What is Science? A perspective on the revolutions of change

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Abstract:

In this 3-part paper, we re-examine the fundamental ideas of scientific change. There might be no (totally) satisfactory definition of "science" as it does not always apply "the scientific method". Even the quantitative "hard science" may be applied to an ostensible non-science because it is highly quantitative and technical. Additionally, mathematics appears to be a metalevel above science because mathematical proof is so definitive: Is it part of science?

We argue that science necessarily does not require examination of just Karl Popper's major thesis of science involving only potentially falsifiable events. It is more than that and feasibility evaluations extend science.
Modern communication processes could have enhanced change along, but true extensive multidisciplinary paradigm shifts remain very slow.
We necessarily extend Kuhn's various stages of understandings of Thomas Kuhn's Scientific Revolutions. We propose the "11 Neppe-Close Revolutions model (11NCR)" of change—the reshaping of science—by adding several more paths along the way. This results in eleven phases of denial and acceptance of Neppe and Close ("the 11NC revolutions" or "11NCR") highlighted by "Not even wrong". We exemplify this 11NCR model to 14 sequences of discovery, and point to the prejudices of the pseudo-skeptics.
We need to add pieces of the jigsaw puzzle within 3S-1t. This way the open-minded appropriate skeptic can examine the data logically. Importantly, some paradigmatic models are incorrect and not feasible. If they were falsifiable, they could then be falsified using the correct approaches. But , most times, they are not falsifiable. What is new, is not necessarily better.

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Re-examining the fundamental ideas of scientific change: Part 1

Both Henry Bauer[2], and Neppe and Close [3], [4] recognize the limitations of science as we know it today [5]. Let's crystallize science, as we know it.

Bauer [6, 2] indicates that there is no (totally) satisfactory definition of "science":

- Does it apply "the scientific method"? [6] Not always.
- Does science require applying mathematics and is that itself a science? [6]
- If science is quantitative like the "hard science" of physics, then economics is also a hard science because it, too, is highly quantitative and technical. [6]

We (Neppe and Close) [4; 5] found correspondences of many aspects of the difficulties Bauer points out: The major area of similarity is the problem with the definition and directions and limits of science, yet there are possible philosophical differences.

For example, we certainly regard math as very useful, but far more than that. Mathematics, to us, is a metalevel above science because mathematical proof is so definitive. Moreover, we argue that mathematics pervades all disciplines, not only as solutions but also as an integral part of reality. Math to us is so fundamental it is part of nature, and not just a series of equations. Whether then math is part of science is a question of definition: Can science be expanded to that metalevel of mathematics?

Bauer recognizes the limits of regarding science purely as an "objective, value-free, and unbiased" method[6]? In practice, this cannot be so: The scientist necessarily bases ideas on his—and often the consensus's—subjective and historical impressions. But this may be false to begin with. To Bauer, *"mistaken views about Nature have often enough disproved themselves (eventually)"*. Science "self-corrects" a great deal, but then, as Bauer points out, it must have been untrue before it self-corrected. We regard Bauer's correction as a great contribution to the Philosophy of Science, and we too like to emphasize this mid-course correction concept.

Science is now subject to anonymous peer-review, yet this *"does not shield people from being jealous, opportunistic, self-serving, or harboring idiosyncratic beliefs, nor does it ensure competence or ethical behavior."* [6] This, indeed, is a problem for all these reasons: Rejection of the new, threats to current thought, even misappropriation of ideas. This certainly does not make science a hard science. Bauer's parallel with economic data also being hard science [6] is exemplified here, as we see it: Peer-review is a soft approach, often implying limitations that may be tantamount to the data being judged by a jury who are not really peers—in most instances, different so-called peers will reach very different conclusions.

Another major player is Karl Popper. Does science necessarily require examination of Popper's major thesis, that science involves examining only potentially falsifiable events? [7-9] We disagree, here, as we regard extending science by feasibility. Falsifiability is certainly often sufficient and has brought science to where it is. But we regard it as not necessary; we have introduced a further higher level concept: the Neppe-Close concept of Lower Dimensional Feasibility, in the absence of falsification by Popperian methods ("LFAF") [4; 5] extends the domain of science, making proof a relative concept, and changing what some call metaphysical thought into real science. [4; 5]

Let's imagine peer-review in previous times. This was different but reflects the same principle: Indeed, the history of creative thought can be conceptualized as the overwhelming denial of what then might have been unfalsifiable data.

Certainly, we know historically that science is resistant to new scientific discoveries! [10] Bernard Barber cites many, many examples through the ages of discoveries incorrectly criticized and dismissed by contemporary peers. [10] These range from Galileo (and the Church) on cosmology, to Lister and Semmelweiss on anti-sepsis, to Mendel on heredity. In the specific areas of physics, Helmholtz and Faraday were frustrated, Planck's "quantum leap" on quantum theory was ignored, and Einstein was particularly isolated from 1915 to 1919 on relativity. And, in medicine, even in modern days, the cause of peptic ulceration being bacterial (Helicobacter pylori) was initially ridiculed. This ultimately led in 2005 to Marshall and Warren receiving the Nobel Prize. [11] If we allowed science to apply feasibility, the creative jigsaw ideas of these great thinkers , would have been simply regarded as "science". These ideas could then have been debated and rejected on its merits—another application of "Lower Dimensional Feasibility, Absent Falsification" (LFAF).

Arthur Koester famously pointed out [12]: *"Innovation is a two-fold threat to academic mediocrities: it endangers their oracular authority; and it evokes the deeper fear that their whole laboriously constructed intellectual edifice may collapse."*

And as E Alan Price, and later Neppe, have amplified this: *"Moreover, in terms of the empirical 'physicalistic presupposition' involving the notion that all knowledge has its basis in what is physically perceived, and only physically, it is of course deceit and illusion to speak of knowledge based on non-physical perception. And therefore, it follows that parapsychology is dealing with deceit and illusion."* [13, 14] We are missing out on discovery and have over the years. This must stop and that is why LFAF is so critical at this time, particularly as discoveries pertaining to multiple dimensions [15-21] can only see some of the jigsaw puzzle from the perspective of our worldly experience not the reality that exists. [19; 21]

To the pre-eminent Physics Nobelist, Max Planck [22] *"science advances one funeral at a time".* He recognized that *"a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it."* This is tragic to modern researchers. Moreover, to Planck: *"Truth never triumphs — its opponents just die out."* [22]

To Neppe and Close, this is particularly frustrating because their hope has been that the modern communication processes, embodied in the Internet, would speed change along. It does somewhat, but nevertheless, paradigm shifts involving major metaparadigms impact several disciplines and such change is painfully slow. Such changes literally threaten our reality base, and are resisted possibly correctly, they still embody profound needed accomplishments in a proportion of such cases. Nevertheless, sadly, this is needed. Such advances require courage and the zeal of the isolated creative pioneer: This can, indeed, be lonely and easily demoralizing. This is commonly the experience of great thinkers like Georg Cantor. [23] To not give up under those circumstances is remarkable and often reflects genius qualities [24] of creativity, driving zeal in the face of opposition, profound logic, physical and mental health, and indeed, the most neglected or poorly admitted quality of all, the opening to extended conscious awareness and the sudden "aha" moments. [25-30]

Certainly, as we envisage it, old ideas must be overridden and buried. This is not new: It was already a significant problem as long ago as 1943. This was pointed out by Erwin Schrödinger [31] in a lecture given in Dublin Ireland: *"We feel clearly that we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole. But, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it."*

Bauer, again, points out another property of today's science: It is an "umbrella" concept. And in today's modern science, [6] scientists appear to know more and more about less and less. How do they prioritize and see the bigger picture? Even *"overwhelming consensus in the scientific community"* [6] does not imply that something is correct. Michael Crichton summarizes it: [32] *"I want to point to what I consider an emerging crisis in the whole enterprise of science, namely the increasingly uneasy relationship between hard science and public policy."*

Revisiting Thomas Kuhn: An Extended Structure for Scientific Revolutions: Part 2

In legal court interpretations, we apply levels of probability: On a more probable than not basis (≥50%); clear and convincing evidence (say ≥80%); and beyond reasonable doubt (say ≥95% postulated certainty) [33]. Certainly, we would expect "feasible" in science to be at least at that ≥50%, but we would prefer it to be ≥95% or even ≥99% as we build that jigsaw puzzle.
In the Veteran's military context, we do not even need ≥50% evidence. The context is simply "as likely as not" —a broad 50% measure. Scientists, individually, can, similarly, apply their own different levels of assessing findings.

We need to be very careful in going with the mainstream because creative endeavors and new discoveries are seldom driven by consensus. *"Essentially, substantive propositions should be answered substantively in every particular … The greatest scientists in history are great precisely because they broke with the consensus."* [2 6] But here, if we had any kind of jury, every new point would be vehemently rejected. The consensus is not always right. This may be the limitation of the democratic vote. It is purely the creative genius who makes paths towards changing our future. These are the "Kuhnian revolutions of change" [34]. But science is not like law. Law is directed to an orderly status quo based on existing rules. Science is directed towards advances in knowledge and skill. [4]

Ironically, as Thomas Kuhn's points out in his famous *The Structure of Scientific Revolutions,* every contemporary mainstream belief or paradigm opposes significant change, and even more vehemently, resists any contradiction of the prevailing view. It can take a very long time before valid minority views become incorporated into a new mainstream. And as this is what produces change, the stability in our world-views is dichotomous: It's good because new ideas might be wrong; and it's bad because it prevents legitimate progress.

Thomas Kuhn's theory of scientific revolution encompasses a repetitive and ongoing cyclical transition that involves three stages, [34] namely:

- normal science;
- crises when paradigm shifts are contemplated or recognized with new assumptions; and
- scientific revolutions when the paradigm alters after a qualitative transformation in theory.

Through our proposed 11 Neppe-Close Revolutions model (11NCR), we have necessarily extended Kuhn's various stages of understandings of the revolutions[34] of change—the reshaping of science—by adding several more paths along the way. This results in eleven key periods of adjustment.

In Table 1A, we refer to what we call the *"the 11NC revolutions" (or "11NCR")*: Of the 11 legitimate phases, individual scientists might be somewhat arbitrary as to which level of classification they would apply. Even attaining a consensus of scientists might not imply they are correct. The spectrum ranges from complete individual rejection to scientific acceptance.

So how, then, can we apply consensus and peer review, and maintain a paradigm or specific knowledge as science? Again, we need to apply LFAF, otherwise this might not even be a science at all and still simply metaphysical speculation or a philosophical standpoint. We, surely, must be careful that when using current consensus ideas, and rejecting feasibility, we regard the greatest contributions to science as "metaphysical" —implying they are not scientific, or simply philosophical, or sometimes involve creativity. We might then recognize, too, the irony. LFAF becomes an impetus for change to redefine experience in the context of identifying different levels of acceptance in this new science. This classification ranges from utter rejection to complete acceptance (Table 2A)

Table 2A: The eleven phases of denial and acceptance of Neppe and Close ("the 11NC revolutions" or "11NCR")

1. Initially there is *"it's too wrong to be wrong"*, often accompanied with a condescending smile or chuckle; the alternative phrase is the derisive *"it's too false to be false";*
2. then there is abject rejection, often accompanied by ridicule and name-calling: *"the insults are deserved. I know, I'm an expert";*
3. then *"that's a good try, but it's simply not true"*;
4. then the consensus rejects it: *"it's definitely incorrect"*;
5. then it is unlikely, but it may be mentioned as a hypothetical for completeness: *"it's an unlikely outlier that we mention just to cover all our bases";*
6. there is the stage of *"I'm opting out: This is outside my discipline, so I don't understand it or haven't studied it. Let me suspend judgment";*
7. then *"maybe there is something there, but I need more";*
8. then *"there is some evidence… interesting"*;
9. then *"it appears to be proven: the evidence is cogent; but most scientist don't accept that"*;
10. then it is hailed as *"it's a new breakthrough"* (even though it may have been proven much earlier);
11. then "*it's obvious: we all know that"*.

Where do we stand? In our opinion, *when so-called scientists write that "it's too false to be false", they're saying a great deal. But this is not usually about the science behind the work they're critiquing. Instead, it may reflect themselves, because with the speakers' ignorance, or their unswerving rigidity, flows forth their character.*

Wolfgang Pauli used different phraseology but with the same implications: [35] *"it is not even wrong"*. "Not even wrong" might conveniently be applied as an insult to areas such as psi, but linguistically it's a contradiction because of the double negation. It may turn out to be correct, and might be the ultimate back-handed compliment.

Kuhn describes the process of recognition, of discovery, of the crises and of the frequent failures, of alternative models, of resistance to the anomaly, of the transition to change, and ultimately of acceptance of paradigm change, at which stage the cycle repeats itself, but with added specialization of components of the paradigm. [34] Effectively, in 11 NCR, the cycles also repeat: What may now be level 11 for one finding or group of findings may resort to say, Level 5 for the objective, logical scientist or level 1, for the bigot.

It would be interesting to establish if any of the "too false to be false" scientists, have ever in history made any creative contribution to knowledge. We would suggest that such dogmatic rigidity of thinking would prevent this happening.

And, ironically, familiarity might breed contempt: How can you, the reader, who may be close to us in view, or know us well, be making a major contribution? Surely, it would be Professors Smith and Jones, whom we don't know, because the grass would be greener on the other side? The expert must come from afar.

Let's apply the 11NCR classification to the example of the following sequences:

1. Close and Neppe developed their detailed TDVP [d] model of the finite and the infinite. [19]
2. They then recognized in their TDVP model that there had to be a multidimensional finite reality. [20; 36]
3. They then postulated in their TDVP model that there had to be specifically a 9-dimensional finite reality. [19; 36]
4. They then demonstrated theoretically why there should be 9 finite dimensions. [19 37; 38]
5. They then mathematically derived the Cabibbo angle which required 9-dimensional spin [39 40]
6. They then replicated this mathematical derivation by a thought experiment. [41]
7. They then extended this work to other areas such as angular momentum and electron spin,[42]
8. They then extended several other related phenomena such as the non-spherical electron and the electron cloud. [43]
9. They then postulated that each higher dimension is an extension of the previous ones: The lower dimensions are embedded within the others. [44]
10. They then developed a model of the third property, gimmel, which shows that we need a 9-dimensional reality. [15; 16]

[d] TDVP = The Triadic Dimensional Distinction Vortical Paradigm

11. They showed correlations of gimmel both subatomically as well as at the cosmological level, and that these relate to a particular way of measuring reality. (Triadic rotational units of Equivalence —TRUE units). [16; 45]
12. They recognized that all these findings are heavily correlated with the commonality being a finite 9-dimensional spin model. [46 47]
13. They further pointed out that all the 9D spin findings in no way compromised the experiential empirical findings that we have in 3S-1t. [17; 18; 48]
14. They then moved from the mathematical and empirical scientific model to the creative exploratory model for the future. They realized that there are many more ways to solve the many conundrums in our current world view by applying this knowledge:
    a. Understanding there needs to be a spinning multidimensional reality (which they then also realized would refute [49] the String Theories [50] which involve folding or curling, not spinning)
    b. That certain other dimensional contradictions or conundrums of physics might be potentially solved in the future. [15 51 52]
    c. That mechanisms for psi phenomena can be solved without contradicting our current experiential reality. [53 54]
    d. That the reality might need to be 9-dimensions or a related exponent: 9 is 3 squared, and it could possibly be 9 cubed = 81, 9 quadrupled = 729, or possibly even 3 cubed =27. [46]

Let's look at some of these 14 options with the four subdivisions of option #14.
How does the conventional scientist, very used to life being only 3 dimensions of space (length, breadth, height) experienced in a moment in time (3S-1t), regard such findings?
First, he could regard each of the fourteen findings individually— #1 to #14, being perceived independently of any others.
Alternatively, he could build on the 14. Knowing that e.g. #5 likely implies that #1 to #4 is also correct.
Therefore, possibly there should be 3 rankings when we classify these 14 statements in the context of the 11 Neppe-Close Revolutions model (11 NCR). The rankings of the statement should lead to a particular level ranking which would be different for each scientist.

A. independent of any other statement;
B. taking all the other previous statements into account yielding a composite;
C. rank the ranker's individual attitude for the above, not based on information delivered but attitude toward the areas (independent, composite, other). This ranking might say much more about the findings or the background (personality, training, ignorance) of the scientist involved than the actual findings.

We briefly go ahead and this may be particularly relevant for C. above.
Level 1 would refer to the pseudo-skeptic denier of "too false to be false"?

The mid-range may involve the considered opinion of Level 5, "unlikely outlier" because we're concerned about all other 3S-1t science, despite knowing that it does not contradict any of 3S-1t, just extends it—so that still requires some denial of the data?
Or is it Level 6, the honest "*I don't understand it: This is outside my discipline".*
Or is it Level 9 *"proven? But most won't accept it?"*
Or is it Level 10 *("a new breakthrough")*?
And what would it take to be Level 11? Would it require the Planckian funerals [22] or has massive, rapid electronic communications changed that ethos?

Of course, adding "feasibility" to the mix might paradoxically lead to being stuck on Level 1 of 11NCR for longer. Before it could just be rejected but not as science, so maybe as a Level 3 ("good try, but this is not science") but now, for some, it might be classifiable initially as "not even feasible, because of its ostensible Bayesian impossibility" [54] [19]. That may be why the Planckian Funerals [22], arguing against the limitations of advancements to occur, are important. Scientists have difficulty with "unthinking"! These 11 stages are not easy to negotiate because they are so threatening, and we can see this in areas where, for many, the evidence is cogent, such as in psi research, and yet for others the data is completely rejected, often out of ignorance.

Scientists might not easily admit variants of the following sentences: *"I'm too threatened by this. I want to stay with what I know. In any event, I must not need to unthink what I've learnt. And I'm an academic and my job is at stake."* Instead, ironically, often those who shout the most about maintaining the status quo, are *ignorant of their own ignorance* about a proposed new paradigm. They've not studied the paradigm in detail, and likely might not even have the requisite training and experience even to make judgments.

We have seen this repetitively in the disciplines of Psi and Consciousness Research, for example. This is, at times, particularly ironic because, with respect, we suggest a feasible unstudied conjecture: This area is so multidisciplinary that few scientists in the area have been able to allocate even as much time to study this area as they would to a regular bachelor's degree in a recognized university discipline, such as physics or psychology.
Parapsychology, therefore, contrasts starkly with other disciplines, perhaps their own, these same experts would never dare to comment unless they had, at minimum, a PhD specializing in the specific area of the discipline being commented on.

So in disciplines like parapsychology, this might be one reason why "too wrong to be wrong" *level 1 statements of the 11NCR* are often very inappropriate: The critic should not be commenting at all or recognizing level 6 is more logical: *This is outside my discipline, so I don't understand it or haven't studied it. Let me suspend judgment.* That individual may be perceived as an "open-minded, appropriate skeptic" as opposed to the Level 1 individual who would be the "pseudo-skeptic" who will not evaluate for "feasibility", stopping at the "not falsifiable" level. And a question: *How would a feasible model explaining all the varied mechanisms of psi*

multidimensionally (as has recently been done [54]) produce change in the perception of psi? Would it raise the 11NCR classification up a notch or two or five?

But on the other hand, importantly, some paradigmatic models are incorrect and not feasible. And if they were falsifiable, they could be falsified using the correct approaches. Yet, most times, they are not falsifiable. Such justified rejection would reflect scientific success in maintaining the status quo: *What is new, is not necessarily better.* But that's why we need added pieces of the jigsaw puzzle within 3S-1t. *This way the open-minded appropriate skeptic can examine the data logically.*

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