

Book: Understanding Humans in a Scientific Age:
Section: The Age of Science at the Beginning of the Twenty-First Century

Fundamentalism in Science, Theology, and Academia

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The term 'fundamentalism' is in dispute.¹ Its older meaning was simply in terms of the 20th century Protestantism tradition emphasizing the literal interpretation of the Bible by Christians who wanted to return to the foundations of their faith. More recently, it has broadened out to a much wider tendency to refer to strict literalist adherence to any dogmatically stated position whatever, whether it be Christian, Jewish, Muslim, that of any other religious tradition, or even that of atheism and dogmatic scientism.

Perhaps its most obvious manifestation is in the present upsurge of fundamentalist religion of all types, where unquestionable revelations rule the day and imply a total rejection of any competing views. However it has also been apparent in philosophy through the ages, because simplistic viewpoints are always easier to comprehend than more nuanced views that capture more of the complex nature of reality; and it occurs in almost any area of thought or human interaction, including science.

It is in this broader sense that I shall use the term in this paper. The point is that laudable as it may be to go back to the foundations of your faith or understanding, whatever it is, if it prevents you from being open to wider viewpoints that may be of value, then in the end it is crippling, and indeed can be very destructive. I will emphasize particularly the widespread occurrence of scientific fundamentalism across almost all the sciences, and the damaging effects that can occur when this is allowed to influence social practice.

1: FUNDAMENTALIST RELIGION

In the religious context, fundamentalism can be broadly seen as a movement emphasizing strict adherence to basic principles, accompanied by a belief in the infallibility of some literally interpreted holy books and associated doctrine. It involves assent to absolute religious authority and legal enforcement of this religious authority. In the Christian case, it has stressed the infallibility and historical accuracy of the Bible, and so is very hostile to literary criticism;² more generally, it claims the literal truth of sacred texts. As any other view is regarded as illegitimate, those who do not share this viewpoint are clearly not really Christians at all even if they classify themselves as Christians, and those of other faiths are in deadly error. This attitude easily leads to violent and cruel behaviour such as the Crusades, the Inquisition, and the Conquistadors: in blatant contradiction to the central message of the Gospels.

¹ See for example <http://www.britannica.com/eb/article-9390025/fundamentalism> and <http://en.wikipedia.org/wiki/Fundamentalism> .

² James Barr (1978): *Fundamentalism*. (Westminster Press).

It has positive aspects in terms of valuing faith and being seen as a defence of what is worthwhile, but this is in the end largely a manifestation of the psychological need for certainty: the desire to have an undeniable hold on absolute truth.

However human beings can never have such a hold, indeed from a monotheistic view, this is the province of God alone; hence such fundamentalism is in fact a form of idolatry, for those claiming infallible access to truth are arrogating to themselves the nature of God. Any claim to infallibility on behalf of any human being or any human agency or works, including holy texts (which are in fact written down by human beings), is of this nature, and when that claim is made by clerics of any hue, it is in profound contradiction to the fundamental understanding of the difference between humans and God that is seen in the monotheistic religions. When combined with the manifest evil that has resulted from this tendency, it is a strong indication that this position is seriously in error: something less dogmatic is needed.

Indeed there is, in contrast, a multi-faith movement and viewpoint which emphasizes the opposite: that each faith position may have something of value to add to our understanding, and we can in fact not just tolerate them but possibly learn from them, even while holding onto our own faith. There are ethical, practical, and theoretical reasons why this inter-faith position is better.

In ethical terms, this is firstly because it avoids those religious positions that almost inevitably lead to harm to others, as emphasized powerfully by writers such as Kimball³ and Dawkins⁴; secondly because one can claim that the deep nature of ethics is kenotic, that is, based on self-emptying and self-sacrifice,⁵ which includes respecting the views of others because of their integrity as humans and prohibits killing others in the name of any religion. Indeed this kenotic view is imbedded in the spiritual tradition of all the major world religions.⁶ In practical terms it is because in an age of globalisation we have to learn to live with each other if we are to survive, and the kind of hostility to others usually entailed in fundamentalism makes life together very difficult. It is often a very destructive force, whatever the religious base.

In theoretical terms, it comes from the realisation that all proclaimers of the truth are fallible and liable to self-delusion; and even the most revered holy writings are their products and so are also liable to error. The different religions proclaim different visions of ultimate reality⁶ – so we get fundamentalist of opposing views claiming each has sole access to ultimate truth. They can't all be right! But the point here is fundamental: human attempts to capture the transcendent in language or symbolism are bound to fail. They will all be partial and incomplete. That is why creeds will inevitably be misleading in various aspects, and indeed are not necessary for a strong religious position.⁷ That is why some religions regard it as blasphemy even to name God – any name will mislead too! We can recognise this fundamental problem will

³ Charles Kimball (2003), *When Religion Becomes Evil* (Harper San Francisco).

⁴ Richard Dawkins (2006), *The God Delusion* (Bantam Press).

⁵ Nancy Murphy and George F R Ellis (1995), *On the Moral Nature of the Universe* (Fortress Press); John Polkinghorne (Ed) (2001), *The Work of Love: Creation as Kenosis* (SPCK: William Eerdmans); George Ellis (2008), "Faith, hope, and doubt in times of uncertainty: combining the realms of scientific and spiritual inquiry." James Backhouse Lecture, Australia Yearly Meeting of the Religious Society of Friends (Quakers).

⁶ Gordon S Wakefield (Ed.) (1983): *A Dictionary of Christian Spirituality* (SCM Press) [despite the title, this book summarises the spirituality of all the major world religions].

⁷ Geoffrey Hubbard (1976): *Quaker by conviction* (London: Penguin).

result in many different representations and interpretations of truth that may seem in conflict, but in the end are fundamentally a unity in that they are each in their own way trying to represent what is in fact unrepresentable in terms of human language or thought; but it is the same transcendent or underlying reality they are trying to represent.⁸ Each attempt will capture some aspects of reality and misrepresent others; despite the opposing nature of the views presented, we can recognise their validity in those terms.

That does not mean we ought not to maintain on to our own deeply held view, and proclaim it as our own best understanding. But it does mean we do not need to decry attempts at representing ultimate reality in other terms, provided they do so in an ethically acceptable way;⁹ and that will indeed be the case if that they too agree about a kenotic aspect to the underlying nature of reality, and live in accordance with that belief. Then we can live with them and respect them, while holding firmly on to our own faith.¹⁰ We can acknowledge that the partial understanding of the nature of God that we have is just that – a partial understanding, and not the whole truth.

2: THE MORE GENERAL ISSUE OF FUNDAMENTALISM

As its presence has become evident to me in many different contexts, I have come to understand the essential nature of fundamentalism as being *a partial truth proclaimed as the whole truth*. Only one viewpoint is allowed on any issue, all others are false. This dogmatism is combined with *an inability to relate understanding to context*, holding on to one viewpoint independent of the relevance to a situation. To admit that what is important varies with context would undermine the fundamentalist's need to see the same single issue as dominant in every situation, come what may.

Fundamentalism in this sense is one of the most ancient of human traits, and is a problem across all subjects and across the ages. It is characterised by dogmatism replacing reflection, the infallible guru, intellectual stockades. Fundamentalists always know without question that they are right, no matter how controversial the terrain; and the partial understanding that they claim as being all that matters of course always just happens to be just that one topic in which they are experts. They are always the people with absolute access to certain truth, because they are not hampered by the consideration of relevance or significance that might worry others.

This tendency to claim that a partial truth is the whole truth, is one of the dominant ways that humanity goes astray intellectually. It gains its strength through the fact that the partial truth being proclaimed is indeed true, or at least is experienced as true by the believer, no matter how restricted its scope of understanding may be. It derives its destructive power from the refusal to acknowledge all the other significant factors in the causal nexus influencing events, either denying that they exist, or at least denying their effectiveness. It makes the implicit or explicit claim that the proclaimer is the

⁸ William E Paden (1992): *Interpreting the Sacred* (Boston: Beacon Press). John Hick (1992): *An Interpretation of Religion* (New Haven: Yale University Press).

⁹ Raimond Gaita (2000): *A Common Humanity : Thinking about love, truth and justice* (London: Routledge)

¹⁰ Jonathan Sacks (2002): *The Dignity of Difference: How to avoid the clash of civilisations* (New York: Continuum).

person with sole access to truth, who others should therefore defer to, while also closing the minds of the proclaimer to seeing any larger reality that may exist.

Some religion is fundamentalist, but much is not. Fundamentalist religion is bad religion, and is also incompatible with good science. However open-minded non-dogmatic religion can be compatible with science. There is a large and sophisticated literature on this.¹¹ One should note here that atheism is a religion just as much as say Christianity, as it is an unprovable belief system claiming to clarify the meaning of life; it too can be dogmatic or open minded, fundamentalist or non-fundamentalist. It is crucial to note however that fundamentalism occurs not only in the religious sphere, but also in all the sciences - natural and human - and the humanities. In academic and public life, the tendency to fundamentalism leads to:

- *A tendency to arrogance*
- *Looking down on the outside world*
- *Believing your speciality is all that matters*
- *Believing you have sole access to truth*
- *Overall: a lack of a holistic view*

These aspects will be illustrated in what follows. The contrast is a humble approach, which when genuinely followed values what the other has to say even when it seems in conflict with one's own position. This is an aspect of a kenotic approach to life – being able to let go of one's own central position, with the confidence it will return in some better and deeper form:

The deepest truth I have discovered is that if one accepts the loss, if one gives up clinging to what is irretrievably gone, then the nothing which is left is not barren but is enormously fruitful. Everything that one has lost comes flooding back out of the darkness, and one's relation to it is new - free and unclinging. But the richness of the nothing contains far more, it is the all-possible, it is the spring of freedom.¹²

3: SCIENCE AND SCIENTISM

Fifty years after C P Snow's Rede lecture on 'The Two Cultures',¹³ the big divide: between science and the humanities remains a battleground of fundamentalisms. I will not trace the 'Science Wars' here,¹⁴ but rather will comment on the extreme scientism that is often set up in contrast to more humane (and particularly religious) views. The claim that science is the sole and perfect access to all truth is a fundamentalist atheist religion, complete with a creed: "Science is the sole route to true, complete, and perfect knowledge"¹⁵ and relic of a saint: the morbid remains of Galileo's finger.¹⁶

¹¹ See for example the writings of Ian Barbour, Arthur Peacocke, John Polkinghorn, Bob Russell, Nancy Murphy, Keith Ward, John Bowker, and John Haught. For summaries, see Mark Richardson and Wesley Wildman (ed.) (1996), *Religion & Science: History, Method, Dialogue* (Routledge) and Wentzel J. Van Huyssteen (ed.) (2003), *Encyclopedia of Science and Religion* (MacMillan).

¹² Richard Bellah (1991) *Beyond Belief: Essays on Religion in a Post-Traditionalist World* (University of California Press).

¹³ See http://en.wikipedia.org/wiki/The_Two_Cultures.

¹⁴ See http://en.wikipedia.org/wiki/Science_wars.

¹⁵ Peter Atkins (2003), *Galileo's Finger: The Ten Great Ideas of Science* (Oxford: Oxford University Press), page 237.

Scientism makes its claims by declamation ("it has to be so") rather than legitimate argumentation, for neither science nor philosophy can establish its main philosophical claims; but it is as dogmatic and closed a belief system as any religion has ever been. It occurs in physics and chemistry, in biology and the social sciences; and proceeds by proscribing what can be legitimately considered the target of enquiry, the methods used, the data allowed, and the kinds of explanation entertained. As an example, Professor P W Atkins believes in "the limitless power of science"¹⁷ He writes,

"Scientists, with their implicit trust in reductionism, are privileged to be at the summit of knowledge, and to see further into truth than any of their contemporaries... there is no reason to expect that science cannot deal with any aspect of existence...

Science, in contrast to religion, opens up the great questions of being to rational discussion ...

Reductionist science is omniscient ... science has never encountered a barrier that it has not surmounted or that we can at least reasonably suppose it has the power to surmount.... I do not consider that there is any corner of the real universe or the mental universe that is shielded from [science's] glare"¹⁸

This is a very clear statement of belief that science can answer questions that are in fact outside its domain of competence. The useful question we can ask is, is Atkins in fact claiming that science can deal with everything of importance to humanity, or rather that anything outside the limited scope of science is unimportant? It appears that the latter is his true position, for he throws out of the window not only theology but also all philosophy, poetry, and art:

"although poets may aspire to understanding, their talents are more akin to entertaining self-deception. Philosophers too, I am afraid, have contributed to the understanding of the universe little more than poets .. I long for immortality, but I know that my only hope of achieving it is through science and medicine, not through sentiment and its subsets, art and theology"¹⁸

His frame of reference thus excludes all the highest understandings of the human predicament that have been attained throughout history; he defines reality to be only that which can be comprehended by his narrow view of reductionist science. Indeed he frames his viewpoint so narrowly that it even excludes psychology, all the social sciences, and behavioural biology, for he states "A gross contamination of the reductionist ethic is the concept of purpose. Science has no need of purpose"¹⁸. This is the framework within which he claims to consider "the great questions of being". The conclusions he attains are dictated by the self-imposed extraordinarily narrow limits of his analytic scheme.

One might ask what is the pay-off of this impoverished world-view, which consigns to the dustbin *inter alia* Plato, Aristotle, Kierkegaard, Shakespeare, Dostoyevsky, Tolstoy, Victor Hugo, T S Eliot? It appears to be two-fold. Firstly, one claims absolute certainty (even if this is not attainable) - it is yet another manifestation of the

¹⁶ *Galileo's Finger*, Frontispiece.

¹⁷ P W Atkins (1995), in *Nature's Imagination: The Frontiers of Scientific Vision*, Ed. J Cornwell. (Oxford: Oxford University Press), pp.122 -132.

¹⁸ *Galileo's Finger*, p. 127.

human longing to be free of the metaphysical doubt that in fact faces us. Secondly, given this view, scientists become the high priests of this barren religion - they are the people with privileged access to omni-competent knowledge. It is their prerogative to judge and dispose of truth in this desolate landscape. Thus the temptation to scientists to promote this view is the same as has throughout history been the temptation to those claiming absolute knowledge of truth: they can see themselves as superior to their contemporaries.

And beware the implicit threat contained in the attitude of scientism, which - as is true of any fundamentalist religion - would like to suppress the thoughts of those who do not agree. I quote from Atkins: "[Theologians] *have no right* to claim that God is an extreme simplicity ... Maintaining that God is an explanation is an abnegation of the precious power of human reasoning"¹⁹ (my italics). Here you have the clear whiff of the Inquisition: if they have *no right* to think this wrongheaded way, then the strong implication is that they should be stopped from doing so.

But this extreme position is not implied by science, and it is not true that all scientists have such a barren and destructive worldview. Science can be done by people who appreciate the arts and humanities and ethics, and indeed also religion. Furthermore, despite all the efforts of scientists, scientific knowledge will always be partial and incomplete, and science cannot comprehend everything of value to humankind. Science is very powerful in its domain, but that domain is strictly limited. Natural and biological science is limited by its very nature to its proper domain of application (the measurable behaviour of physical objects), and so cannot handle features of a quite different nature, such as

- the appreciation of beauty,
- the greatness of literature,
- the joy of cooking,
- the lessons of history,
- the nature of evil,
- the quality of meditation,
- the understanding of love.

That does not mean they are unimportant to us. By its very nature, science cannot deal with major issues of great importance. In particular, it cannot deal with ethics, aesthetics, metaphysics, and meaning. It is crucial that they be recognised in their own right over and against science, with scientific factors in their development but their own logic and nature justified in their own terms. They are causally effective in terms of influencing what happens in human life. They are of great significance to humanity. Science can explore some of the associated conditions for each of these topics, but cannot in each case enter the core of the topic itself.

As regards ethics, there is a tendency to mistakenly believe that science can handle ethical issues, either by evolutionary psychology (the imperative of survival) or by sociology (the force of culture), but these are both partial explanations; ethical values themselves are in fact by their very nature beyond the scope of science. If proposed as total explanations, these theories only explain ethics away²⁰ (and indeed the

¹⁹ P W Atkins (1995), in *Nature's Imagination*.

²⁰ Murphy and Ellis, *On the Moral Nature of the Universe*; Ellis (2008), James Backhouse Lecture.

proponents of these two views do not even agree amongst themselves). As an example, one can ask those who claim that science can handle ethics, what is the scientific prescription for handling what is currently happening in Iraq? Of course there is none. The attempt to deal with these issues on a scientific basis is not only misleading, it is positively dangerous: see the Social Darwinism movement and its consequences.²¹

As regards aesthetics, there are no machines that can measure the beauty of a painting; there are no scientific units for beauty ('two milli-Rembrants'). The attempt to set up such experiments on a purely scientific basis would be absurd. That does not mean making judgements in this area is absurd: on the contrary it is an important part of human life. The point simply is that it lies outside the strictly limited domain of science itself.

The implication is that there are different types of knowledge and understanding important to us: there is that accessible by the scientific method, but additionally philosophical and moral knowledge, art and literature, personal knowledge, mystical experience can all be significant to us. One can still use methods similar to those used in science in understanding these areas, looking for predictive power and adopting a form of critical realism,²² but the data used will be quite different – often involving individual personal experiences, for example, rather than repeatable laboratory situations. Indeed it is in the uniqueness of experience that much of life's richness is captured; but science is searching for the common core that can be reliably tested for in identical situations.

The scientific perspective per se gives a wonderful understanding of mechanisms in operation in the world. It does not encompass all the significant causal mechanisms. Claiming it does so is a form of fundamentalism as envisaged in this paper.²³

4 REDUCTIONISM AND CAUSALITY

The basic structure of physical things is well known: quarks make up protons and neutrons, which together form nuclei; these together with electrons make up atoms; atoms combine together to make molecules; complex chains of molecules make biomolecules. If you string these together in the right way you eventually get cells; cells make tissues, tissues make systems, systems make the organism and the organism makes communities.²⁴ This is the hierarchy of structure and causation (Figure 1).

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Reductionism: The common physics view is that bottom-up causation is all there is: micro-forces determine what happens at the lower levels and thereby are the foundation of higher level activity: electrons attract protons at the bottom level, and this is the basic causal mechanism at work, causing everything else all the way up: this is all there is. In a certain sense that is obviously true. You are able to think

²¹ Richerd Weikart (2004), *From Darwin to Hitler: Evolutionary Ethics, Eugenics, and Racism in Germany* (Palgrave Macmillan).

²² See for example Murphy and Ellis, *On the Moral Nature of the Universe*.

²³ For a response to arguments of this kind by Monod, Sagan, Dawkins, Dennett, and Atkins, see G F R Ellis (1998), "The thinking underlying the new 'scientific' world-views". In *Evolutionary and Molecular Biology*. Ed R Russell, W Stoecker, F Ayala. (Vatican Observatory/CTNS), 251-280.

²⁴ Campbell, N A and Reece, J B (2005). *Biology* (San Francisco: Benjamin Cummings).

because electrons are attracting protons in your neurons. But strong reductionists tell us this is the only kind of causality there is (using the phrase “nothing but” to emphasize their viewpoint):

“The major task for the reductionist is to show that nothing important, no essential insight or avenue of research, is lost when some aspect of animal or human behaviour is explained in terms of chemistry: when in short the sociological, psychological or biological is abandoned in favour of the chemical bond Sometimes criminal or aggressive behaviour is explained in terms of levels of neurotransmitters in the brain ... the reductionist has to explain not only that serotonin is involved in some way but also that we have no need for sociological theories to understand criminality: that abnormal blood chemistry fully explains abnormal behaviour”²⁵

This is a form of fundamentalism, claiming a partial cause is the whole cause. There are other forms of causality in action in the real world. More holistic non-reductionist views of science will take them into account, thus taking emergent properties seriously and freeing us from the straightjacket of strong reductionist world views.

Top-down action: The important realisation then is that as well as this bottom-up action, there is “whole part” or “top-down” causation in this hierarchy of structure: the top levels influence what happens at the lower levels. They do so by setting the context in which the lower level actions function, thereby organising the way lower level functions integrate together to give higher level functions.²⁶ The higher levels of the hierarchy structure what happens at the lower levels in a coordinated way, enabling self-organisation of complex systems. Boundary effects (linking the system to the environment) as well as structural relations in the system itself effect top-down causation by changing both context and the nature of the constituent parts. They change the interaction patterns of the parts, and may shape the results of adaptive selection or embody the goals of feedback control systems.²⁷ These effects are prevalent in the real physical world and in biology, because no real physical or biological system is isolated.

“The reductionist perspective is needed but so is the perspective of the biologist interested in physiology, or whole organisms, or the relation between organisms and their environment, or their evolution. A satisfying biological explanation is one that ... uses different levels, and so unifies, or makes connections between, some of the research styles. Anti-reductionists do not dispute the revelatory powers of molecular techniques, but argue that the higher levels cannot be ignored. Understanding of these higher levels cannot be reduced to theories that apply to lower levels ... Emergentism states that new properties emerge as you go from level to level, and an attempt to explain these properties in terms of lower levels alone will end in failure”²⁸

²⁵ Stephen Webster (2003). *Thinking about Biology* (Cambridge: Cambridge University Press)

²⁶ For more detailed discussions, see G F R Ellis “On the nature of emergent reality”, in *The Re-emergence of Emergence*, ed P Clayton and P C W Davies (Oxford University Press, 2006); G F R Ellis “Physics and the real world”. *Foundations of Physics*, Apr 2006, 1–36, available at <http://www.mth.uct.ac.za/~ellis/realworld.pdf>.

²⁷ G. Auletta, G. Ellis, and L. Jaeger (2007) “Top-Down Causation: From a Philosophical Problem to a Scientific Research Program”: [arXiv:0710.4235](https://arxiv.org/abs/0710.4235). George Ellis (2007), “On the nature of causation in complex systems” For the *Royal Society of South Africa Transactions Centenary Issue* (2008).

²⁸ Webster (2003). *Thinking about Biology*.

An important example is human volition: the fact that when I move my arm, it moves because I have ‘told it’ to do so. In other words, my brain is able to co-ordinate the action of many millions of electrons and protons in such a way that it makes the arm move as I desire. Every artefact in the room in which you are sitting, as well as the room itself, was created by human volition – so our minds are causally effective in the world around us. Top-down action from the mind to muscle tissue enables the higher levels of the hierarchy to be causally effective.

The important point is that physics as it currently stands is causally incomplete. It is not able to describe all the causes and effects shaping what happens in the world. For example, physics cannot explain the curve of the glass in my spectacles, because it has been shaped on purpose to fit my individual eyes. The vocabulary of physics has no variable corresponding to the intention that has shaped the spectacles. Because of this, physics cannot explain why their glasses have their particular curvature.

It is also important to understand that information is causally effective, even though information is not physical but an abstract entity. Social constructions, too, are causally effective. A classic example of this is the chess set. Imagine some being coming from Mars and watching chess pieces moving. It is a very puzzling situation. Some pieces can only move diagonally and other pieces can only move parallel to the sides. You imagine the Martian turning the board upside down and looking inside the rook, searching for a mechanism causing this behaviour. But it is an abstraction, a social agreement, that is making the chess piece move that way. Such an agreement, reached by social interaction over many hundreds of years, is not the same as any individual’s brain state; it exists in an abstract space of social convention, and yet is causally effective.

Many other social constructions are equally causally effective, perhaps one of the most important being the value of money. This already is enough to undermine any simplistic materialistic views of the world, because these causal abstractions do not have a place in the simple materialist view of how things function.

Ethics too is causally effective. It constitutes the highest level of goals in the feedback control system underlying our behaviour,²⁹ because it is the choice of which other goals are acceptable. When you have chosen your value system, which depends also on your understanding of meaning (the ‘telos’ or purpose of life), this governs which goals are acceptable to you and which are not. So this abstract entity is causally effective. As an example, if your country believes that a death penalty is okay, this will result in the physical realisation of that belief in an electric chair or some causally equivalent physical apparatus. Without the death penalty they will not be there. This lies outside what reductionist physics and chemistry includes in their causal schemes.

5: ON BEING FULLY HUMAN: FAITH, EMOTION, AND CHOICE

The myth of rationality: Since the time of the Greek philosophers, there has been a perception by some that one could live a purely rational life: that emotion, faith, and

²⁹ Stafford Beer, *Brain of the Firm* (Wiley, 1994).

hope simply get in the way of rationally desirable decisions.³⁰ This view was particularly promoted by Descartes, and attained ascendancy with the rise of the natural sciences, with physics taken as a paradigm for the social sciences and rational choice theory an idealised model for human behaviour. It is this viewpoint that underlies much of present day scientism.³¹ Given such a rationalist view, how can one reasonably have an alignment of religious faith and scientific commitment? How does one hold without contradiction a deep and intrinsic respect for evidence and reason, and an equally deep respect for matters of belief?

This is the Cartesian error of considering the essential feature of human existence as being rationality alone. The mind is an integral part of a being imbued with internal affective states as well as external senses. Emotions are just as much core human capacities as thinking is, and have evolved to what they are because they serve vital functions in human life.³² In essence they continuously evaluate our situation as being satisfactory or unsatisfactory, and signal both the conscious and unconscious brain when change is needed. Thus this view of a purely rational way of existence is a deeply flawed view of how we can conduct both personal and social life. It is not possible to reason things out and make decisions purely on a rational basis. The true situation is much richer than that (see Figure 2).

Firstly, in order to live our lives we need faith and hope,³³ because we always have inadequate information for making any real decision. Faith is to do with understanding what is there, hope with the nature of the outcomes. When we make important decisions like whom to marry, whether to take a new job, or whether to move to a new place, we never have enough data to be certain of the situation or the outcome. We can keep gathering evidence as long as we like, but we will never be truly sure as to how many people will buy our product, what the weather will be like, how people will treat us, and so on. Thus our choices in the end have to be concluded on the basis of partial information and are necessarily to a considerable degree based in faith and hope: faith about how things will be, hope and trust that it will work out all right. This is true even in science. When my scientific colleagues set up research projects to look at string theory or particle physics, they do so in the belief that they will be able to obtain useful results when their grant applications have been funded. They do not know for sure that they will succeed in their endeavours. They believe that their colleagues will act honestly. So embedded in the very foundations even of science there is a human structure of hope, and trust³⁴.

Together with our attitudes to risk, perceptions of how things are now and will be in the future are crucial in making real-world decisions. Do we tend to see things in a threatening or optimistic way? Are we willing to act on the basis of little evidence, or do we demand very detailed analysis before proceeding? This sets the balance we

³⁰ **Rational**, *adj.* **1:** (of behaviour, ideas, etc) – based on reason rather than emotions: a *rational argument/ choice/ decision – rational analysis/ thought. **2:** (of a person) able to think clearly and make decisions based on reason rather than emotions (*Oxford Advanced Learner Dictionary of Current English*. Oxford University Press, 2000).*

³¹ P W Atkins, "The limitless power of science". In *Nature's Imagination*

³² Antonio Damasio (2000). *Descartes's Error* (Harper Collins).

³³ George F R Ellis (2006): "On Rationality, Emotion, Faith, and Hope: Being Human in the Present Age". In *Humanity in Science and Religion: the South African experience*, Ed A Schutte (Cluster Publications).

³⁴ R P Crease (2004), "The paradox of trust in science". *Physics World* (March 2004), 18.

make between rationality on the one hand and faith and hope on the other. Helping make decisions are intuition³⁵ and imagination³⁶. Intuition is a way of knowing—something to do with understanding and acting. The intuition of a doctor, a motor car mechanic, a football player, a financial analyst, is the deeply imbedded result of our previous experience and training. It is a fast-track ability to see the guts of the situation long before we have had time to figure it out rationally, embodying in rapid-fire form the results of previous experience and rational understanding. Imagination helps us think of the possibilities to be taken into account in making our rational choices and to envisage what might occur, setting the stage for our analysis of options and choices. But we can never imagine all the options: the completely unexpected often occurs and undermines the best laid plans of mice and men,³⁷ and even the widest lateral thinking only uncovers some of the possibilities.

Secondly, our emotions are a major factor in real decision making – both the hard-wired primary emotions that are our genetic inheritance from our animal forebears, and the socially determined secondary emotions that are our cultural inheritance from society. As explained so well in Antonio Damasio’s writing,³⁸ no decisions are made purely as a result of rational choice; the first factor effecting what we tend to do is the emotional tag attached to each experience, memory, and future plan. For example, the hoped-for joy of successful achievement underlies most work in science; without it, science would not exist. In a full human life, love is one of the most important driving factors, determining how we deploy our rationality. The degree to which one loves another is not a scientifically ascertainable fact.³⁹ The importance of emotions derives from the fact that the primary emotions have evolved over many millions of years to give us immediate guidance as to what is good for our survival in a hostile environment; they then guide the further development of secondary emotions (telling us what is good for us in terms of fitting into society) and intellect.⁴⁰

Thirdly, we need values to guide our rational decisions; ethics, aesthetics and meaning are crucial to deciding what kind of life we will live. They are the highest level in our goals hierarchy, shaping all the other goal decisions by setting the direction and purpose that underlies them: they define the ‘Telos’ (purpose) which guides our life.⁴¹ They do not directly determine what the lower level decisions will be, but set the framework within which choices involving conflicting criteria will be made and guide the kinds of decisions which will be made. Emotional intuitions are absolutely necessary to moral decision making, but do not fully encompass them – for rational reflection and self-searching is a key element of higher level morality. Indeed this is all done in the context of overall meaning and purpose (‘telos’), for the mind searches all the time for meaning, both in metaphysical terms and in terms of the social life we live. These highest level understandings, and the associated emotions, drive all else.

³⁵ David G Myers (2003), *Intuition: Its Powers and Perils* (Yale University Press).

³⁶ Margaret Boden (1994), *The Creative Mind: Myths and Mechanisms* (Abacus). Arnold H Modell (2003), *Imagination and the meaningful Brain* (MIT Press).

³⁷ “To a Mouse,” by Robert Burns. <http://www.robertburns.org/works/75.shtml>.

³⁸ Antonio Damasio, *Descartes’s Error; The Feeling of what happens* (Vintage, 2000).

³⁹ This is memorably demonstrated in remarks made by Palmer Joss to Eleanor Arroway in the film *Contact*, directed by Robert Zemeckis (1997).

⁴⁰ George F R Ellis and Judith A Toronchuk (2005). “[Neural Development: Affective and Immune System Influences.](#)” In *Consciousness and Emotion*. Ed. Ralph D. Ellis and Natika Newton (John Benjamins), pp. 81–119.

⁴¹ Murphy and Ellis. *On The Moral Nature of the universe.*

Our minds act, as it were, as an arbiter between three tendencies guiding our actions: first, what rationality suggests is the best course of action – the cold calculus of more and less, the economically most beneficial choice; second, what emotion sways us to do – the way that feels best, what we would like to do; and third, what our values tell us we ought to do – the ethically best option, the right thing to do. It is our personal responsibility to choose between them on the basis of our best wisdom and integrity, making the best choice we can between these usually conflicting calls, informed by the limited data available, and in the face of the pressures from society on the one hand (which we must understand as best we can⁴²) and from our inherited tendencies on the other. Our ability to choose is a crucial human capacity.⁴³

Thus the desire to free us from irrationality⁴⁴ leads to the myth of pure rationality, suggesting pure reason alone is the best basis for a worthwhile life. But this is a completely inadequate understanding of causation on which to base a full life. Rationality, faith, hope, and doubt as well as imagination, emotions and values are all important in a full understanding of human choices and decisions. They all interact with each other and are causally important in the real world. The key one is values, related to aesthetics and meaning ('Telos'): this is what ultimately guides our choices and actions, and so shapes both individual lives and society.

The sources of values that help guide the higher emotions are as important to our lives as the rationality that assesses what is happening on the basis of those values. Science can help us determine if we can attain our chosen goals, and see the outcomes that will follow from our chosen values; but it cannot itself substitute for the human choices of such values and goals. This is why scientism is an inadequate basis for a holistic human life.

6: THE DANGERS

Various fundamentalisms are battling to claim sole rights to what a human being is. But if you think of people in a fundamentalist way, you will begin to treat them this way: medically, socially and in policy terms, politically. A strong reductionist view results in thinking of people as less than human, and this will inevitably result in treating them as less than human. I have argued that physics does not give a causally complete understanding of the world - it does not comprehend human intention or indeed any adaptive behaviour. Higher levels of emergent order such as the mind have autonomous causal powers independent of the lower levels of causation (physics, chemistry). But there are many other fundamentalist attacks on humanity, each emphasizing some part of the whole at the expense of the others.

Psychological Fundamentalism: A classic example of fundamentalism was the behaviourist movement that dominated many major psychology departments last century:

⁴² Daniel Goleman, *Social Intelligence* (Arrow Books, 2007).

⁴³ Jacj Martin, Jeff Sugarman, and Janice Thompson. *Psychology and the question of agency* (State University of New York Press, 2003). Robert Kane: *A Contemporary Introduction to Free Will* (Oxford University Press, 2005).

⁴⁴ Sagan, *op cit*.

*“In behaviourism, there was no such thing as a talent or and ability. Watson had banned them from psychology, together with the contents of the mind, such as ideas, beliefs, desires, and feelings. To a behaviourist, the only legitimate topic for psychology is overt behaviour and how it is controlled by the past and present environment... In The Behaviour of Organisms [Skinner], the only organisms are rats and pigeons”.*⁴⁵

This is a seriously inadequate theory in academic terms: it ignores major parts of the network of causation. But the point is that it was then deployed in a social context: Watson wrote an influential child-rearing manual recommending that parents establish rigid feeding schedules for their children and give them a minimum of attention and love. However we now know that it is precisely such attention that is a key need of developing children: indeed they can suffer damage if deprived of parental attention.⁴⁶ Watson was promoting what is in effect child malpractice as if it was indisputable truth. It undoubtedly must have caused harm to many children.

One might think that this kind of hard line is now a thing of the past, but that is not the case; it is being pursued vigorously today, albeit in slightly modified form. According to Merlin Donald,

*“Hardliners, led by a vanguard of rather voluble philosophers, believe not merely that consciousness is limited, as experimentalists have been saying for years, but that it plays no significant role in human cognition. They believe that we think, speak, and remember entirely outside its influence. Moreover, the use of the term ‘consciousness’ is viewed as pernicious because (note the theological undertones) it leads us into error ... They support the downgrading of consciousness to the status of an epiphenomenon .. A secondary byproduct of the brain’s activity, a superficial manifestation of mental activity that plays no role in cognition”.*⁴⁷

This is not just an academic theory about how consciousness works:

*“[Daniel] Dennett is actually denying the biological reality of the self. Selves, he says, hence self-consciousness, are cultural inventions. ... the initiation and execution of mental activity is always outside conscious control... Consciousness is an illusion and we do not exist in any meaningful sense. But, they apologize at great length, this daunting fact Does Not Matter. Life will go on as always, meaningless algorithm after meaningless algorithm, and we can all return to our lives as if Nothing Has Happened. This is rather like telling you your real parents were not the ones you grew to know and love but Jack the Ripper and Elsa, She-Wolf of the SS. But not to worry”.*⁴⁸

This line of thought can hardly be pursued without eventually leading to equally pernicious consequences if you really believe it. If you believe minds are automata, it is logical to treat people as if this is so. There is a devastating effect from such dehumanizing psychological/philosophical views:

⁴⁵ Steven Pinker (2003): *The Blank Slate: the modern denial of human nature* (Penguin).

⁴⁶ http://en.wikipedia.org/wiki/Attachment_theory.

⁴⁷ Merlin Donald (2001), *A Mind so Rare: The Evolution of Human Consciousness* (W W Norton), pages 29, 36.

⁴⁸ Merlin Donald, *A Mind so Rare*, pages 31, 45.

“The practical consequences of this deterministic crusade are terrible indeed. There is no sound biological or ideological basis for selfhood, willpower, freedom, or responsibility. The notion of the conscious life as a vacuum leaves us with an idea of the self that is arbitrary, relative, and much worse, totally empty because it is not really a conscious self, at least not in any important way”⁴⁹

The response to this deterministic and reductionist denial of the core of personhood is multiple. This view is based on laboratory results that fail to take into account the timescales and complexity of real-life interactions, and it does not adequately represent the way the human mind develops and functions as part of a distributed cognitive network. It fails to take into account top-down action in the brain, together with the causal effectiveness of consciousness.

And above all, if it were actually true, then science would not be possible, because we would not have the power to assess theories on the basis of their internal consistency and compatibility with the data. Our brains would be computing output in some internally determined way that would not necessarily relate to any concept we might have of rationally deciding whether theories are scientifically acceptable or not. The whole supposed basis of the scientific enterprise would turn out to be a charade. This dehumanizing view is not necessary, and is self-defeating: if really true it would undermine the very form of rational argument

Another clash of fundamentalism as regard human nature is that between the cultural and biological views.⁵⁰ Those devoted to cultural explanation alone are bitterly fighting those who believe that only biology, and particularly genetic inheritance, matters. There are major feuds going on, particularly as regards the nature of evolutionary psychology and evidence for these theories^{51, 52, 53}. The point I wish to make here is that these factors are both important, and in addition personal choice plays an active role in shaping personality and the brain (Figure 3). Omitting any of these factors is a form of fundamentalism as envisaged in this paper, for it is a way of promoting a partial cause as the whole.

One particularly important area where these kinds of differences play out is as regards teaching of literacy. There are bottom up approaches preferred by some, particularly at present the *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS) project⁵⁴ where the emphasis is on phonics first and then building up language bit by bit, ad opposed to whole-language learning,⁵⁵ where the emphasis is on experiencing language in its meaningful context and developing a coherent understanding of language from that experience. In effect, this is a clash between a bottom-up and a top-down approach to literacy: and what is needed is a sound blend between the two, but with a strong emphasis on the motivation that comes from placing the experience

⁴⁹ Merlin Donald, *A Mind so Rare*, page 31.

⁵⁰ Pinker, *The Blank Slate*.

⁵¹ Stephen Jay Gould (1997), “Darwinian Fundamentalism”. *New York Review of Books* **44**, JUNE 12..

⁵² Harold Kalant, Werner Kalow, Steven Pinker, Reply by Stephen Jay Gould (1997) “Evolutionary Psychology: An Exchange”. *New York Review of Books* **44**, OCTOBER 9.

⁵³ Merlin Donald, Steven Mithen, Reply by Howard Gardner (1998) “The Prehistory of the Mind’: An Exchange”. *New York Review of Books* **45**: MAY 28.

⁵⁴ <http://dibels.uoregon.edu/>.

⁵⁵ <http://www.kidsource.com/kidsource/content3/phonics.whole.p.k12.3.html>.

un a meaningful context. The DIBELS approach emphasizes learning meaningless phonemes in a disciplinary style context, and hence in some cases develops a profound dislike of the school experience that then becomes a major hurdle to any further learning whatever.⁵⁶ This is a fundamentalist approach that causes the kind of damage that such approaches inevitably lead to. Reductionism only understands part of the overall picture – holistic views are more satisfactory and correct. A proper account of humanity takes higher level causes and understandings into account as well as mechanistic aspects.

Finally I will just briefly mention the scourge of fundamentalism in environmental activism that has developed in so many parts of the world, with a tunnel-vision focus on some specific environmental issues, to the exclusion of other considerations. This occurs in relation to energy technology and biotechnology in particular, as well as in relation to conservation biology. A more integrated approach is desperately needed.⁵⁷

7: CONCLUSION

Fundamentalisms comprehend part of the causal nexus and proclaim it to be the whole. They therefore reduce the whole to a part and ignore major factors of importance. This occurs across the spectrum of understanding, resulting in diminished pictures of existence and of human nature. The need is to take the whole into account. It is expressed well by John Dupre as follows:

*“Scientific Imperialism is the tendency to push a good scientific idea far beyond the domain in which it was introduced and often far beyond the domain where it can provide much illumination. My own project is to insist that pluralism goes all the way down to the basic metaphysical issues of causality and of what kinds of things there are. This perspective makes the kinds of narrowly focused scientific projects I have been examining look as philosophically misguided as they have proved empirically unrewarding”*⁵⁸

Any scientific speciality looks at important aspects of what is going on, but these are only a part of the whole:

*“These are important fragments of the picture that we have spent the last few millennia trying to put together. But they are fragments, and trying to make one or even a few such fragments stand for the whole presents us with a deformed image of ourselves An adequate view of ourselves would include many parts. One of the most traditional objections to such one-sided reductive pictures is that they leave no room for human autonomy or freedom. I have tried to show that the philosophical context in which I consider these reductive views does indeed provide an endorsement of the traditional objection. It would include biological organisation, an account of how societies function, and an account of how aspects of social organisation contribute to the endowment of human individuals with complex capacities that would in principle be beyond the reach of an isolated member of our species”*⁵⁹ .

⁵⁶ Kenneth S. Goodman (2006) *The Truth About DIBELS: What It Is - What It Does* (Heinemann).

⁵⁷ William F. Baxter (1974). *People or Penguins: The Case for Optimal Pollution*. (New York: Columbia University Press)

⁵⁸ John Dupre (2002) *Human Nature and the Limits of Science*, (New York: Oxford University Press).

⁵⁹ Dupre, *Human Nature and the Limits of Science*.

We can engage with life in different ways: mainly on a scientific basis, obtaining rational impersonal answers based on simplified analytic models and repeatable experimental observations, with all the strengths and limitations that entails, or alternatively in terms of personal and communal faith and hope, based on wider aspects of our experience, and addressing other dimensions of understanding.

Either approach by itself is partial and limited. The suggestion is that we need a focus on the nature of being human that involves the integral whole – that celebrates and nurtures an ever-changing and deepening interaction between rationality, emotion, values, faith, and hope. The interaction between them has the potential to help produce the kind of integrative worldview, incorporating all these elements, that will ultimately be most satisfying. It can take religious and spiritual views into account as well as scientific standpoints and technological achievement. They all represent parts of the overall whole that makes a complete human being.

Thus the antidotes to fundamentalism are embracing the multi-causal nature of things, understanding and relating it to context. It involves being always ready to see the wider causal patterns, rather than acknowledging only that part you are comfortable with or expert in. And this applies particularly to the overall philosophical view whereby we understand the nature of our existence: which entails our attitudes to religions and spiritual issues. An open minded explorative approach enables a freedom to engage with the whole. And that is the way to our own freedom.

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The Hierarchy of Structure and Causation

Ethics/Aesthetics/Philosophy
Sociology/Economics/Politics
Psychology
Botany/Zoology/Physiology
Cell biology
Biochemistry
Chemistry
Atomic Physics
Particle physics

Figure 1: *The hierarchy of structure and causation for intelligent beings, as reflected in the relevant academic subjects.*

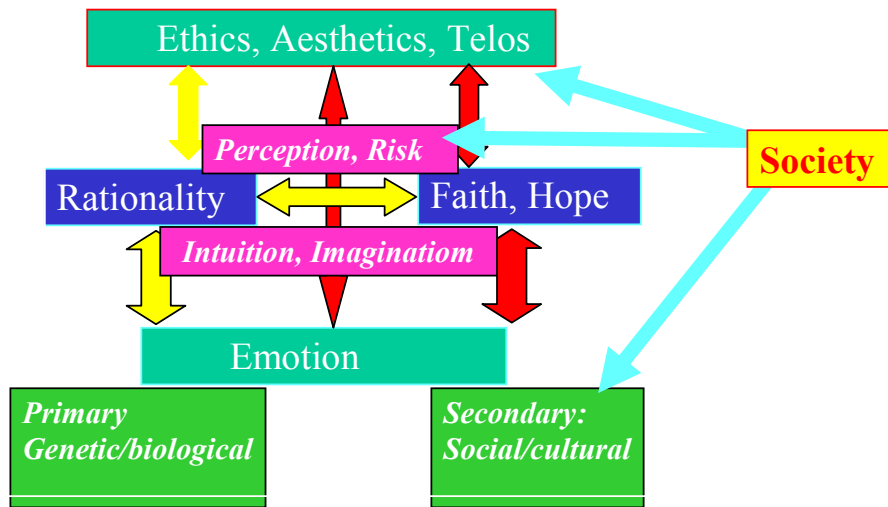


Figure 2: Factors affecting actions/decisions: Each of Rationality, Emotions, Ethics, and Faith/Hope are influenced by each of the other, with reason being the key player trying to bring the others into harmony in the face of insufficient evidence. Perceptions and attitudes to risk modulate responses. Intuition acts as a short-cut for rationality, embodying an ability to quickly act by activating learnt patterns of understanding in response to recognized patterns of occurrences; thus intuition is learnt rather than hard wired. Imagination opens up the world of what might be.

Figure 3

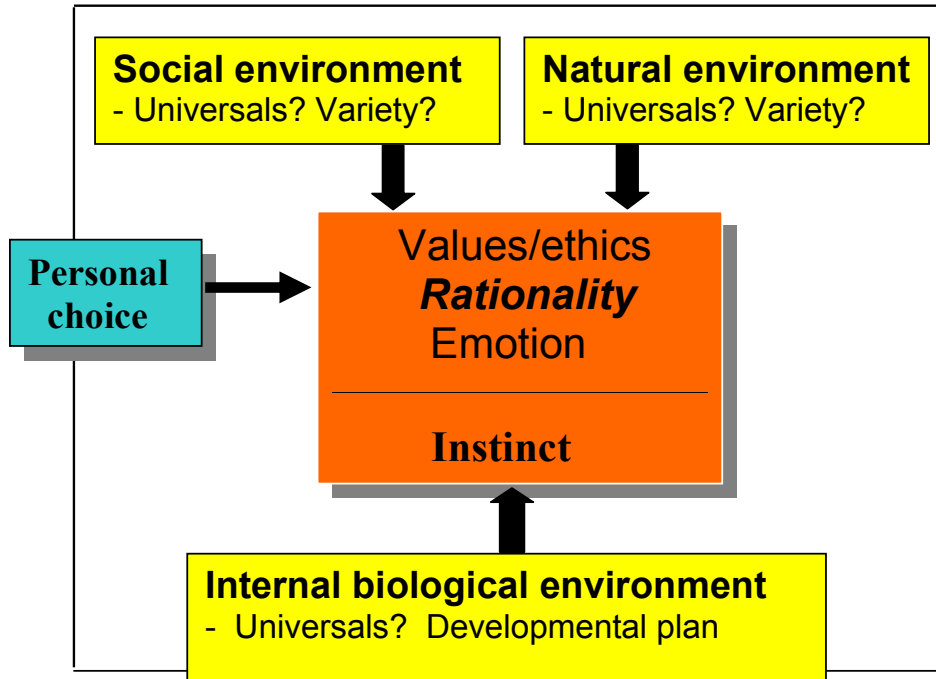


Figure 3: The nature-nurture issue: three main factors that contribute to the development of the mind are the social environment, the natural environment, and our inherited biological makeup (underlying a universal human development plan). They all interact with each other to produce the specifics of higher brain functioning via the process of Affective Neural Darwinism, shaped by the primary emotions. However variety in each environment as well as in the genetic inheritance leads to variety of outcome, as does personal choice.