



Agency and Choice in Evolution

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Abstract

Denis Noble has produced a succinct analysis of the ‘Illusions of the Modern Synthesis’. At the heart of the matter is the place of agency in organisms. This paper examines the nature of conscious agent action in organisms, and the role of affects in shaping agent choice. It examines the dual role these have in shaping evolution, and in the social worlds of scientists that shape evolutionary theory. Its central claim follows Noble, that agency is central to the structure of organisms, and raises careful consideration for the role animal agency and affective evaluations in biology, and in biologists.

Keywords Agency · Affect · Evolution · Choice · Biology · Social meaning-making

Noble’s brave assertion is that biology has fallen under an illusion of its own creation. He writes to biosemioticians in a plea to help solve the conundrum of how a school of well-intentioned, extraordinarily bright individuals may unwittingly lead the field astray. Noble’s complaint that the field has been waylaid from its path of pure logic and reason has its roots in the very nature of the subject that he complains about. Biology is a school of human animals, and the social logic of these animals is structured by their phylogenetic inheritance to generate shared meaning – something that resonates true for all of those within the group, and serves its purpose. To achieve something more universally and objectively pure, and therefore scientifically correct, does not yet appear possible, because of the very social nature of the discipline.

Conscious Agency

At the heart of Noble’s complaint is a fundamental displacement of the role of agency in life to something outside of the study of life, outside of biology. As a psychologist

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trained in the psychobiology of sensorimotor control, I find this is a very odd displacement indeed, because all living organisms sense and move in their environment purposefully, for their individual benefit; the sensorimotor system is at the root of animal cognition and consciousness (Lakoff & Johnson, 1999; McNeill, 2005; Sheets-Johnstone, 2011; Trevarthen & Delafield-Butt, 2017). The neurologist and Nobel Prize laureate Roger Sperry noted, ‘the sole output of brain function is motor coordination’ (Sperry, 1952).

The evolution of vertebrate motility long ago forced the development of anticipatory motor control into the head ganglion of the nervous system (Coghill, 1929) to generate neural control with knowledge of its future (Merker, 2005). This anticipatory awareness is at the root of conscious awareness, a sense of possible futures. Such anticipatory knowledge does not appear restricted to neural system, but may be operative in the anticipatory growth of plants (Calvo et al., 2019; Trewavas et al., 2020) and in the migration cells, too (Delafield-Butt et al., 2012). Both are performed with non-neural, but comparable biological systems that integrate sensory appraisal for choice of action.

Anticipatory motor control with its sense of possible futures affords the organism *choice*. It is the pivot on which sits immediate experience and agency. In mammals, this pivot rests on a tripartite of information integrated from the *exteroceptive* senses of the outside world (i.e. sight, sound, touch, taste), *interoceptive* senses of visceral and vital physiological need (e.g. hunger, thirst, thermoregulation), altogether with *proprioceptive* senses of the body-in-motion. Our conscious experience is an integration of these three pillars of sensory information, contextualised within a store of memories of similar previous events and knowledge of their outcomes. The triad of sensory experiences are brainstem-mediated, and the cortex provides the memory store for abstract imaginative planning (what is often mistaken to be consciousness per se). Agent action of this kind is common to all vertebrates, and the basic system of ‘sense, evaluate, choose’ common to all organisms.

Agent action is critical for the choices that drive evolution (Packard & Delafield-Butt, 2014).

Philosophical Dispositions

In its wish to be a ‘hard physical science’, biology has come to treat organisms as passive, reactive entities. In physics, objects are passive and reactive, like billiard balls on a table. They will not move unless moved, and through study, physics has come to learn the lawful relations of these forces, and how they generate billiard ball behaviour. There is an inherited wisdom that lawful relations are concrete, and real. And they are, it is true.

But living organisms are something unique, because they generate their own causal power. In pure physical terms, they have more energy than their environment and so are destabilised relative to it and therefore must ‘move’. But they do not decay into entropy. Much more than that, they organise their movement with self-generated force, guided through self-generated agency. They *create* movement. And they use this to move the world they experience into channels that enable them to have more power, more energy. In this way, they self-sustain, and grow.

By thinking of organisms as passive and reactive, biology excludes perhaps the most fundamental aspect of living organisms – their agency – and its role in living, as well as in evolution. Noble is right to bring this major fallacy to attention.¹

Even in psychology the extraordinary power of agency is often missed. The experimental paradigm favours examination of stimulus-response mechanisms that treat the individual as a passive, reactive machine.² But the individual is absolutely not that. The human organism is an active agent even from before birth (Delafield-Butt & Gangopadhyay, 2013) and this agency is fundamental and necessary for its growth, learning, and development (Trevvarthen & Delafield-Butt, 2013). It is a source of active awareness that theories of consciousness are beginning to address (Ciaunica et al., 2021).

Education, as a field of scientific study and human practice, is acutely aware of its importance in children's growth, development, and learning. Respect for a human child's interests, intentions, and self-led learning are fundamental pedagogic principles, especially in the early years before executive self-governance by arbitrary societal obligations come to over-ride that creative power (Delafield-Butt, 2018; Trevvarthen et al., 2018). In Scotland, as in Scandinavia, we have enshrined protection of children's agency in learning in national, legislated policy (Scottish Government, 2008). And internationally the United Nations protects children's right to self-determination precisely because that agency is valued as an essential element of human being, from before birth (United Nations Commission on Human Rights, 1990). Why, then, does biology eschew agency in favour of treating organisms as blind, passive and reactive?

This is Noble's question, and the answer to it tectonic, with ramifications far greater than biology alone.

Metaphysical Depths

What Denis draws attention to in biology is a particular expression of fundamental philosophical assumptions about the nature of life, with deep roots in the history of ideas. At the crux of it is a contrasting polarisation between 'sheer blind mechanism' and 'active agent choice'.³ In the conventional idea of pure physical determinism, there is no place for self-determination. This is the old Cartesian split between mind and matter, and biology wishes to avoid something so intangible as 'the mind', of which agency is an inalienable part. Therefore, biology leaves it out.

This self-imposed barrier around biology is short-sighted, unnecessarily limiting, and creates fallacies of the kind Noble points to. A very old, but rather neglected metaphysic can place agency back into the heart of organisms of all kinds, by placing

¹ At the first general meeting of The Third Way group of biologists, evolutionary biologists, theorists, philosophers and biosemioticians in the Sherrington Room in the Department of Physiology, Anatomy, and Genetics at Oxford, chaired by Noble and Shapiro, there was near-unanimous agreement the one major omission and driving factor in evolution was *agency*, evidenced to be operative at many levels of biological operation, including the molecular, cellular, physiological, and whole-organism.

² The conventional idea is that the organism is a collection of complex mechanisms, and that its nature can be explained by a set of causal equations more complex, but the same in principle to those of billiard balls.

³ The two are perceived to be incompatible, an inheritance that can be traced back to tensions between science and religion in the Enlightenment. Descartes's solution is the one we have inherited, a division of physical mechanism from the mind, but it is not necessarily the correct metaphysical model.

agency into the fabric of the physics of life, i.e. as co-existent with matter, molecules (Strawson, 2017). But this is another story far deeper than this commentary can allow, although one that may ultimately offer disruptive, step-change solutions for the better.

What Denis points out is that agency is at the heart of the matter, at the heart of evolution. Because it is at the heart of organisms, no matter how small.

Biology as a Social Science

Noble's complaint is that biology continues to fall under the spell of its own illusions, and he does very well to identify and describe these, giving a clear historical account of their development. In that sense, he is describing the evolution of an organism, the particular constellation of interactions of biologists that come together to share their ideas, to coalesce them into something enduring. In this case Denis cautions us that this particular set of ideas is illogical, and illusory.

At the heart of this conundrum is its people, the individual human animals that come together to evaluate their world and make decision about the best way to interact, and to be together. As animals, we are *affective agents* (Damasio, 1999; Solms, 2021). We evaluate affordances for action and interaction in the world and generate *feelings* about the best course of action. These evaluative feelings are brainstem-mediated, part of the most phylogenetically ancient neural system that governs all animal action (Panksepp, 1998). As social animals, we have evolved to guide individual action set within groups, and to value the hierarchy and pattern of group behaviour.

Pure logic is not a part of these ancient feelings that drive social belonging and group cohesion. And herein lies the crux of Noble's problem. Logic and feeling are decoupled. They are not necessarily part of the same psychological process, but they do combine within us when making choices. As highly educated and intellectually developed scientists, we strive to free pure logic from feeling. We train ourselves and we train our PhD students to put aside feeling and focus on the logic of the problem, the logic of our science. That is all fine and well, and we progress step-wise pieces of logic. But then we come together in groups to share this logic, and when we do, all of that ancient inherited animal feeling structured by respect for dominance hierarchies, competition for limited resources, and affiliative need for social belonging come into play. And our choices for what logic and who (which animal) to agree with becomes shaped by an *affective evaluation* of the social, emotional, cognitive, and resource benefits it will bring. Especially resource benefits. To witness the power of human psychosocial need to trump logic, cast your eye over the last US presidential term and the rise of 'post-truth'. And just like our feelings of lust or hunger, these are more powerful than logic, and more immediately necessary to one's survival as a scientist.

Feelings are not rationally logical, but have an evolved logic of their own.⁴

Noble is concerned with the semiotics of words in the illusion. This is a part of it. But more importantly is that those linguistic semiotics are nested within our inherited

⁴ I am using 'feelings' here to account for not only the obvious affects with their motive forces, but also those operative below reflective consciousness, 'access consciousness'. These are 'felt appraisals' (Bråten, 2009) of situations that measure risk and reward. A good example of these can be found in 'unconscious bias' where one may unwittingly discriminate against another due to prejudices operating within oneself, below the level of conscious awareness.

animal sociality of raw instinctual feeling. In biology, the conference hall, university department and laboratory are social ‘behaviour spaces’ where human animals live, with ideas expressed as currency in journals and grant bids. Belonging, competition for resource, and affective values based on need for social inclusion and material success evaluate all of this, and structure the affective logic of the school.

Conclusions

Noble’s contribution is part of a process of change, striving for logical clarity. The target article affords valuable insight and guidance, giving a clear articulated logic. But as human animals, we must be cautious not to stumble into the same pitfalls that created these illusions in the first place. For example, Noble states with certainty that molecules cannot have ‘intentions’.⁵ But why not? There is an affective logic behind that assumption, given as fact. As scientists, we do not have access to the private experiences of organisms, let alone the molecules that compose them. However peculiar it might seem, we must be sensitive to possible explanations that intentions may be so fundamental that they are included in the experiences of molecules (Basile, 2010). This is the point of the very old, very strong lineage of logic currently gaining traction in the philosophy of science (Brüntrup & Jaskolla, 2017; Goff, 2019). It supposes that mind and matter co-exist as two sides of the same coin, and it does very well in answering some fundamental problems with the logic of how experience and intentional agency can come about in the first place (Delafield-Butt, 2008; Strawson, 2006). We must work hard not to make the same mistakes identified in others, ourselves.

In sum, Noble’s driving claim to re-configure evolutionary theory in light of naked facts places agency back into biological systems and evolutionary theory. The subject stands to benefit. But at the same time, one must remain cognisant that science is a social discipline, and humans are social animals powered by an affective logic that does not always support the scientific, rational logic we strive to advance, especially when disruptive to group cohesion – *status quo*. The challenge for all persons in any science is to be as true to logic as humanly possible. And where it is not possible, to recognise our human limitations, and bring these into the equation of discovery. It is within our power, our agency, to do so.

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⁵ Words such as ‘intention’, ‘consciousness’, even ‘agency’ carry assumptions in common use. Careful clarification is required with explicit logical reasoning. In the case here, I have attempted to do so with the word ‘intention’, characterising it at different levels in human infant development (Delafield-Butt & Gangopadhyay, 2013), and Searle (1980, 1983) has done remarkable work to differentiate primary intention-actions common to basic forms of agency from intentions-to-act that require higher-order abstract reflection. In terms of ‘intentions’ in molecules, this requires significant further clarification beyond the scope of this footnote, but one thing is clear, a goal- or future-directedness is at the heart of the explanation of mind-matter (Basile, 2010) important for inclusion in biological explanation (*c.f.* Russell, 1945; Delafield-Butt, 2007).

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References

- Basile, P. (2010). It must be true - but how can it be? Some remarks on panpsychism and mental composition. In P. Basile, J. Kiverstein, & P. Phemister (Eds.), *The metaphysics of consciousness* (pp. 93–112). Cambridge University Press.
- Bråten, S. (2009). *The Intersubjective Mirror in infant learning and evolution of speech*. John Benjamins.
- Brüntrup, G., & Jaskolla, L. (Eds.). (2017). *Mind and being: The primacy of panpsychism*. Oxford University Press.
- Calvo, P., Gagliano, M., Souza, G. M., & Trewavas, A. (2019). Plants are intelligent, here's how. *Annals of Botany*, 125(1), 11–28.
- Ciaunica, A., Safron, A., & Delafeld-Butt, J. (2021). Back to square one: From embodied experiences in utero to theories of consciousness. *PsyArXiv*. <https://doi.org/10.31234/osf.io/zspm2>.
- Coghill, G. E. (1929). *Anatomy and the problem of behaviour*. Cambridge University Press.
- Damasio, A. (1999). *The feeling of what happens*. Harcourt, Inc..
- Delafeld-Butt, J. T. (2007). Towards a process ontology of organism: Explaining behaviour in a cell. In T. Kelly & M. Dibben (Eds.), *Applied process thought: Frontiers of theory and research*. Ontos Verlag.
- Delafeld-Butt, J. T. (2008). Biology. In M. Weber, J. Seibt, & N. Rescher (Eds.), *Handbook of Whiteheadian process thought*. Ontos Verlag.
- Delafeld-Butt, J. (2018). The emotional and embodied nature of human understanding: Sharing narratives of meaning. In C. Trevarthen, J. Delafeld-Butt, & A.-W. Dunlop (Eds.), *The Child's curriculum: Working with the natural voices of young children*. Oxford University Press.
- Delafeld-Butt, J. T., & Gangopadhyay, N. (2013). Sensorimotor intentionality: The origins of intentionality in prospective agent action. *Developmental Review*, 33(4), 399–425.
- Delafeld-Butt, J. T., Pepping, G.-J., McCaig, C. D., & Lee, D. N. (2012). Prospective guidance in a free-swimming cell. *Biological Cybernetics*, 106, 283–293.
- Goff, P. (2019). *Galileo's error: Foundations for a new science of consciousness*. Pantheon Books.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought*. New York: Basic Books.
- McNeill, D. (2005). *Gesture and thought*. University of Chicago Press.
- Merker, B. (2005). The liabilities of mobility: A selection pressure for the transition to consciousness in animal evolution. *Consciousness and Cognition*, 14, 89–114.
- Packard, A., & Delafeld-Butt, J. T. (2014). Feelings as agents of selection: Putting Charles Darwin back into (extended neo-) Darwinism. *Biological Journal of the Linnean Society*, 112, 332–353.
- Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford University Press.
- Rusell, E. S. (1945). *The Directiveness of organic activities*. Cambridge University Press.
- Scottish Government. (2008). *Curriculum for excellence: A framework for learning and teaching*. The Scottish Government.
- Searle, J. R. (1980). The intentionality of intention and action. *Cognitive Science*, 4, 47–70.
- Searle, J. R. (1983). *Intentionality: An essay in the philosophy of mind*. Cambridge University Press.
- Sheets-Johnstone, M. (2011). *The primacy of movement (2nd ed.)*. John Benjamins.
- Solms, M. (2021). *The hidden spring: A journey to the source of consciousness*. London: Profile Books.
- Sperry, R. W. (1952). Neurology and the mind-brain problem. *American Scientist*, 40, 291–312.
- Strawson, G. (2006). Realistic monism: Why physicalism entails panpsychism. In A. Freeman (Ed.), *Consciousness and its place in nature* (pp. 3–31). Imprint Academic.
- Strawson, G. (2017). Mind and being: The primacy of panpsychism. In G. Brüntrup & L. Jaskolla (Eds.), *Panpsychism: Contemporary perspectives*. Oxford University Press.

- Trevarthen, C., & Delafield-Butt, J. T. (2013). Biology of shared meaning and language development: Regulating the life of narratives. In M. Legerstee, D. Haley, & M. Bornstein (Eds.), *The infant mind: Origins of the social brain* (pp. 167–199). Guildford Press.
- Trevarthen, C., & Delafield-Butt, J. T. (2017). Development of consciousness. In B. Hopkins, E. Geangu, & S. Linkenauger (Eds.), *Cambridge encyclopedia of child development* (pp. 821–835). Cambridge University Press.
- Trevarthen, C., Delafield-Butt, J., & Dunlop, A.-W. (Eds.). (2018). *The Child's curriculum: Working with the natural values of young children*. Oxford University Press.
- Trewavas, A., Baluška, F., Mancuso, S., & Calvo, P. (2020). Consciousness facilitates plant behavior. *Trends in Plant Science*, 25(3), 216–217.
- United Nations Commission on Human Rights. (1990). *Convention on the rights of the child*. E/CN.4/RES/1990/74. Geneva: United Nations Commission on Human Rights.

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