experience qualities such as pleasure and pain, or the colour and perfume of a flower. We have such experiences through our bodies and are consciously aware through our minds. These are two aspects of one unity, the organism. But we assume that life has evolved from non-sentient matter in motion. The result is a logical conundrum: How can experiencing subjects arise from non-sentient matter? This question has no logically consistent answer except to deny the reality of experience, a very high price to pay for particular assumptions about 'reality'. Is there not another way in which we can simultaneously preserve the deep insights that have come from modern science and save our experience as organisms with body-minds that give us feelings and awareness?

One way of approaching a resolution to this dilemma is to go back to the distinction made in science between primary and secondary qualities, the former real, the latter in some sense illusory. The argument that I shall pursue here will take the following form. Organisms are wholes that are centres of agency. To live is to act intentionally, to discriminate and to experience. To accommodate within science an understanding of the life with which we as organisms are familiar it is necessary to acknowledge the reality of qualitative experience. This leads to an expanded conception of science that preserves all that is of value in our tradition of exploring reality but avoids the unfortunate conclusion that some of our deepest experiences are in some sense unreal.

Organisms as Causally Efficacious Wholes with Agency

Organisms have disappeared as fundamental entities, as basic unities, from contemporary biology because they have no real status as centres of causal agency. Organisms are now considered to be generated by the genes they contain. These genes have been selected by the external forces of natural selection acting on the functional properties, or characters, that allow the organism to survive and reproduce more of its kind in a particular habitat. Thus organisms are arbitrary aggregates of characters, generated by genes, which collectively pass the survival test in a particular environment. The characters clearly cohere within the physical body which they define, but there is no causally efficacious unity that transcends the properties of the interacting parts. This is the sense in which organisms have disappeared from biology.

What would it mean for organisms to have causal efficacy above and beyond that of their interacting parts? A definition of this concept is given by Silberstein (1998) in his discussion of emergent properties: 'qualitatively new properties of systems or wholes that possess causal capacities that are not reducible to any of the causal capacities of the parts.' One approach to the question of such properties in organisms is to provide a systematic account of the relationships between parts and whole during the development of the adult form of an organism from a zygote (a fertilised egg). It can be shown that organisms are more than functional unities in which the parts exist for one another in the performance of a particular function or set of functions, as in a machine. They are also structural unities in which the parts exist for and by means of one another, to use Kant's descriptive phrase.

That is to say, the component parts of an organism arise from an undifferentiated unity, the zygote, by the progressive emergence of distinct structures during the course of embryonic development (morphogenesis). The initial unity of the organism is maintained throughout this process and into the adult form as a condition of dynamic coherence. The traditional literature on embryonic development conforms to this view (see, e.g., Waddington, 1956, Berrill, 1972). A detailed description of morphogenesis as the emergence of integrated wholes, articulated for a variety of different types of organism and different aspects of embryonic development, is given in Webster and Goodwin(1996). I will not present details of the argument here, but simply point to this evidence that organisms are generated as causally efficacious unities, and the type of theory that is required to account for it.

What about the claim that organisms are intentional agents? A detailed argument elaborating on this concept can be found in Kauffman (1999). His position has two aspects. First, organisms are autonomous agents; that is, they are organised systems with the property that they produce more of the same organisation. The biological term for this is reproduction. They are therefore logically closed systems which are open to a flow of matter and energy across their boundaries, on which they depend. Hence they are coupled to their environments but not determined by them. Their autonomy results from the self-defining logical closure which perpetuates their distinctive type of organisation. Maturana and Varela (1987) defined this as autopoiesis.

The second aspect of Kauffman's argument concerns the nature of living agency. His phrase is: organisms take action on their own behalf. They do so not by computing the set of possible actions and optimising according to some criterion, because the set of possibilities cannot be finitely described in advance. Organisms live their lives, they do not compute them. But what does it mean to live your life rather than compute it? It means to make choices in some manner that does not depend on algorithmic prespecification and selection. That is, organisms function in ways that go beyond mechanical causality and computation. How this can be articulated in terms that are consistent with current science (including quantum mechanics), or whether new principles of action are required, is a question that cannot yet be answered with any certainty. However, it seems clear that if we are to have a concept of organisms that is consistent with our own experience of intentionality and agency, and which accommodates the observed properties and behaviour of living beings, it is necessary to recognise that life embodies a quality of sentience and experience that allows organisms to act spontaneously and appropriately, to take action on their own behalf. This is reflected in the coherence and integrity of organisms, which we perceive through qualities. To elaborate further on this, I shall now explore a particular quality of whole organisms that we describe as health.

Dynamic Indicators of Wholeness and Health

I take the position that there is a property of health of the whole organism that cannot be described in terms of the functioning and interactions of the constituent organs or tissues or molecules - whatever level of parts one wishes to consider. Furthermore, this property of the whole influences the functioning of the parts in identifiable ways; that is, it has causal efficacy. The absence of such a conception from mainstream biology and medicine is evident from the fact that there is no theory and practice of health taught to medical students that develops systematically such an emergent property of the whole organism with which one can work methodically. Health in the medical model is absence of disease, not presence of a coherent state that can be recognised and facilitated by an appropriate therapeutic relationship.

Let me describe a recent development in the study of health and disease that provides evidence of a dynamic condition of the whole that transcends the properties of parts in interaction. This comes from work on the complex dynamics of the heartbeat. The mean heart rate of an individual is reliably constant for any particular activity, such as sitting still or lying or walking. However it turns out that if one examines a series of heartbeats for any one of these conditions, as recorded in an electrocardiogram, there is considerable variability in the interval between successive heartbeats. What came as something of a surprise was that this variability is significantly greater in healthy individuals than in people with various types of heart condition, such as cardiac arrhythmias or congestive heart disease. In the latter cases there is more regularity and order in the heart rate than in healthy persons. This is a case in which too much order, or the wrong kind of order, is a sign of danger!

It is possible that the irregularity of the interbeat intervals in healthy individuals is a kind of 'noise' resulting from the sum of influences exerted on the heart by other systems of the body - the nervous, respiratory, endocrine, muscular and other systems whose activities modulate heart rate. On the other hand, healthy variability might carry within it some signature of a subtle dynamic order that transcends the collective influences of these other parts of the organism. Poon and Merrill (1997) claim that the variability of the interbeat interval does not have the characteristics of noise, but of deterministic chaos. The order manifested by chaos is indeed subtle, the dynamics being characterised by irregularity that is unpredictable but mathematically determined by the properties of strange attractors, which constrain the trajectories of motion within bounds. The functional interpretation of this unexpected physiological behaviour is as follows. The healthy heart maintains continuous sensitivity to unpredictable demands on it from the rest of the body by continuously changing its rate so that it never gets stuck in a particular pattern of dynamic order. A diseased heart, on the other hand, does tend to fall into patterns of order which fail to respond to the body's constantly changing needs. We thus get the notion of dynamic disease, and inappropriate order is indicative of danger.

Do healthy people all share the same dynamic signature of health, or are they healthy in distinctive ways? This question was addressed by Ivanov et al (1996) in a study of people suffering from sleep apnoea (interrupted breathing during sleep) compared with matched healthy controls. They found that while each healthy individual has a distinct pattern of variability, they all share the same generic signature of subtle dynamic order that is characteristic of chaotic systems, characterised by self-similarity and the occurrence of a well-defined scaling law of variations. Individuals with sleep apnoea do not have this pattern. The property in question can be characterised as a type of long-range order or coherence that maintains a subtle balance of activity in the heart such that a series of short interbeat intervals tends to be followed by longer intervals. The origin of this behaviour is not clear. It appears to reflect a property of the whole organism that transcends the behaviour of its parts. This points to a holistic aspect of the organism with causal

efficacy; i.e., the observed dynamic is an emergent property of the whole that affects the parts, maintaining a condition of coherence throughout the organism. These studies are of considerable interest and importance in indicating ways of diagnosing different conditions of the body by a detailed dynamic analysis of particular physiological variables. Traditional diagnostic procedures use a similar approach, but the condition of the whole is observed through a different aspect of dynamic behaviour of the organism. To illustrate this, consider next an example that indicates the procedure in a context that extends the notion of health to include behaviour generally.

Reclaiming Qualities in Science

What type of theory and praxis go with the recognition of organisms as causally efficacious, emergent wholes? The argument that I shall now develop is logically independent of whether or not one accepts the case that organisms have whole emergent properties, though there is logical consistency between them. How might we approach the question of assessing the quality of life that an animal has experienced in the past from observation of its current behaviour? We actually do this frequently. On the whole, people have little difficulty in choosing a dog from a rescue home that exhibits behaviour indicative of a life without serious deprivation or cruelty, which elicits fear and aggression. However, we also make mistakes. That is, our individual evaluations can be unreliable. Is there a way of being systematic about such evaluations? One approach is to develop a method of intersubjective consensus applicable to this problem. This involves systematic comparison of the evaluations made independently by different individuals observing the same animal. I present here an example of this type of study carried out by Wemelsfelder et al (1999) on farm animals.

The study was carried out on two groups of pigs, one of which had been living in barren conditions (a small pen with a bare concrete floor) and the other in an enriched environment (a large pen with straw and various objects to play with, such as fresh branches, car tyres and metal chains). People were asked to observe the pigs behaving in standard conditions and to assess their behaviour using qualitative descriptors of their choice to describe the pigs' style of behaviour.

This procedure is known as 'Free Choice Profiling' and is widely used in food science and sensory research. A multivariate statistical technique called Generalised Procrustes Analysis was used to assess consensus between different observers in their evaluations. This identifies the degree of clustering of observer scoring patterns in a multidimensional space using transformations that identify mathematical invariants in the data. Analytical details are presented in the paper by Wemelsfelder et al (1999).

The results of the pig study were very striking. There was a high degree of consistency in the evaluations between different people of pigs from the two groups, barren and enriched. Evidently human beings are pretty good at qualitative judgements of this kind. This is not surprising; we live our lives primarily in terms of such judgements, of one another and of situations generally. Where it can be carried out, quantitative assessment is a very useful addition to qualitative judgement, but often it is not possible or convenient. In science, however, it is regarded as the sine qua non of data acquisition.

The pig study employed an analytical procedure to evaluate consensus between different observers. This involves an effective blend of qualitative and quantitative procedures. However, it is reasonable to suggest that a group of practitioners who are focussed on the qualitative assessment of animal behaviour could reach consensus without this analytical step, after systematically cultivating the development of evaluative skills. With or without the analytical procedure, the evaluators would be practising a systematic science of qualities. They would be using their capacity for evaluation of the quality of life exhibited by animals through observation of their behaviour. The primary data used in this evaluation is not measurable with an instrument; it requires a human subject as the observer, assessing quality. This is not to argue that some purely quantitative measure of behaviour might not subsequently be found that correlates with the qualitative assessment. However, the qualitative evaluation is necessarily primary and would probably remain more reliable and effective for this type of evaluation.

Doctors and therapists do something similar to this in evaluating the health of the people that come to them for healing. They pay attention to posture, tone of voice, complexion, and other aspects of the person that reflect the condition of the whole in ways that cannot be measured by instruments. Quantitative data on body temperature,

heart rate, blood pressure, blood cell counts, etc., can add significantly to a diagnosis, but qualitative evaluation of the condition of health remains a very important aspect of diagnostic skill which is developed through practice and experience. It could be cultivated more systematically during training by some type of intersubjective consensual procedure of the kind described above in the pig study. This would extend scientific data to include both quantitative and qualitative information, without losing the essential scientific principles of comparison of results within a community of persons using agreed procedures of assessment. Qualitative experience would then be recognised as a potentially reliable indicator of real situations, subject to consensus among trained practitioners.

There are many communities of investigators into qualitative methodology that are already pursuing such procedures. However, they work under the shadow of a science that has honed the quantitative study of natural process to a very fine art, while qualitative procedures, though by no means new within science, are still being explored and developed. Furthermore, the metaphysical assumptions about reality that have emerged within conventional science exclude qualities from the real and locate them within subjective, hence idiosyncratic and objectively unreliable, experience. A science of qualities requires a fundamental reappraisal of the very nature of real process, because it recognises experience as real and primary. But this is also required if we are to accept the reality of our own experience as feeling, intending, conscious organisms. If these properties are real, then they can only arise from a reality that embodies some form of sentience as the precursor of this condition; otherwise they can be construed only as unintelligible miracles of emergence from dead matter. It seems better to extend our basic description of reality than to have to believe in this type of miracle.

Qualities Require a New Science

The change required in our conception of 'reality' to accommodate subjective experience has been the subject of many articles and I cannot add significantly to what has already been said by others. However, I can indicate which lines of argument I think will provide a metaphysical basis for a science of qualities of the type sketched above. A foundation for the requisite rethinking comes from the writings of Bergson (1911) and Whitehead (1929), with subsequent developments by Hartshorne (1972) and, most recently, by Griffin (1998). The essentials of the position are that 'matter' has sentience and 'mind' exists only as an aspect of 'matter'. What resolves these apparent antinomies is process, in which present mind gives rise to past matter as spent experience, to use the useful and evocative phrases of de Quincey (1999). There is a rough analogy here with electromagnetic waves as described in Maxwell's equations in which the electric field gives way to the magnetic field which in turn generates the electric field in a never-ending cycle of unfolding. Likewise 'mind' and 'matter' transform one into the other, mind (experience, sentience) being the creative pole that incorporates past matter into a new unfolding involving a degree of freedom and choice, this creative act then expiring in matter which produces the conditions for a new creative emergence. Working out the details of this new cosmology is a task that will occupy many a philosopher and scientist, the two areas of enquiry necessarily joining forces to define a new conception of reality. But this new conception involves a union much more extensive than philosophy and science. With qualities and feelings as essential aspects of science, the door is open to a rethinking of the relation between the arts and the sciences in our culture. The move will be beyond holistic science to a holistic culture. However, there is a great deal of work to be done if we are to get there in an effective way. As the Sufi poet, Rumi, put it:

> This talk is like stamping new coins. They pile up,
> While the real work is done outside
> By someone digging in the ground.

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