



laetus in praesens

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Potential of Feynman Diagrams for Challenging Psychosocial Relationships?

Comprehending the neglect of an unexplored possibility

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Introduction

The complexity and subtlety of the arguments and models offered by fundamental physics are widely recognized as one means of comprehending reality, . To most they are essentially incomprehensible, if not irrelevant to the experience of daily life. It is of course the case that another form of complexity is evident in psychosocial systems, whether at the macro-level of global modelling or at the micro-level of interpersonal relationships.

As the current crisis has demonstrated, it is far from clear that macro-level systemic models have been adequate to the challenge of global governance (*Uncritical Strategic Dependence on Little-known Metrics the Gaussian Copula, the Kaya Identity, and what else?* 2009). More poignant is the challenging nature of interpersonal relationships, as endlessly explored in personal experience and dramatisations -- currently highlighted by the preoccupation with "same-sex marriage", and without consideration of other possibilities (*Marrying an Other whatever the Form: reframing and extending the understanding of marriage*, 2013; *Transcending Simplistic Binary Contractual Relationships What is hindering their exploration?* 2012).

In these circumstances it is striking to note the role played by [Feynman diagrams](#) in providing a common language through which the mathematical complexity of fundamental physics can be succinctly implied -- in such a way as to facilitate discourse, whilst avoiding any immediate need for decoding and interpreting the significance of the underlying equations. The diagrams were promoted in their final form by the renowned physicist [Richard Feynman](#) and have proven to be a remarkable medium of discourse over many decades, as noted by [David Kaiser](#) (*Drawing Theories Apart: the dispersion of Feynman Diagrams in postwar physics*, 2005).

Essentially the diagrams offer a way of engaging with complexity without being rendered impotent by doing so. Given their archetypal simplicity as diagrams, and the fundamental nature of what they are able to "hold", the question to be asked is whether some form of "Feynman diagram" would be of considerable value to discourse regarding challenging psychosocial relationships. More provocatively, the question might be framed as to whether Feynman diagrams could themselves be understood even more generally such as to encompass the cognitive dynamics of psychosocial relationships. This possibility would be consistent with the cognitive psychology of [George Lakoff](#) and [Rafael Nuñez](#) (*Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2001), as further elaborated by [Chris Fields](#) (*Metaphorical Motion in Mathematical Reasoning: further evidence for pre-motor implementation of structure mapping in abstract domains*, *Cognitive Processing*, 2013).

Potentially of even greater relevance to this argument is the manner in which this possibility has been neglected. This is explained in part by challenges made to any equivalence between comprehension of "unnatural" psychosocial systems and of "natural systems", highlighted by debate regarding the [Sokal Affair](#) -- the hoax perpetrated by the physicist [Alan Sokal](#) to mock and deprecate the explorations of postmodern social sciences. As previously suggested with respect to mathematical metaphors, the current vulnerability of a global civilization (so dependent on collective confidence), indicates a degree of urgency to further exploration (*Risk-enhancing Cognitive Implications of the Basic Mathematical Operations: ADD, MULTIPLY, DIVIDE and SUBTRACT*, 2013; *Mathematical*

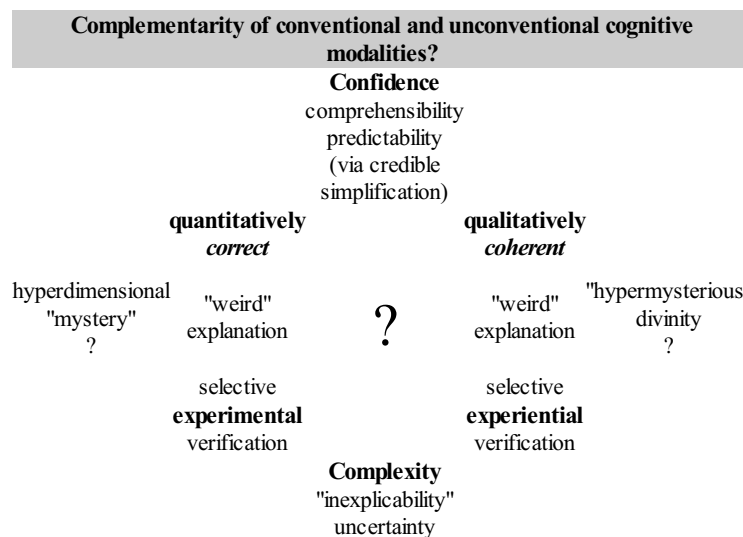
Theology -- Future Science of Confidence in Belief: self-reflexive global reframing to enable faith-based governance, 2011).

This exploration is largely inspired by a confluence of threads in the work of **Johan Galtung** (*Chemical Structure and Social Structure: an essay on structuralism*, 1977; *Peace Mathematics*, 2012), together with his direction of the sub-project on **Forms of Presentation** (FoP) of the Goals, Processes and Indicators of Development (GPID) project of the United Nations University (1979) -- and the challenges these might imply (*Forms of Presentation and the Future of Comprehension*, 1984).

The following argument primarily takes the form of a survey of relevant web resources which may be of inspiration to others -- whatever may prove to be the meaning of "inspiration" and enlightenment within such complementary diagrams. A key point made is that through psychosocial interaction in daily life, and its representation by the media, **people are necessarily already very familiar with the degree of complexity that a "Feynman diagram" presents in schematic form**. The question is whether, as a pattern language, it suggests a wider range of fruitful possibilities -- notably in collective processes -- and how any such pattern can be cognitively embodied.

Is it feasible to imagine a **cognitive interface** with **complexity of a very high order** and how it might be possible to engage with it fruitfully in practice? Feynman diagrams are indicative of such a process with respect to the microcosm of fundamental particles of which humans are composed -- understood **quantitatively** in the light of **complex numbers** and **quantum electrodynamics** (QED). The elegant visual rendering of the **Mandelbrot fractal** offers a related experience, as do renderings of the "exceptionally simple" **Lie Groups** of symmetry theory.

As a pattern language, is the emergence and use of Feynman diagrams then helpful in indicating the possibility of a **qualitative analogue** to that interface? Does it constitute a key to enabling comprehension and development of "**qualum psychosocial dynamics**" (QPD) in terms of **complex qualities**, whatever they might be understood to mean? The complementarity of the conventional and unconventional modes might be represented by the following.



The above scheme distinguishes the contrasting columns of "science" versus "belief" -- as challenged by complexity in the quest for comprehension and confidence. Typically proponents identifying with either column find the other either fundamentally absurd or misguided. Each has problematic consequences, especially from the perspective of the other. It is intriguing to note that one achieves a sense of "coherence" from quantitative correctness derived experimentally, whilst the other achieves a sense of "correctness" from qualitative coherence derived experientially.

The columns are potentially complementary, but this would call for challenging exploration of their respective cognitive methodologies, as argued separately (*Mathematical Theology: Future Science of Confidence in Belief*, 2011). The following argument explores one thread in this potential complementarity in terms of the "science" column.

Questionable appreciation of quantum electrodynamics

The argument which follows calls for a preliminary comment on the imaginative psychosocial response to quantum electrodynamics by those who have little formal expertise in the issues for which it is valued. As asserted by Richard Feynman: *I think I can safely say that nobody understands quantum mechanics* (*The Character of Physical Law*, 1965). The questionable enthusiasm regarding the matter can be further clarified by a review by Amanda Gefter (*Quantum Gods Don't Deserve Your Faith*, *New Scientist*, 22 April 2009) of a book by **Victor J. Stenger** (*Quantum Gods: creation, chaos and the search for cosmic consciousness*, 2009):

Quantum mechanics is remarkably weird: even though it is well understood mathematically and can produce accurate, ultra-precise predictions, nobody really knows what it means. This leaves lots of room for people in search of the spiritual -- and who are not burdened by any knowledge of mathematics - to impose on it whatever quasi-religious beliefs or interpretations they like. In this much-needed book, physicist Victor Stenger isolates and then debunks the claims of two kinds of "quantum belief". One he calls "quantum theology" because it offers quantum physics as a way for God to act in the world without violating natural laws. The second is "quantum spirituality", which is rooted in the even vaguer notion that quantum physics connects the human mind to the universe, allowing us to create our own reality. Like most scientists, Stenger believes most religious claims can be

dealt with scientifically, so beliefs such as creationism or astrology aren't immune to science, they are merely wrong.

It is appropriate to note that the special theory of relativity is only a century old and was fundamental to the reframing of Newtonian mechanics. Fundamental physics is not a cognitively self-reflexive process -- despite indications and aspirations to the contrary -- rather it is a domain of exploration defined for cognitive convenience by what might be termed "[scientific gerrymandering](#)". It has arrogated to itself the freedom to give considerable credibility to the "weird" and to "nothing" -- insights which most find essentially meaningless in practice ([Lawrence M. Krauss, *A Universe from Nothing: why there is something rather than nothing*, 2012](#)).

In this context the affirmation by physics that any particular belief favoured within society is "wrong" is simplistic at best -- and unworthy of its methodology, although possibly symptomatic of its challenges. It merits being set within a larger framework, given that physics has proven to be the discipline that is most complicit in the development of weapons of mass destruction -- a process from which it continues to derive significant funding and for which it denies all responsibility. Social "responsibility" has no meaning within the discipline of physics. There is no evidence of the application of the quality and subtlety of thinking for which it is renowned to the bloody violence engendered by conflicting simplistic assertions and beliefs.

Whilst Stenger may "believe" that most "religious claims can be dealt with scientifically" and "aren't immune to science", there is no proof that science has contributed significantly to reconciling conflicting belief systems -- even amongst the sciences. This assertion regarding the use of scientific insight -- especially that of physics regarding the relativity of frames of reference -- needs to be distinguished from the sociopolitical initiatives of the renowned [Pugwash Conferences on Science and World Affairs](#). These bear greater similarity to those of many worthy non-scientific bodies characterized by their many fruitless recommendations and calls for remedial action.

The title of Stenger's preceding book ([God: The Failed Hypothesis: how science shows that God does not exist](#), 2007) is strangely reminiscent of that of Krauss -- with neither likely to engender a convincing universal consensus regarding their complex implications. The title of Stenger's subsequent book ([God and the Folly of Faith: the incompatibility of science and religion](#), 2012) is ironical at best -- given the professed religious faith of the country providing most funding for research by physicists, the folly of their own "faith" (demonstrably subject to radical revolution over time), and the "incompatibility" currently fundamental to the relation between the two "religions" of physics: quantum mechanics and relativity theory.

Feynman himself exemplifies the challenge for physics. He has declared:

The theory of quantum electrodynamics describes nature as absurd from the point of view of common sense. And it agrees fully with experiment. So I hope you can accept nature as she is -- absurd. ([QED : The Strange Theory of Light and Matter](#), 1985)

However, in the discussion of "belief" in "God" by [Jesse Bering](#) ([God Instinct: the psychology of souls, destiny and the meaning of life](#), 2010), Feynman is quoted as declaring that:

God was invented to explain mystery. God is always invented to explain those things that you do not understand. Now, when you finally discover how something works, you get some laws which you're taking away from God; you don't need him anymore. But you need him for the other mysteries. So therefore you leave him to create the universe because we haven't figured that out yet; you need him for understanding those things which you don't believe the laws will explain, such as consciousness, or why you only live to a certain length of time -- life and death -- stuff like that. God is always associated with those things that you do not understand. (originally in Paul C. W. Davies and Julian R. Brown, [Superstrings: a Theory of Everything](#), 1988, pp. 208-9)

Bering, a regular contributor to *Scientific American*, prefaces this quotation by noting that:

Many nonbelievers favor the view that humans resort to such superstitious explanations without sound, scientific causal knowledge. As we increasingly understand how the natural world operates, say defenders of this view, our need for God increasingly shrivels and it can be expected to disappear altogether -- eventually. In theological parlance, this view is referred to as the "[God of gaps](#)": because we need to feel in control over the fickle doings of nature, God is plugged in by default as the responsible party wherever there are gaps in our knowledge. (p. 143)

Using the term, "plugged in" as have others, Bering argues that plugging God into the gaps works well because our Theory of Mind enables us to attribute causes to an agent who presumably knows something that we do not. However he then asks why it is not possible to "turn off" our Theory of Mind in such cases -- concluding the argument with the statement that atheism is more a verbal muzzling of God than an effective cognitive exorcism.

The difficulty for physics is that it is demonstrably adept at "plugging in" an every larger number of "dimensions" to fill the gaps required to ensure the adequacy of any explanation -- and experiences no embarrassment in doing so. It is questionable whether these can be distinguished from [fudge factors](#) -- as God emerges in Feynman's argument. Although beyond the comprehension of all but the very few (whose comprehension it is virtually impossible to challenge or prove), this is done in the unexamined expectation that this constitutes meaningful coherence and credibility, inviting the confidence of all but the ignorant and the misguided. The equivalence to "plugging in" a mysterious "deity" -- as something to believe in -- is all too evident.

Given the distinctive role of "[cardinals](#)" in Catholicism -- transcended by that of the Pope -- there is a related irony to the role of "[cardinals](#)" in mathematics. The Pope is understood by the faithful to be a representative of the transfinite within the mundane -- even as

an "Earthly Embodiment of a Theory of Everything". Recent work by [Harvey Friedman](#) (*Boolean Relation Theory and Incompleteness*, 2010), as described by Richard Elwes (*It doesn't add up*, *New Scientist*, 14 August 2010), suggests that:

The only way that Friedman's undecidable statements can be tamed, and the integrity of arithmetic restored, is to expand [Peano's rule book](#) to include "[large cardinals](#)" -- monstrous infinite quantities whose existence can only ever be assumed rather than logically deduced.... We can deny the existence of infinity, a quantity that pervades modern mathematics, or we must resign ourselves to the idea that there are certain things about numbers we are destined never to know.

Feynman's diagrams successfully addressed the challenge of the simplest electromagnetic interactions, such as those between two electrons in which one was understood as emitting a [virtual particle](#) then absorbed by the other. With respect to "infinity", especially problematic were those diagrams including loops in space-time in which the virtual particle was emitted and absorbed by the same electron -- giving rise to loops in which the maximum energy grew to infinity in that interaction. This implication spoiled the description of an isolated electron -- suggesting that it had infinite energy and infinite charge. The resultant difficulties in calculation were bypassed through a procedure termed [renormalization](#). This effectively "cancels out infinities" -- yielding satisfactory results highly consistent with experiment.

Such use of "renormalization" could be fruitfully compared with its extensive use in psychosocial literature. The "cancellation of infinities" might then correspond questionably to the process of reducing the "infinities" of individual self-referential subjective experience (aspiration and belief) to collective expectations regarding objective [behavioural norms](#). The process could potentially be compared to "[reeducation](#)" -- with its problematic connotations. Feynman diagrams could offer a pattern language through which to distinguish such tendencies. The concern is whether some seemingly irrational sense of "infinite" and "plenitude" is the essence of "being human" -- irrespective of its inexplicability. The reduction of such "nonsense" to a "mechanical" explanation should then be explored with care.

A recent issue of the *New Scientist* (11 May 2013), featuring [dark energy](#), highlights the fact that "*it is two-thirds of everything..., its imprints are everywhere..., and we still have no idea what it is*". Whether or not God should be invoked, or yet more intricate dimensionality beyond human ken, there would appear to be a strong case for a cognitive [Precautionary Principle](#), namely avoidance of unproductively definitive assertions the future may be obliged to call into question -- [Newtonian mechanics](#) comes to mind. There is a curious correspondence in human progress towards a Theory of Everything to a form of the [Peter Principle](#), namely that those adhering to a belief system, through which they are recognized as giving expression to ever greater comprehension, will eventually be "promoted" beyond their capacity -- to deliver a credibly comprehensible explanation.

Whilst physicists choose to make categorical assertions about society, deprecating the nonsensical nature of its belief systems, they have proven completely unable to offer any fruitful insight into its incommensurable frames of reference -- in which they are variously embedded, and from which they derive their funding. More embarrassing, under these circumstances, are the implications of a recent survey of quantum physicists showing that they themselves do not share a consensus on the nature of quantum electrodynamics and are perplexed by the meaning framed by the models they variously prefer ([Sean Carroll, The Most Embarrassing Graph in Modern Physics](#), 17 January 2013; [Sean Carroll on the embarrassment of quantum mechanics](#), 28 February 2013).

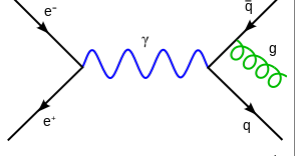
In a much troubled world, the quality of the dogmatic debate between science and religion regarding their respective "beliefs", tends to be worthy of neither -- with dimensions beyond the skills of either to transcend. In the archetypal shadowy combat between adherents of the two, does Bering's *God Instinct* call for a deprecatory riposte with the title *Mathematical Instinct*, or rather *Mathematical Intuition*?

As is only too clear, neither has proven able to address the disruptive dynamics of a global civilization coherently and effectively. Whilst they are both part of the problem, they fail to understand that only by recognizing that will they achieve the ability to understand the nature of the solution required -- whatever its nature may prove to be.

Characterisation of Feynman diagrams

It is far beyond the scope of this argument (or the competence of the author) to provide an elaborate introduction to Feynman diagrams as the standard method for communicating complicated high-energy physics calculations. The focus is rather on comprehending the potential relevance of such thinking for the "high-energy" psychosocial interactions which prove to be so problematic and bloody in practice -- as reported in the media on an hourly basis.

Apparent simplicity: The apparently archetypal simplicity of the diagrams is illustrated by the following image from the [Wikipedia explanation](#).

QED	Indicative Feynman diagram	QPD
<p>Conventional representation of "quantum electrodynamics" (QED) between wave-particles variously characterized quantitatively</p>		<p>Unconventional representation of "qualum psychodynamics" (QPD) between challenging othernesses variously characterized qualitatively?</p>

The clearest explanation located, accessible to non-physicists, is that of *Let's draw Feynman diagrams* (*Quantum Diaries*, February 2010). The *Diaries* are a project of [Interactions.org](#), a network of physics laboratories. Other explanations include the video by [Brady Haran](#) (*Sixty Symbols*, University of Nottingham). The historical process of uptake of the diagrams, and the resistances to them, can be most readily appreciated in the article of David Kaiser (*Physics and Feynman's Diagrams*, *American Scientist*, 2005), effectively a

summary of his book (*Drawing Theories Apart: the dispersion of Feynman Diagrams in postwar physics*, 2005).

It is appropriate to note that software exists to enable the drawing/generation of a multiplicity Feynman diagrams (see [FeynDiagram](#); [FeynEdit - a tool for drawing Feynman diagrams](#)). It is also appropriate to mention their elaboration with coloured paper in an educational environment by students of quantum physics (Natalie Kay-Thatcher, *Feynman Diagrams*, 2012; *How to Start a Feynman*, 2011).

Requisite craziness: As becomes apparent from the account of Kaiser, it was a case of a (strategically) vital aid to comprehension of complexity which was incomprehensible to many of those who were later to adopt it widely. A key figure in enabling this understanding was **Freeman Dyson** (*The radiation theories of Tomonaga, Schwinger, and Feynman*, *Physical Review*, 1949). It was he who was later to remark that:

When a great innovation appears, it will almost certainly be in a muddled, incomplete and confusing form. To the discoverer, himself, it will be only half understood; to everyone else, it will be a mystery. For any speculation which does not at first glance look crazy, there is no hope! (*Innovation in Physics*, *Scientific American*, 199, No. 3, September 1958)

Dyson made the remark in commenting on the much-cited response of **Niels Bohr** to **Wolfgang Pauli**:

We are all agreed that your theory is crazy. The question which divides us is whether it is crazy enough to have a chance of being correct. My own feeling is that it is not crazy enough.

Aesthetic aids: For a psychosocial system built on the shifting sands of ever more widely acknowledged contradictions, the craziness of advocated alternatives may then be inadequate to the challenges to be faced. In the absence of any equally insightful account of *Innovations in Psychosocial Sciences*, the strange challenges of "global" governance and psychosocial dynamics may well be only comprehensible through other more "crazy" means, as Niels Bohr said of understanding of atoms and their "globality":

When it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images.

A similar point has been made with respect to complexity by the biologist/anthropologist Gregory Bateson, in explaining why "we are our own metaphor", pointed out to a conference that:

One reason why poetry is important for finding out about the world is because in poetry a set of relationships get mapped onto a level of diversity in us that we don't ordinarily have access to. We bring it out in poetry. We can give to each other in poetry the access to a set of relationships in the other person and in the world that we are not usually conscious of in ourselves. So we need poetry as knowledge about the world and about ourselves, because of this mapping from complexity to complexity. (Cited by Mary Catherine Bateson, *Our Own Metaphor: a personal account of a conference on the effects of conscious purpose on human adaptation*, 1972, 288-9)

With respect to Feynman diagrams, as introduced in the *Quantum Diaries*, the simplicity of these diagrams has a certain aesthetic appeal, though there are many layers of meaning behind them. The argument is that it is relatively easy to understand the first few layers and to interpret their physical meaning. Although they appear aesthetically simple, each element in the space-time diagram represents an underlying particle interaction phenomenon with strict rules governing how they are constructed.

"Path integration": The diagrams emerged as a consequence of Feynman's innovative [path integral formulation](#) of quantum mechanics - the quantum theory of interacting electrons and electromagnetic fields (known as quantum electrodynamics). He realized the possibility of a great simplification of that complexity -- through formulating a set of rules for writing the results without deriving each one. The diagrams are thus graphical shorthand to represent exchange forces -- conserving charge, baryon number and lepton number at each point of intersection. This shorthand tends to raise doubts amongst students of physics who are nervous about the use of "cartoons" when "hazy on the mathematical foundation that supposedly underlies them" -- as expressed by **Michael H. Seymour** (*The Meaning of Feynman Diagrams*).

As clarified by **Silvan S. Schweber** (*Feynman's Legacy*, *American Scientist*, May-June 2011):

In the nonrelativistic domain, Feynman conceived a microscopic entity (such as an electron) going from space-time point (x_1, t_1) to space-time point (x_2, t_2) as being able to take any path joining these two points, and he assigned a complex amplitude to each possible path that depended on the force field present and on the particular path. All these amplitudes were to be added, and the absolute square of that sum yielded the probability that the particle would go from (x_1, t_1) to (x_2, t_2) . Feynman was able to determine which particular assignment of weight for each path yielded the usual Schrödinger formulation of quantum mechanics. In Feynman's formulation, a "particle" is clearly something very different from its classical conceptualization

The question raised by this approach is whether an analogous argument could be made metaphorically with respect to learning pathways and the manner in which knowledge and insight are "integrated" -- as framed by variants of the classic adage: *there are a thousand paths to the top of the hill, but the view from the top is the same*. Missing in much contentious discourse is the manner of their integration. Silvan S. Schweber (2011) continues:

To generalize the theory to describe quantum mechanically the interaction of charged particles with the electromagnetic field, Feynman introduced a graphic shorthand to help him translate all the terms in the perturbative expansions of his integral over paths into calculable expressions for the transition amplitudes being considered. Not only did these diagrams eventually come to represent all the contributions to a given process, such as an electron being scattered by a proton and emitting a photon, they also became an elegant way to organize and visualize the perturbation series.

Only lines entering or leaving the diagram represent observable particles with their direction of travel indicated by arrows. Virtual particles are represented by wavy or broken lines and have no arrows. The diagrams have enabled many to engage in a form of diagrammatic calculation -- now applied to all of the new theories of current and proposed new particles and interactions. They can be calculated to high order and are now generated by computer and calculated by computer.

Reservations: Feynman diagrams are an unusual "representation" of quantum electrodynamic processes. They only offer a way of comprehending and enabling some distinct processes of calculation and their interrelationship.

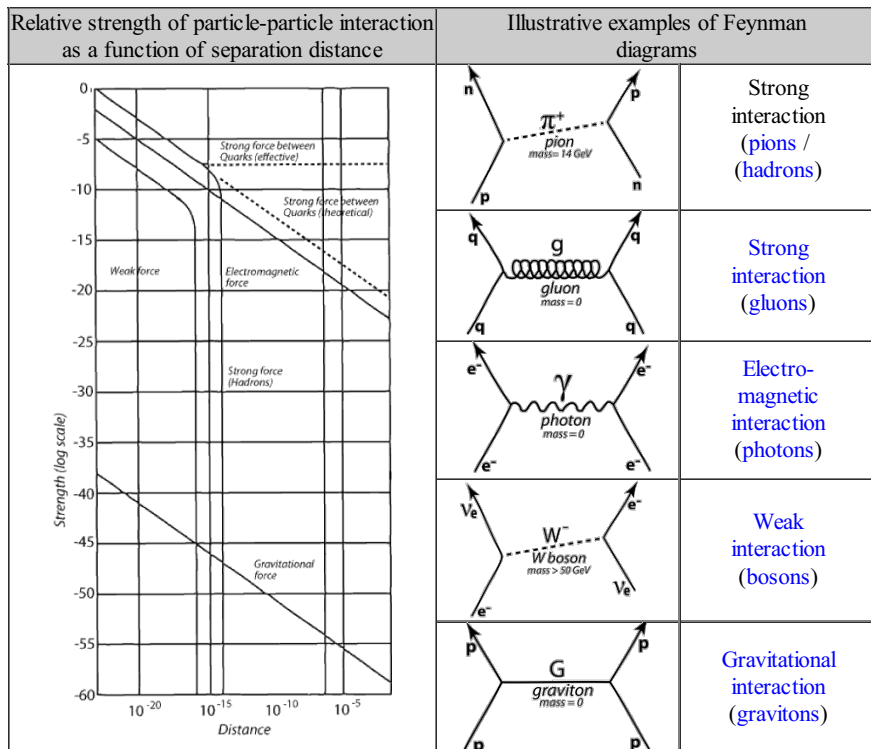
In exploring the possibility of an analogue, it cannot be too heavily stressed that its use would then only offer a way of comprehending the qualitative distinctions between some experiential processes, and their interrelationship. It would thereby enable its exploration and communication. As a pattern language, the elements of the diagrams are imbued with recognizable significance only to a degree whose full limitations remain to be explored. They are only indicative and symbolic -- implying the subtle significance of intangibles, rather than encompassing them comprehensively.

Possible analogues: An intriguing question is whether the archetypal simplicity of the diagrams is reminiscent of those symbols used in a variety of cultures to represent fundamental interactions, potentially including those emerging from religions. The image above, for example, is suggestive of the challenging relationship between "good" and "evil", or (less controversially) between "positive" and "negative" (as discussed below). The question might then be framed in terms of cognitive constraints on representational "appropriateness" (*Comprehension of Appropriateness*, 1986).

It is of course the case that Feynman diagrams are used to encompass the variety of relationships between "negative" and "positive" particles (electrons and positrons), and their variants. It is perhaps only the epistemologies of Eastern religions that endeavour to elaborate their cognitive equivalents, notably the *All Embracing Net of Views*, much appreciated by Buddhists (as discussed in the [Annex](#)).

The diagrams may be recognized as having some of the characteristics of the "transitional objects" recognized in psychological development -- surrogates for greater comprehension which may later prove possible.

For the purpose of this argument they could be understood as a form of catalyst (*In Quest of Mnemonic Catalysts -- for comprehension of complex psychosocial dynamics*, 2007). They could also be appreciated as a means of engaging with that to which Ludwig Wittgenstein alluded with the famous phrase: *Whereof one cannot speak, thereof one must pass over in silence* (*Tractatus Logico-Philosophicus*, 1922).



The presentation above is an adaptation of that regarding Feynman diagrams in William A. Tiller, et al. (*Conscious Acts of Creation: the emergence of a new physics*, 2001). To what extent is the graph on the left suggestive of the relation between the various psychosocial forces (as experienced) -- in terms of their "strength" and a sense of "distance" or "proximity". The associated "energy" merits consideration (*Reframing Sustainable Sources of Energy for the Future the vital role of psychosocial variants*, 2006).

Credibility of psychosocial analogues of Feynman diagrams

This section takes the form of an [Annex](#) organized as follows:

[Progressive recognition of the cognitive significance of visualization](#)
[Elucidating the general principles of diagrammatics and visualization](#)
[Social networking as offering a degree of formalization of complex relationships](#)
[Multi-loop causal implications encompassed by Feynman diagrams](#)
[Implication of the exemplary irrelevance of Feynman diagrams as employed](#)
[Unconventional explorations of the psychosocial relevance of Feynman diagrams](#)
[Implications of Feynman diagrams in terms of other cultural perspectives](#)
[Cognitive embodiment in time in contrast to extra-temporal explanation](#)

Urgent need for subtle representation of positive-negative relationships through a pattern language

The argument above has endeavoured to highlight the case for "getting real" with respect to the psychosocial dynamics which notably give rise to violence and death on a daily basis, and for the subtler forms of [structural violence](#). The fruitfulness of expressions of unctuous regret and appeals for peace need to be factored into those dynamics. Particle physics has developed vast expertise in the study of the nuances of positive and negative charges -- according to their spin and other characteristics -- and in relation to light.

Given the acclaimed world leadership role of the USA, serious consideration of the nature of the relationship of "negative" and "positive" - and the manner in which inspiration is engendered or lost -- is warranted, if the following are to be taken seriously.

Good-Evil: Especially problematic are cases of the affirmation of the "other" as being evil, as fruitfully reviewed by [Wendell Bell](#) (*All About Evil*, *World Future Society Forum on Future Generations*, 28 October 2002):

- This has been most notably explicit in the case of Barack Obama on the occasion of his acceptance speech for the Nobel Peace Prize, asserting: ***For make no mistake: evil does exist in the world*** (*Remarks by the President at the Acceptance of the Nobel Peace Prize*, 10 December 2009). Is this a case for re-examining the justification for the highly influential *Malleus Maleficarum* (1487), namely the methodological "instrument" with which [Galileo](#) was encouraged to recant by the Catholic Church regarding his "erroneous" views on the heliocentric model of the solar system? Or are [Abu Ghraib](#) and [Guantanamo Bay](#) indications that this has indeed already been done? Has the recognition resulted in a US government agency being mandated to deal with the phenomenon -- perhaps secretly of necessity? Has the equivalent been proposed internationally? If not, why not? Is the struggle against "terrorism" and "extremism" to be understood as a modern reframing of the systemic role of witchcraft, as previously considered (*Norms in the Global Struggle against Extremism: "rooting for" normalization vs. "rooting out" extremism?* 2005).
- Similarly, in relation to the [Boston Marathon bombings](#), the US Secretary of State, John Kerry asserted that *We've been in direct confrontation with evil* (*BBC News*, 19 April 2013). In both cases, such recognition presumably has the full support of the President's Chief Science Adviser, as head of the [Office of Science and Technology Policy](#), and of the [President's Committee of Advisors on Science and Technology](#) -- and of the associated US National Academy of Sciences, with the seeming acquiescence of physicists. These might otherwise be assumed not to have the professional capacity to recognize the phenomenon. Any reservations regarding this understanding are presumably to be seen as subject to the policy sanctions regarding terrorism: *You're either with us or against us* (as notably articulated by Hilary Clinton on 13 September 2001).
- The difficulty is that Obama is himself framed as "evil" by many of his fellow citizens, just as the Christian-inspired US is framed as "satanic" by many of Islamic inspiration -- with that favour being duly returned. Some would argue that opposing political parties in a democracy tend to see each other as fundamentally misguided, if not essentially "evil" in their inspiration. This could be said to follow from the preoccupation with adhering to the "party line" -- ensuring "alignment" with the programme. Each party must then necessarily see any other as being "out of line". This reinforces the curious irony that a democracy is the encounter between parties that perceive each other to be "malign". Such appreciation is exacerbated in the UK by prefixing reference to leadership roles in any opposition with the term "shadow" ([Shadow Chancellor](#), etc), given their membership of the [Shadow Cabinet](#). A leading member of the Blair Cabinet was even caricatured as the [Prince of Darkness](#).
- A month following the Boston Marathon bombings, the US has been confronted by a major tornado disaster in Oklahoma, with far greater devastation and numbers killed. It is unclear how official policy may frame this as a "direct confrontation with evil", although many affected would see their experience as contrasting fundamentally with "good", especially since funding for storm shelters, promised on a previous occasion, had not been received (surely to be construed as a manifestation of "evil"?). Within some religious frameworks (especially in the past), any such disaster is clearly to be understood as the work of "evil forces", although others would frame it as the Hand of God -- "*working in mysterious ways his wonders to perform*". It is indeed understood as an [Act of God](#) by the insurance industry. The subtlety of such argument was previously explored in relation to [Hurricane Katrina](#) (2005) in the same region (*Acts of God vs Acts of al-Qaida: Hurricane Katrina as a message to Bible Belt America?* 2005). The responsibility of God in such matters has been explored in a comedy about an individual who, having suffered losses from a lightning strike, undertook a class action suit against a range of religions claiming to be representatives of God (*The Man Who Sued God*, 2001).

The manner in which "good" and "evil" are variously confused is also evident in the case of the weather more generally -- understood explicitly by some to be "bad" when it rains, despite the possible approval of farmers, otherwise potentially faced with the disastrous

effects of a "bad" drought. In the case of destructive wildfires in Australia, these are well-recognized as being of benefit to the life-cycle of eucalyptus forests. More controversial is the manner in which a successful drone strike is acclaimed as "good" by the perpetrators, irrespective of the interpretations of those suffering collateral damage -- who may frame a successful IED explosion as correspondingly "good".

Positive-Negative: The complementary framing to be recognized is the widespread focus on the "positive" as being typically upheld as unquestionably synonymous with the appropriate and the "good".

- Military success is then necessarily framed in such terms (by either side). Similarly any birth is welcomed as "good", irrespective of any consideration of the possible consequences in the absence of resources -- whilst any death may be deplored as "evil", whether or not a person in agony welcomes it as a relief (and others may accept it as "one less mouth to feed").
- An associated process, and its implications, is well explored with respect to the USA in a book, variously titled, by [Barbara Ehrenreich](#) (*Bright-sided: How the Relentless Promotion of Positive Thinking Has Undermined America*, 2009; *Smile Or Die: How Positive Thinking Fooled America and the World*, 2010).
- Systemically this conflation of preoccupations and processes, deprecating the negative, is questionable in the light of the implications for the functioning of any system, and especially electrical systems. This is more specifically recognized in the well-recognized value of [negative feedback](#) to ensure appropriate control of any system, whether psychosocial or technology-based, as discussed separately (*Being Positive Avoiding Negativity: management challenge of positive vs negative*, 2005).
- The questionable positive-negative framing that is so widely cultivated implies an attempt at governance of society in the absence of "negative" feedback. This could be seen as reinforcing processes of denial and the repression (or "classification") of challenging alternative perspectives (*Framing the Global Future by Ignoring Alternatives*, 2009). This tendency is questioned by the value variously attached to [critical thinking](#), itself readily framed as "negative" (*Web resources: Critical thinking vs. Specious arguments*, 2001).

Us-Them: Widely evident is the tendency to blame the ills of the world and society on "them", by whom -- if only they would act according to the insights and appeals of "us" -- the various problems could be readily resolved. Many are variously framed as "them", agents of the "dark force": terrorists, multinationals, greenies, religions, science, socialists, conservatives, etc. Through such finger-pointing, "we" -- as agents of the "forces of light" -- emerge as unquestionably free from problematic tendencies (*Us and Them: Relating to Challenging Others: patterns in the shadow dance between "good" and "evil"*, 2009; *The "Dark Riders" of Social Change: a challenge for any Fellowship of the Ring*, 2002; *Needing Evil Elsewhere*, 2001).

Right-Wrong: There is a curious ease to the assertive declaration that the other is "wrong" in contrast to the perspective of those making the assertions -- necessarily believing they are "right". This is evident, for example:

- in the view of physicist Victor Stenger (cited above) to the effect that: *most religious claims can be dealt with scientifically, so beliefs such as creationism or astrology aren't immune to science, they are merely wrong*. It makes no allowance for the implication that those holding those beliefs -- far greater than those sharing Stenger's -- hold contrary views.
- in the repeated assertion by environmental journalist [George Monbiot](#) that overpopulation is the primary factor in disrupting the environment (and engendering resource-related problems), is "wrong", despite the case repeatedly argued by [David Attenborough](#): *Though in general he has done an excellent job in promoting the State of Nature report, on this issue he is wrong* (George Monbiot, *Why Britain's barren uplands have farming subsidies to blame*, *The Guardian*, 22 May 2013).

There is little capacity (or motivation) to process such contrasting perspectives or to set them in a suitably complex framework respective of their worldviews. They have their violent and manipulative consequences in practice.

Physicists have taken the matter further through use of the phrase "not even wrong", generally attributed to theoretical physicist [Wolfgang Pauli](#). and exploited in a critique of string theory ([Peter Woit](#), *Not Even Wrong: the failure of string theory and the search for unity in physical law*, 2007). It has been elaborated in the form "wronger than wrong" by [Michael Shermer](#) (*Wronger Than Wrong*, *Scientific American*, November 2006).

Its use by physicists could be considered somewhat embarrassing given Pauli's collaborative relationship with psychoanalyst Carl Jung (*Atom and Archetype: the Pauli/Jung Letters 1932-1958*), and the elaborate analysis of more than 400 of Pauli's dreams, as documented by Jung in *Psychology and Alchemy*. Together Jung and Pauli co-authored (*The Interpretation of Nature and the Psyche*, 1955), as discussed separately (*Quest for a "universal constant" of globalization? Questionable insights for the future from physics*, 2010).

Accounts of that collaboration are provided by physicist [Arthur I. Miller](#) (*137: Jung, Pauli, and the Pursuit of a Scientific Obsession*, 2009; *Deciphering the Cosmic Number: the strange friendship of Wolfgang Pauli and Carl Jung*, 2009). Miller notes Pauli's extraordinary conclusion, as one of the most eminent physicists of the century, that:

- "even the most modern physics lends itself to the symbolic representation of psychic processes"
- there are "deeper spiritual layers that cannot be adequately defined by the conceptual concept of time" (Miller, p. 162)

From the perspective of physicists such as Alan Sokal, physicists like Pauli and Bohm can best be understood as having "lost it" -- much as [Isaac Newton's preoccupation with alchemy](#) has long been considered an aberration to the science which otherwise upholds him as an icon. The more interesting question is whether they were in process of finding something which could not be adequately articulated within conventional frames of reference, as discussed separately (*Beyond the Standard Model of Universal Awareness: Being Not Even Wrong?* 2010).

Sense-Nonsense: Closely related to the right-wrong distinction is that evident in what is assertively declared to be "nonsense". This was noted above with respect to the condemnation of post-modernist efforts to adapt the insights of the natural sciences to the psychosocial sciences by [Alan Sokal](#) (*Fashionable Nonsense: postmodern intellectuals' abuse of science*, 1998). In a global civilization endeavouring to make sense of its challenges -- as exemplified by the efforts of the [Global Sensemaking](#) initiative -- how is "sense" to be made?

Is there the remotest possibility, as with the purported emergence of the universe from "nothing", that it may indeed emerge from what is commonly held to be "nonsense" and ignorance -- a cognitive analogue to "dark energy"? Their value to that end, from the perspective of Feynman, is mentioned above and below. It might well be said that, as initially presented by Feynman, the diagrams were considered to be "nonsense" by many of his peers. Might a variant of such diagrams be able to encode the associated cognitive processes of qualifying "as nonsensical"?

The response of mainstream science to "nonsense" has recently been exemplified in the [TEDx Controversy](#) in response to the arguments of biochemist [Rupert Sheldrake](#) (*The Science Delusion: freeing the spirit of enquiry*, 2012). He was known for an earlier book (*A New Science of Life: the hypothesis of formative causation*, 1981) famously condemned by the editor of [Rupert Sheldrake](#) (*The Science Delusion: freeing the spirit of enquiry*, Coronet, 2012), *Nature*, John Maddox, as *A book for burning?* (*Nature*, 24 September 1981), a view Maddox later reiterated:

Sheldrake's is not a scientific theory. Sheldrake is putting forward magic instead of science, and that can be condemned, in exactly the language that the Pope used to condemn Galileo, and for the same reasons: it is heresy. (*BBC Documentary*, 1994)

Having spoken in the famed [TEDx conference series](#) in January 2013, as previously had Rob Bryanton (*Imagining the Tenth Dimension: a new way of thinking about time and space*, 2007), the Sheldrake recording was removed from the TEDx video archive on instructions from the anonymous TEDx Science Board under pressure from militant atheists. This has elicited a multitude of comments regarding the credibility of TEDx as a vehicle for creative, cutting edge, scientific thinking (see [Charles Eisenstein](#), *TED: a Choice Point*, 11 April 2013). Eisenstein notes that the TED rationale was that such removal was due to its being "far removed from mainstream scientific thinking".

Use of the "mainstream" metaphor is appropriately indicative of the constraint on conventional science. In contrast to what any geographer would otherwise seek to understand, it precludes recognition of other "rivers" (of knowing) -- which may, or may not, flow into the same "sea" from the same direction -- a metaphor explored by [Jorge Ferrer](#) (*Revisioning Transpersonal Theory: a participatory vision of human spirituality*, 2002). Worse, the "mainstream" metaphor precludes recognition of multiple seas/oceans between which global currents may vitally "stream", as with the [global oceanic thermohaline circulation](#) as argued separately (*Potential Misuse of the Conveyor Metaphor: recognition of the circular dynamic essential to its appropriate operation*, 2007).

Should use of the "mainstream" metaphor evoke questions regarding the extent to which the dynamics of the confluence of two major rivers are considered? Fluid dynamics distinguishes clearly between [streamline flow](#) and [turbulence](#) -- described by [Feynman](#) as the as "the most important unsolved problem of classical physics." Might that be true metaphorically of "mainstream" science? Any implication that "science" is in some way analogous to a sacred river (like the Ganges), calls for particular attention to the consequences of its degree of pollution, given the uses to which the river is put and the life it can sustain. Given the much reported iconic lifecycle of the salmon, it could be asked whether "mainstream" science enables any equivalent return upstream to a "spawning ground".

Given Obama's unchallenged declaration regarding the existence of "evil", it is appropriate to ask how the TEDx Science Board might handle any TEDx talk given by [John Holdren](#), as Chief Science Adviser to the President, or by Wolfgang Pauli, or by David Bohm? And what of Isaac Newton? The implications of such mainstream conventionalism, and its resemblance to that of religion, have been discussed separately (*End of Science: the death knell as sounded by the Royal Society*, 2008).

Agreement-Disagreement: As the above indicate, there is a more fundamental issue of how the incommensurability of conflicting views is handled. The capacity to transcend the obsession with achieving some form of archetypal agreement or consensus is exceptionally limited. Whether Richard Dawkins (*The God Delusion*), or the complementary argument of Rupert Sheldrake (*The Science Delusion*), neither is challenged by reframing disagreement -- other than through a biased preference for agreement. No consideration is given to the potential value of disagreement (cf. *Social organization determined by incommunicability of insights; Patterning: Interrelating incompatible viewpoints*). Both together are indicative of a shared delusion (*The Consensus Delusion: mysterious attractor undermining global civilization as currently imagined*, 2011). The possible basis for a contrasting approach is discussed separately (*Enabling a 12-fold Pattern of Systemic Dialogue for Governance*, 2011).

Value polarities: Similar arguments could be made with respect to the associated dynamics of "belief-unbelief", "responsibility-irresponsibility", "legality-illegality", "equality-inequality", "transparency-secrecy", "mainstream-alternative" -- in all of which physics is variously complicit. These are part of the set of such "value polarities" which have been a focus of the [Human Values Project](#).

The associated dilemmas are of course especially evident in the "meso-world" in which real people dwell (as indicated in the [3-world schematic](#) in the Annex). As the place of "nonsense" for physicists (and for many inhabitants), the "meso-world" -- as the "in-between world" -- is the realm:

- from which their research funding is essentially derived
- in which the massively destructive outcome of their endeavours is most evident -- readily to be framed as most nonsensical
- in which radioactive nuclear waste, engendered through their skills and efforts (as noted above), has been variously disposed for the dubious appreciation of many generations to come. In his otherwise optimistic forecast, the physicist [Michio Kaku](#) specifically acknowledges the current incapacity of physics to remedy the situation -- without recognizing that it is characteristic of a discipline that is questionably capable of attaching appropriate significance to multi-causal feedback loops (*Physics of the Future:*

how science will shape human destiny and our daily lives by the Year 2100, 2011)

- in which, for those of Abrahamic tradition, Jerusalem bizarrely constitutes a central locus (perhaps appropriately to be associated with the illusory "twist" in the Möbius strip in the [schematic](#) in the Annex)

The incommensurable framings above suggest the need for allocation of significant resources to transcending their limitations, as discussed separately (*Transcending Simplistic Binary Contractual Relationships: what is hindering their exploration?* 2012). Metaphorically, as with the consequence of their nuclear endeavours, it could be said that physicists are most notable for the manner in which they exacerbate the unresolved implications of the positive-negative dynamic -- whilst deploying a very impressive range of intellectual skills to a very particular articulation of them.

Could the Feynman-diagram approach facilitate understanding of the complexity of the world within which these dilemmas are so "experientially" fundamental -- whether or not they are "evidently" fundamental to physics?

Relevance to much-valued psychosocial processes

Learning: Given the importance of learning, both individually and collectively, are there subtle processes that could benefit from indication by analogues to Feynman diagrams? Would this help to clarify possible learning pathways and the manner in which inspiration is engendered -- or inhibited -- and the manner in which knowledge and insight are communicated? The [mapping of metabolic pathways](#) by biochemists is suggestive in that respect

Creativity: The importance of cultivating and eliciting creativity is widely recognized. Exploration of creative processes and experience of them in all their variety -- and the associated value of imagination -- makes extensive use of "light" as a metaphor. Would analogues to Feynman diagrams facilitate understanding of its emergence and how it may otherwise be inhibited? Would these patterns provide a context for comprehending the variety of ways these can occur?

Dialogue: Much is made of the reliance on dialogue in complex psychosocial situations. Both learning and creativity are potentially vital to fruitful dialogue. To what extent would such a pattern language enable a far richer self-referential appreciation of the processes and experience of dialogue with any "other" -- perhaps of a kind yet to be widely recognized. How might this be appreciated and vigorously enabled in a social networking environment? Clearly any such opportunity is worth exploring -- given the current inadequacy of discourse, whether parliamentary, interdisciplinary, intersectoral, interfaith, or that between those engaged in bloody conflict?

Given the evidently problematic nature of the climate change debate (even within disciplines), how might the interplay of "positive" and "negative" statements be more fruitfully associated with the emergence of "insight"? How might this be widely communicated? How better to understand the deficiencies and inadequacies of the unquestionable lecture/Q-and-A model of debate -- whether academic or otherwise? Can techniques of [argument mapping](#) be enhanced in the light of Feynman diagrams?

Romance: This is the inherently mysterious process fundamental to the lives and aspirations of many -- potentially to be compared experientially with the attraction of a Theory of Everything. It is characterized by a depth of subtle feeling and insight whose incommunicability is the theme of endless comment and aesthetic representation. Would the intimate familiarity with its complex subtleties and varieties offer a means of enriching appreciation of the processes encoded by the pattern language imagined here? Would the existence of such a language enable a more fruitful approach to much-stressed interpersonal relationships? Would it enable other patterns of elective affinity to emerge, as separately discussed (*Marrying an Other whatever the Form: reframing and extending the understanding of marriage*, 2013)

Contractual bonding: The potential cognitive embodiment implied by such a pattern language could give form to a wider spectrum of viable contractual relationships of greater subtlety, as discussed separately (*Transcending Simplistic Binary Contractual Relationships: what is hindering their exploration?* 2012).

Meditation: There is the further possibility that such a pattern language would offer a means whereby processes of meditational experience could be articulated by practitioners for wider appreciation. This could imbue with greater significance and coherence the complex multi-layered nature of the elemental processes indicated by such use of these patterns.

Questioning: This process is challenging to unexamined assumptions and is therefore fundamental to learning imaginatively, to engaging in dialogue, and to creative reframing. It is central to Zen Buddhism in the use of the *koan*. It is arguably vital to strategic initiatives (*Strategic Implications of 12 Unasked Questions in Response to Disaster*, 2013). How might questioning be indicated within a set of Feynman diagrams? Could this approach contribute to reframing understanding of "[enhanced interrogation techniques](#)", now that these are converging increasingly with the classical institutional procedures of the *Malleus Maleficarum* (1487) for dealing with unacceptable others?

Passing patterns: As noted in the Annex, of considerable potential relevance with respect to any form of "path awareness", and its "integration", is the widespread popular fascination with ball sports within which "[passing patterns](#)" (discussed separately) can be recognized, appreciated, emulated, and studied. It could be argued that this fascination derives from an unconscious recognition of analogous patterns in the psychosocial realm. The challenge is to relate the two -- potentially by using passing patterns to encode and embody those which might otherwise be represented by Feynman diagrams.

Exploratory psychosocial reframing of Feynman diagrams

The question raised here is whether Feynman diagrams constitute a pattern language which can be understood more generically -- as offering a metaphor, an analogy, or suggesting a degree of isomorphism or cognitive mirroring, as yet to be fully comprehended.

This exploration therefore draws on the insights recently offered by [Douglas Hofstadter](#) and [Emmanuel Sander](#) (*Surfaces and Essences*:

analogy as the fuel and fire of thinking, 2013), as a further development of Hofstadter's earlier work (*Gödel, Escher, Bach: an Eternal Golden Braid*, 1979; *Fluid Concepts and Creative Analogies*, 1995; *I Am a Strange Loop*, 2007). Hofstadter and Sander have also recently summarized their argument (*The talent so fundamental that it is fuel to our minds*, *New Scientist*, 4 May 2013). The methodology of a **pattern language**, and the possibilities of its use as a metaphorical template, is inspired by the work of **Christopher Alexander**, as separately discussed and explored experimentally (*5-fold Pattern Language*, 1984).

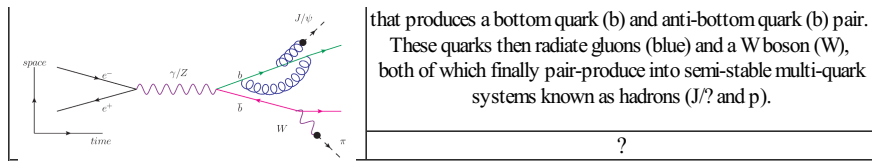
Can very familiar experience, intimately known, be fruitfully mapped onto the diagrams -- usefully imbuing their elements with distinct experiences? However, rather than being being a static representation, the question is whether the dynamic of that experience (as a process) can be felt to be associated with the pattern -- an articulation of process thinking (Ann Langley, *Process Thinking in Strategic Organization*, 2007). The experience of the "geometry" of communication space has been fruitfully articulated by the mathematician Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space?* 1981), as separately summarized (*Comprehension: Social organization determined by incommunicability of insights*).

As indicated above, the following images are adapted from *Let's draw Feynman diagrams* (*Quantum Diaries*, February 2010). The *Diaries* are a project of Interactions.org, a network of physics laboratories.

Feynman diagrams of psychosocial significance?	
	Electrons (denoted by e-) accelerate (change direction of motion) by (a) absorbing or (b) emitting a photon (denoted by the Greek letter gamma: ?). ?
	Positrons (e+) can accelerate (change direction of motion) by (a) absorbing or (b) emitting a photon (?). Positrons are moving from left to right, implying that the positron is an anti-particle. ?
	Exchange of a photon (?) between an electrons (e-) and a positron (e+), both traveling from the left to the right -- lack of explicit distinction between whether the electron is emitting or absorbing is intentional. ?

	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) that then produces an e+e- pair. Note: All particles depicted travel from left to right. ?
	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) that then produces a muon (μ-) and anti-muon(μ+) pair. ?
	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) that then produces a bottom quark (b) and anti-bottom quark (b) pair. ?
	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) that produces a bottom quark (b) and anti-bottom quark (b) pair, which then radiate gluons (blue). ?

	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) that produces a bottom quark (b) and anti-bottom quark (b) pair. These quarks then radiate gluons (blue), which finally pair-produce into quarks. ?
	Annihilation of an electrons (e-) and a positron (e+) into a photon (?) or a Z boson (Z)



The diagrams are presented here as a challenge. The temptation to interpret psychosocial equivalents has been indicated by a question mark at this stage.

Unacknowledged preferences for partial clarity and partial transparency

Preference for "cognitive shade": It is readily assumed that clarity and transparency are desirable -- and desired by all -- like consensus. This is notably the case with explanations of any kind -- including theories of the world and everything. It is currently an expectation with regard to governance. Its absence is regularly deplored -- despite the massive investment in classification and confidentiality, which would seem to preclude global comprehension. A similar point could be made with respect to certainty, predictability and completion.

There is however clearly a widespread appreciation of lack of clarity, of ambiguity in various forms, of explanations which are incomplete. These are experienced as fruitful in that they do not exhaust the questioning process and associated creative speculation -- calling for imagination which is otherwise precluded as being unnecessary. What need for imagination if all has already been clearly articulated and expressed with adequate simplicity? Religions continue to face this challenge.

The preference for partial clarity may be demonstrated with geographical metaphors -- through the contrasting preferences for blazing sunlight, shade, and an edenic woodland glen in which shade is relieved by isolated beams of sunlight. Clearly these contrasts create niches favourable to the development of different species variously dependent on different combinations of light and shade.

An equivalent variety of preferences enables the development of a variety of human lifestyles -- favouring or avoiding light and shade with a sense of their relative advantages and risks. In these terms the degree of uptake of any comprehensive explanation becomes questionable -- however adequate it may appear to its advocates. The challenge is as evident in the case of scientific theories as it is of religious beliefs. The variety of preferences engenders niches which are variously occupied.

The challenge can be more dramatically imagined in the case of a Theory of Everything, a Universal Belief System, a Global Ethic, a Global Strategic Plan, or the like. Each implies that people, especially the young, are to be expected to "get with the programme" -- avoiding "inappropriate" questions which do not reinforce the required belief in it. Examples in the case of science were given above. What will physicists do after the Theory of Everything has been discovered? What will they do with their creative imagination?

Obligation to "dwell in the shade": Irrespective of "preferences", there is also the sense in which many do not have the luxury of dwelling cognitively in the niche to which they aspire. Their access to information and insight may be variously constrained. Metaphorically, as articulated by religion, they may be obliged to "dwell in the dark". Science also regrets the widespread ignorance of the cognitive worlds it has articulated -- and the indifference to them. Both avoid the question of the problematic relations between religions, between disciplines, and between religion and science -- presumably to be understood as a higher order of ignorance.

As discussed separately, many are obliged to live imaginatively in the half light "between worlds" as a consequence of the failure of systemic initiatives (*Living as an Imaginal Bridge between Worlds: global implications of "betwixt and between" and liminality*, 2011; *Towards the Dynamic Art of Partial Comprehension*, 2012).

Appreciation of ignorance and error: Given that the world is as productive of ignorance as it is of knowledge, through growth in population and the relative inaccessibility of insight, there is a case for exploring ignorance more creatively, as separately discussed (*Reframing the conventional deprecation of ignorance*, 2013; *University of Ignorance: engaging with nothing, the unknown, the incomprehensible*, 2013; *Living with Incomprehension and Uncertainty: re-cognizing the varieties of non-comprehension and misunderstanding*, 2012).

Appropriate to this argument is Feynman's much quoted attitude to ignorance (*Science is the belief in the ignorance of experts*). He develops his case in terms of the *The Role of Doubt in Science*:

The scientist has a lot of experience with ignorance and doubt and uncertainty, and this experience is of very great importance, I think. When a scientist doesn't know the answer to a problem, he is ignorant. When he has a hunch as to what the result is, he is uncertain. And when he is pretty darned sure of what the result is going to be, he is in some doubt. We have found it of paramount importance that in order to progress we must recognize the ignorance and leave room for doubt. Scientific knowledge is a body of statements of varying degrees of certainty -- some most unsure, some nearly sure, none absolutely certain. (Quoted from Richard P. Feynman, *What Do You Care What Other People Think?: Further Adventures of a Curious Character*, 1988)

A related concern has been expressed by Donald N. Michael: *On the requirement to embrace error*:

More bluntly, future-responsive societal learning makes it necessary for individuals and organizations to embrace error. It is the only way to ensure a shared self-consciousness about limited theory to the nature of social dynamics, about limited data for testing theory, and hence about our limited ability to control our situation well enough to be successful more often than not (*On Learning to Plan and Planning to Learn: the social psychology of changing toward future-responsive societal learning*, 1973)

Appropriate dimensionality: In arguing above for recognition of the challenge of living imaginatively "between worlds" -- "betwixt and between" -- this could be reframed in terms of the "dimensionality" of mathematicians, as has been done by Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space?* 1981). There is however considerable ambiguity to this with respect to the "clarity" offered by higher dimensionality and the "incomprehension" through which it may be experienced -- to be contrasted with the "darkness" of lower dimensionality and the "clarity" with which it may be readily experienced.

Exploiting the metaphor of "light" and "shade", there is a case for recognizing the viability of (edenic) niches characterised by "not too much light" and "not too much shade". Ignorance may be as conducive to cognitive development as insight. Ironically it is "knowledge trees" which may offer welcome shade -- perhaps reminiscent of the archetypal [Tree of the Knowledge of Good and Evil](#). Curiously in the tree metaphor, it is the "leaves" on which knowledge is presumably inscribed, thereby associating them with any compilation into a Book of Knowledge -- and yet it is the leaves which provide the shade. If astrophysicists continue to think in terms of the Sun "rising" -- and presumably to derive enjoyment from the process -- what is the case **for** the "subunderstanding" deplored by [Magoroh Maruyama](#) (*Polyocular vision or subunderstanding?* *Organization Studies*, 2004), and similarly for "subrepresentation"?

The biotic metaphor (see [Annex](#)) may be taken further with respect to the psychosocial corruption which is so deplored as a characteristic of non-transparency and absence of light. Framed as an exemplification of evil in psychosocial systems, it has a much valued role in the case of biological systems -- especially with respect to "waste disposal", which is increasingly a challenge in the human environment. What then is to be said of "cognitive corruption"?

Qualum reality: These arguments help to "clarify" the advantages of psychosocial analogues to Feynman diagrams -- with the degree of closure they imply. As noted above, the original resistance to them, as described in the account by David Kaiser (2005), offers insights in that respect. To a higher degree than in the case of "quantum electrodynamics", the potential qualitative analogue -- "qualum psychodynamics" -- requires a form of inherent conceptual openness. This can be understood as implication without closure -- enabling future development. It may be described metaphorically through a dynamic, as discussed separately -- responding to the challenge that a candle constitutes for a butterfly (*Paradoxes of Engaging with the Ultimate in any Guise: living life penultimately*, 2012).

Use of "qualum", as a qualitative contrast to "quantum", is also potentially suggestive -- metaphorically -- given its use as a descriptor of wicker basket woven from reeds. Rather than the metaphorical use of "[knowledge trees](#)", with their various structural and dynamic associations, the sense of the development of knowledge in terms of [basket weaving](#) is suggestive of both openness (to the future) and offering a useful container (in the present), as previously discussed (*The Future of Comprehension conceptual birdcages and functional basket-weaving*, 1980). The weaving metaphor is itself valuable with respect to threaded internet discourse and global governance (*Interweaving Thematic Threads and Learning Pathways: noonautics, magic carpets and widdomes*, 2010; *Warp and Weft: Governance through Alternation - world governance as a Gandhian challenge for the individual*, 2002).

Time: Feynman diagrams are valuable in their explicit implication of a relation between space and time. Governance, sustainability and daily life call for an engagement with spacetime which remains a challenge to comprehension -- despite intimate experience of its complex dimensions. Strategic recommendations taking space-like form are typically challenged by the process of implementation in time. Those emphasizing processes over time are typically challenged to achieve viability as experientially meaningful structures in the moment. Especially for the individual, however, the reality of the present moment constitutes a major challenge -- an existential question with "metaphysical" dimensions.

Analogues to Feynman diagrams could help to reframe the interface with the temporal dimensions of qualitative complexity and their implications as previously discussed (*The Isdom of the Wisdom Society: embodying time as the heartland of humanity*, 2003; *Strategic Embodiment of Time: configuring questions fundamental to change*, 2010; *Emergence of Cyclical Psycho-social Identity: sustainability as "psychically" defined*, 2007; *Embodying a Timeship vs. Empowering a Spaceship*, 2003)

Conclusion

An argument of the kind above invites the response that it is "wrong" and "nonsense" -- an exhibition of "ignorance" with which the knowledgeable must necessarily be in "disagreement". The increasingly evident difficulty for those who claim "knowledge" is that their capacity to engage meaningfully with others, claiming other forms of knowledge, is very limited. This dynamic merits attention in a troubled world where it exacerbates destabilizing processes. Accepting the probability of a degree of ignorance and error, being open to question is potentially more fruitful.

The most fruitful insight for which Feynman is acknowledged is his [path integral formulation](#). As noted above, this complex insight recalls the widely used phrase regarding contrasting belief systems: *There are a thousand paths to the top of the hill, but the view from the top is the same*. Both merit recognition in terms of the cognitive implications of [autopoiesis](#) as elaborated by [Francisco Varela](#) (*Laying Down a Path in Walking: essays on enactive cognition*, 1997; *The Embodied Mind: cognitive science and human experience*, 1991).

Curiously physics has no requirement that an explanation should be "comprehensible" -- providing the calculations are "correct", and irrespective of the time taken to verify any proof (possibly extending into months of rigorous attention by the qualified) or the cost of experiments to do so (possibly extending to billions of dollars). Meaning may well remain a mystery -- if it is not considered irrelevant. These factors raise interesting questions regarding the nature of any [Theory of Everything](#) -- as it is intended that it be experienced by any envisaged audience:

- If it is implicitly to be understood cognitively and symbolically as an emergent manifestation of an archetypal "Temple of Jerusalem", a major issue is how access to that intellectual property is enabled -- as an ultimate organization of knowledge. Who would seek to govern that, and why -- in the light of millennia of dubious historical experience and demonstrable incapacity to address issues of territoriality (*Reframing Relationships as a Mathematical Challenge -- Jerusalem: a parody of current inter-faith dialogue*, 1997).

- The construction of a hyperdimensional Theory of Everything, as a form of "New Jerusalem" -- to which only the very few have the cognitive entry key -- could be compared to the construction of a strangely attractive exclusive birdcage for "birds of strange feather" -- but necessarily of limited significance to others of lower dimensionality (*The Future of Comprehension: conceptual birdcages and functional basket-weaving*, 1980).
- As the ultimate "container" for dynamically organized knowledge processes, a Theory of Everything (TOE) constitutes a paradoxical form of ending or boundary, posing the question of what is to be done with it, or in relation to it -- namely for what it provides a context.
- Understood as a construct in cognitive geometry, there is every possibility that the "dome" tradition of many religions will be inadequate to the communication dynamic it should contain -- and by which it will be sustained (or destroyed). Especially intriguing is the sense in which the spherical metaphor of globality (in its most generic sense) may need to be nuanced dynamically in terms of related cognitive topological forms in order to function as an adequate container (*Metaphorical Geometry in Quest of Globality -- in response to global governance challenges*, 2009).
- The torus is a suggestive possibility in this quest (*Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: transforming a matrix classification onto intertwined tori*, 2006; *Implication of Toroidal Transformation of the Crown of Thorns: design challenge to enable integrative comprehension of global dynamics*, 2011). This is particularly the case in the light of the design constraints obliging its use in nuclear fusion reactors, as discussed separately (*Enactivating a Cognitive Fusion Reactor: Imaginal Transformation of Energy Resourcing (ITER-8)*, 2006). With respect to knowledge organization, the creativity of mathematics has offered other possibilities (*Potential Psychosocial Significance of Monstrous Moonshine an exceptional form of symmetry as a Rosetta stone for cognitive frameworks*, 2007; *Psycho-social Significance of the Mandelbrot Set: a sustainable boundary between chaos and order*, 2005).
- More challenging may be embodying the requisite degree of self-reference into the design of such an emergent container, as suggested by the arguments regarding the relevance of the Klein bottle by Steven M. Rosen (*Bridging the "Two Cultures": Merleau-Ponty and the Crisis in Modern Physics*, 2009), and considered separately (*Intercourse with Globality through Enacting a Klein bottle: cognitive implication in a polysensorial "lens"*, 2009)
- There is clearly a challenge of requisite hyperconnectivity to be addressed, especially when explanations take hyperdimensional form, with the possibility of supersymmetry -- in a communication environment which is running short of attention time (*Hyperaction through Hypercomprehension and Hyperdrive: necessary complement to proliferation of hypermedia in hypersociety*, 2006). The challenge of "hypercomprehension" remains daunting and potentially divisive, as previously discussed (*Dynamics of Symmetry Group Theorizing: comprehension of psycho-social implication*, 2008; *Dynamically Gated Conceptual Communities emergent patterns of isolation within knowledge society*, 2004).
- Most ironic may be the extent to which the "container" may best be comprehended as "mirroring" the observable universe "metaphorically" (*Towards an Astrophysics of the Knowledge Universe: from astronautics to noonautics?* 2006). This would then hold the possibility of "sources of enlightenment" of greater or lesser brilliance, at greater or lesser distance in terms of communication and learning -- with all the challenges of the time taken for "light" to be received from them -- and to travel to them. Such sources of insight may indeed have their own life cycle -- as is only too evident with their metaphorical analogues.
- A mirroring of the "TOE" might also be provocatively explored as an "EOT", whether as an End of Time (an **End-of-Tape** marker) or an Embodiment of Theories of some form -- implying an End of Theorization, a paradoxical End of Science as currently known (Julian Barbour, *The End of Time: the next revolution in physics*, 2001; David Bohm, *The Ending of Time*, 1985). The irony for physics is that any final achievement of a theoretical "Explanation of Everything" may be indistinguishably related to a theoretical "Explanation of Nothing" -- accompanied by questionable assertions that "nothing matters" (cf. Corey Kaup, *General Nothingness Theory*, 2007; Russell K. Standish, *Theory of Nothing*, 2006; Ronald Green, *Nothing matters: a book about nothing*, 2011). Unfortunately this comes at a time when many people are faced with "nothing", if not worse -- a matter which physics is much challenged to acknowledge and address, as can be variously discussed (*Emerging Significance of Nothing*, 2012; *Import of Nothingness and Emptiness through Happening and Mattering*, 2008).
- Whether a singular universe is imagined, or multiple parallel universes, there is every probability that there will then be multiple Theories of Everything -- as indicated by the account of physicist John D. Barrow (*Theories of Everything: the quest for ultimate explanation*, 1992). Current speculation by physicists regarding a **multiverse** -- the hypothetical set of infinite possible universes -- might then be matched by a "cognitive multiverse" requiring another mode of understanding, although tantalizingly similar to the experience of many in the meso-world of today (*Enactivating Multiversal Community: hearing a pattern of voices in the global wilderness*, 2012; *Being a Poem in the Making: engendering a multiverse through musing*, 2012).

Any cognitive "New Jerusalem" might well prove to be as distant and "universally" irrelevant as the archetypes explored in Isaac Asimov's *Foundation Trilogy*, to whose psychohistorical initiatives reference is made in an editorial in a current issue of the *New Scientist* (A Foundation for the Future, 11 May 2013) in presenting the GDELT Penn State Event Data Project (*Global Data on Events, Location and Tone*). The capacity to engage with the challenges of such data are similar to those of the projected "Living Earth Simulator", of the FuturIcT EU research initiative "to explore social life on earth and everything it relates to". Does the challenge of "global sensemaking" implied by such projects frame the case for the complementary form of "Feynman diagram" -- understood in the light of a "path integral

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