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**Stretching situated knowledge: from standpoint epistemology to cosmology and back again**

Abstract. This article is driven by the belief that there is great potential benefit in carefully considering the implications of ‘situated knowledge’ in IR scholarship. This can be helpful not just for scholars thinking through meta-theoretical puzzles in International Relations (IR), but also for shaping concrete knowledge practices in international political practice today. Yet, there seems to be something of an unresolved puzzle at the heart of the situated knowledge paradigm: a puzzle relating to what the situatedness of knowledge entails and how we should ‘deal with it’. This piece suggests that philosophical and social theoretical, and by extension also IR theoretical, engagements with situated knowledge can benefit from being considered anew: from the point of view of theoretical physicists and cosmologists. While not always reflexive concerning ‘social’ situatedness, the physicists and cosmologists considered here have reflected on aspects of situatedness that have been under-emphasised in standpoint philosophy. Crucially, physics and cosmology framings of situated knowledge can help to show why dealing with situated knowledge should mean more than attentiveness to various knowers and their positionality, and more than reflexive ‘dialogue’ between knowers; it also seems to require ‘stretching beyond’ the horizons of ‘situated knowers’. It is suggested that science is and, perhaps even ‘scientifically aspirant’ IR then should be, about imaginative conceptual ‘stretching’ rather than merely ‘situating’. This stretching should go hand in hand with opportunistic but critical methodological probing, seeking to push us ‘beyond’ how we understand the world from our situated perspectives. The provocations developed here have three main audiences in IR: scholars engaged in meta-theoretical debates in IR, those studying international politics through the situated knowledge approach, and also critical theorists seeking to understand conditions of critique.

**Stretching situated knowledge: from standpoint epistemology to cosmology and back again**

We are not in charge of the world…We just live here and try to strike up non-innocent conversations...[[1]](#footnote-1)

A key aspect of post-positivist and critical theory attacks on positivism has been an emphasis on social context of knowledge construction. The point has been made, in various different permutations, that ‘objective’ knowledge about social affairs does not arise from specific universal methods of ‘science’. Rather it has been emphasised that knowledge, including ‘scientific knowledge’, needs to be considered as arising from, at least in part, specific political and social contexts. It is the failures of ‘positivism’ that have been most directly attacked. Inanna Hamati-Ataya aptly summarises the postpositivist or reflexivist drive in IR: ‘the main targets of the ‘reflexive critique’ are positivism’s adherence to ‘truth as correspondence’, its understanding of knowledge as ‘representation’ and its separation of subject and object, and of facts and values.’[[2]](#footnote-2) A considerable, in fact quite an overwhelming, literature has arisen on post-positivist scholarship[[3]](#footnote-3), meta-theoretical alternatives to positivism[[4]](#footnote-4) and related notions such as reflexive theorising[[5]](#footnote-5). The lessons of post-positivism then have been well-learned, it seems, in International Relations scholarship – at least on the European side of the Atlantic.

This paper seeks to take some initial steps in developing a new, or rather to ‘renew’ an existing, avenue for exploration in post-positivist philosophy of science, social theory and critical IR theorising. The piece seeks to do so by exploring the potential but also the puzzles implicated in theorising what ‘situated knowledge’ means. The notion of situated knowledge, and standpoint philosophy which has sought to develop it, have important things to say to meta-theorists and theorists in IR about the conditions of scholarship in the field, but also, crucially, about how to think through and reshape knowledge management practices in concrete international political processes.

At present, situated knowledge has mainly been developed in IR in feminist scholarship, particularly by those feminists who identify with feminist standpoint epistemology. Cynthia Enloe, perhaps most famously, has been associated with the perspective of seeking knowledge from the point of view women as situated knowers,[[6]](#footnote-6) although it is important to note that many feminists deny that any clean break exists between empiricist, standpoint and poststructuralist feminist perspectives.[[7]](#footnote-7) While (often also implicitly) informative of a range of gender theorists’ work in IR, and while also present in many textbook accounts of feminist IR theories[[8]](#footnote-8), standpoint epistemology is little discussed outside feminism. The impetus of much postcolonial theorising has been to bring attention to situatedness of knowing, and the generic ethos of situatedness is present in much post-positivist reflection on knowledge production, but in IR context Christine Sylvester’s work, which directly addressed standpoint epistemology as a way of knowing in IR, and Steve Smith’s discussion of it in 1996, still remain perhaps the most direct discussions of the implications of this philosophy in the field.[[9]](#footnote-9) That said, recent engagements with reflexivity, such as Inanna Hamati-Ataya’s work[[10]](#footnote-10), bring attention to this strand of thought – and rightly so, for it has great relevance for work in the field.

I want to propose that carefully thinking through the implications of situated knowledge and standpoint philosophy is an interesting avenue to take on in IR scholarship. This is not so just because IR scholars and meta-theorists can learn important insights from situated knowledge philosophy but rather because there is a potential for it to be of even more direct applicability in international politics today. Given all the commitments in international political practices and global governance today to ‘knowledge banking’, ‘knowledge communication’ and ‘knowledge-based partnerships’ between donors and recipients, paying attention to knowledge construction and how it is conducted is particularly important. In addressing some of these puzzles, situated knowledge philosophy can be particularly helpful in thinking through key aspects of knowledge production – certainly in policy fields such as development and democratisation. Why? Because especially in these areas of global governance intervention, the wish to ‘listen to the locals’, that is, local development or local democratic actors or other beneficiaries of aid, has become the primary mode of action. The wish to engage in ‘partnerships’ between donors and recipients in such policy areas has, however, simultaneously resulted in the – rather paradoxical – rise of ‘scientific methods’ in recording ‘local voices’ and ‘effects’ of local projects. Various knowledge management tools, which seek to record, measure and assess, local conceptions of democracy and the effects of activities in achieving ‘development objectives’ are developed and implemented, but the question arises: are the ‘knowledge practices’ and ‘paradigms’ of democracy promoters or development practitioners in tune with their commitment to ‘localisation of project design and delivery’ and what would taking localisation of project design and delivery mean in terms of knowledge management mechanisms? Specifically, have development and democracy support donors considered explicitly moving away from ‘objectivist’ approaches to recording knowledge about the locals towards epistemological positions which have more sophisticated conceptual systems to think through what ‘listening’ to ‘locals’ would even mean, what it means for knowers from different positions to engage? I want to suggest that, if indeed ‘listening’ is of interest to global governance actors, they should try to deal with the ‘social positioning of knowledge’ better. What is the consequence of power for any process of ‘listening’ and how do we listen to ‘marginalised voices’ we do not tend to ‘see’? Given the insights of standpoint epistemology especially on the implications of ‘listening’ – that this requires positioning, reflexivity and awareness of power – situated knowledge philosophy would seem to be a potentially fruitful avenue to reflect on to improve the practices of ‘engagement’ and ‘management’ in development and democracy aid.

That said, while interested in exploring the insights of situated knowledge, this intervention does not take situated knowledge approach as an unproblematic starting point, but rather as a rather puzzling starting point. As a precursor to a wider study of situated knowledge in development and democracy aid, this article is interested in exploring a puzzle internal to situated knowledge theorising: namely, what does it take to ‘deal with’ the challenges to knowledge construction provoked by ‘situatedness’ of knowledge? This is a trickier question than is often appreciated, this piece will argue. This is because at the heart of standpoint epistemology an important lack of clarity exists as to what it means to ‘address’ situated knowledge. Standpoint epistemologists argue that situated knowers, to deal with their situatedness, must try to be reflexive, must better understand the causal conditions of their own knowledge and must recognise multiple positions of knowing as well as establishing basis for dialogue. In so doing they can develop avenues towards ‘strong objectivity’ – more objective, although not ‘objectivist’ knowledge.[[11]](#footnote-11)

Yet, the standpoint epistemologists’ attempts to deal with the question of how different positioned knowers interact remain ambiguous and incomplete in an important respect. It is argued here that while reflexivity, pluralism and dialogue are excellent suggestions to bear in mind, it could be argued that they fail to address a core problem: how is one to ‘deal with’ the fact that one’s knowledge is situated? How does one ‘reach’ for dialogue with others when one is situated or ‘reach’ for understanding of causal conditions? Can one, and should one, somehow seek to ‘escape’ situatedness, push ‘beyond it’, in order to deal with it? Crucially, is it sufficient for knowers aspiring to strong objectivity to situate knowledge or does situated knowledge necessarily imply something more? Do we need, somehow, to ‘stretch’ situated knowledge in order to deal with situatedness? As those reading Adorno carefully today would argue, perhaps we need to know also how to think ‘beyond’ our horizons if indeed we exist in a totality which in part obscures our access to it.[[12]](#footnote-12)

Now since it is argued below that standpoint philosophy does not particularly help us in thinking through these puzzles, this piece explores a different, a somewhat unusual but surprisingly helpful, avenue for coming at the situatedness of knowledge: in this article I am interested in exploring the implications of our situatedness as beings in the cosmos, or trying to explore if you like the interconnections between situated knowledge in the social sciences and situated knowledge as a condition of knowing or experiencing the cosmos. This move helps in certain ways in exploring what dealing with situatedness might mean in social contexts, including in applications in IR. Crucially, it will be argued that situated knowledge viewed from this perspective may in fact mean more than attentiveness to situated knowledge or ‘dialogue’; it may in fact require conceptual stretching, alongside insistence on methodological openness.

The argument proceeds in three sections. First, the article addresses situated knowledge and how standpoint epistemologists and related approaches come at the process of acquiring situated knowledge and strong objectivity. Second, having pointed to the potential but also the limitations inherent in standpoint epistemologists’ recommendations as to how we should deal with situatedness, I then explore how reflections by physicists and cosmologists might be helpful in understanding the condition of situated knowledge. I try to elucidate why we should consider situated knowledge in a cosmological and not just ‘social’ context. If we do so, we see that we can obtain a better understanding of some new tools in dealing with situated knowledge. In exploring the insights of cosmological approaches to situated knowledge in the conclusion, the piece seeks to interrogate what a wider view of situated knowledge brings to IR theory, meta-theory, and critical thinking in IR. In agreement with Bruno Latour[[13]](#footnote-13), who criticises self-avowed critical theorists for reifying the social world and its ‘structures’ through its language and theoretical tools, it is argued that situating situated knowledge cosmologically can help in addressing these issues for it allows us to see both the limitedness and the necessary ambition we need to have in dealing with situated knowledge.

**The puzzle of situated knowing**

Increasingly, in an international system where most political and economic actors are also knowledge producers, questions of philosophy of science and knowledge concern these knowledge producers, not just ‘academics’ of international politics. This is why wider understanding of philosophy of science is of some importance: not just for ‘IR scholarship’ but also for thinking through policy practices involved in concrete international political processes. Indeed, how we produce knowledge, which epistemological warrants we cash out, and how we apply or designate methods for study of effects of policies are questions of intense concern for many policy practitioners in international politics today. In development aid, for example, debates about measurement of effects of developmental interventions has been intense for years; whereas in the area of democracy promotion and support, of particular interest to the author, an intense set of debates have erupted as to what criteria to use to measure democratisation and effects of democracy support.[[14]](#footnote-14)

But what do epistemologists or philosophers of science have to offer to IR analysts or practitioners for that matter? Is there a consensus in philosophy of science on how we should approach knowledge production that we could ‘extend’ out to them? Unfortunately, there is not. Instead of philosophy of science ‘providing answers’, in general and in IR, philosophy of science is well-versed in setting out the complications of production of knowledge. How is it that truthful or at least somehow trustworthy knowledge of the world we are in can be constructed? Do positivist scientific methods geared around production of knowledge about ‘patterns’ of social behaviour assist in this? Is all knowledge in fact simply justified by ‘what works for us’ as the pragmatists would have it? Or is there a ‘reality’ out there which our concepts, and scientific experimentation, are getting at, as scientific realists argue? These kinds of debates have been played out in the meta-theoretical literature in IR.[[15]](#footnote-15)

Even as disagreement prevails in the ‘post-positivist era’ of IR scholarship there are some important agreements. Importantly, most positions challenge classical ‘objectivist’ philosophies of science, especially ‘positivism’, whether it be through poststructuralist, pragmatist or critical realist lines. Yet, pragmatism and poststructuralism tend towards ‘a-realist’ critiques of positivism and tend to emphasise contingency of knowledge on social and linguistic frames. Critical realism on the other hand explicitly argues for a ‘critical naturalism’, a science of society premised on ontological and causal realism. Standpoint epistemologists, alongside critical realists, and unlike pragmatists and poststructuralists, have a firm commitment to ‘the world’ and the possibility of objectivity – albeit not of ‘positivist’ kind. While critical realists ground analysis in abstraction of ontological causal powers, standpoint epistemology emphasises that to ‘get at’ the world, which is real and causal on us, we need to think seriously about the ‘positionality’ of knowledge ‘in the world’. Standpoint epistemology tries to think through knowledge and science ‘after the demise of the ideal of neutrality’[[16]](#footnote-16), but also explicitly steers clear from relativist perspectives emphasising standpoints as hooks to reality and objectivity.

Although it has been made reference to by feminist IR theorists,[[17]](#footnote-17) standpoint feminism has received relatively little attention outside feminism. This is particularly in comparison to the attention received by critical realism, which this postpositivist approach can speak to and converse with in particularly interesting ways.[[18]](#footnote-18) But what does standpoint feminism and its key notion situated knowledge mean and entail?

Key feminist epistemologists and social theorists such as Sandra Harding, Nancy Hartsock and Donna Haraway are primarily responsible for the development of the notion situated knowledge.[[19]](#footnote-19) (This is despite the fact that situated knowledge and standpoint theory originate in the Marxist tradition more widely, hence also its similarity with critical realism which draws on the Marxist tradition.[[20]](#footnote-20)) The ‘situated knowledge’ concept the standpoint theorists develop is noteworthy because it gets at three important things that are acknowledged within other related philosophies of science, such as critical realism, but do not receive central focus within them. First, situated knowledge theorists argue that knowledge always arises from a context, a social and political context, which shapes it. The idea that neutral knowledge, in science or outside it, is possible a false ideal we should not aim at, or even critique as such, for it is a misleading starting point. Knowledge is always positioned, or situated.[[21]](#footnote-21) Second, knower, in order to know, must engage with the causal context within which the knowledge arises, to understand their own knowledge as well as to try and understand the social positionality of the knowledge of others, difficult and contested as this might be. When this social positioning of knowledge, the implicit and explicit structures and assumptions which condition it, are understood, we gain a better, more holistic, understanding of processes around us. This better knowledge is what Sandra Harding famously calls ‘strong objectivity’.[[22]](#footnote-22) It is a stronger form of objectivity vis a vis the positivist idea of value-neutral objectivity because it possesses greater depth and understanding of social conditions of knowledge. Third, knowledge sources contributing to strong objectivity are plural because knowledge is presented from various locations but also the possibility of ‘translation’ exists, for more objective knowledge can arise from standpoint(s) and their translation into – not a universal ‘God’s eye point of view’ – but better, situated, embodied grasp of structures of power relations and processes. Emphasis on these aspects is important in bringing attention to situatedness of knowledge and the need to engage the question of who speaks, theorises, gathers data and ‘abstracts’ (arguably not receiving enough attention in critical realism despite the general acceptance of social nature of knowledge).

Yet, a crucial puzzling question arises: how do we gain ‘strong objectivity’, that is, how do we gain knowledge of the context of our knowledge that ‘escapes’ the situated view point of the knowers? Can and should situated knowledge also seek to escape situatedness?

To address the question of what situated knowledge means and how it can be communicated or ‘dealt with’ standpoint epistemologists propose some crucial moves.[[23]](#footnote-23) Standpoint theory argues that we need to generate a) ‘self-reflective’ or ‘openly’ situated, embodied knowledge. Generating this involves b) causal analysis of the context of one’s knowledge, and c) reaching out to other knowers outside one’s own context to ‘understand’ them in their context of knowing. As a methodological principle in reaching out, Harding proposes we: d) ‘start with’ the points of view of marginalised knowers, for these points of views are privileged, not necessarily in all respects but in respect to understanding causal limitations on producing deeper knowledge of matters affecting marginalised populations negatively. In engaging with different knowers we should understand the ‘agency’ of them as knowers (not just as ‘objects’)[[24]](#footnote-24) but more than that, should also somehow e) ‘translate’ or ‘communicate’ our knowledge with them. This in turn requires, it seems f) democratic dialogue between knowers, some way of ensuring less power-biased conversations between knowers.[[25]](#footnote-25)

There is an impetus towards (self-)reflexivity and engaging with ‘the world’ outside one’s experience, and at the same time democratic communication and learning in one’s standpoint. It is through coming to appreciate our context and learning from others about their experience of their context, in so doing grappling also with relations of power between knowers, that our knowledge will ‘lock into place’ in the social realm and become more objective. Even if a God’s eye view is not created, embodied situated knowledge(s) – even when plural – have the potential to be *more* objective while avoiding the false ideal of ‘neutral’ knowledge. The impetus here of course is to provide grounding for women’s knowledge, or knowledge of other marginalised populations – standpoint epistemology is a normative project as well as emphasising that the process of acquiring situated knowledge is a political process of engagement. The point is to say that in their differential embodiments, experiences, personal knowledge of others, emotions and interests, know-how, cognitive styles, background knowledge and relations to others, situatedness affects knowledge: not only access to information but form of knowledge, attitudes to beliefs, standards of justification, authoritiveness of claims, and views on importance of specific claims[[26]](#footnote-26) and that to deal with these differences, self-reflexivity, understanding and sensitivity to oneself and to others are necessary.

Standpoint viewpoint is interesting in that it sets out reasons to avoid objectivist science but closely guards against relativism, which it sees as equally universalist ‘non-located’ position.[[27]](#footnote-27) As such it is also of great potential interest in dealing with the problems of objectivity in knowledge production in international politics. If indeed development practitioners or democracy promoters wish to engage with ‘the locals’, what kind of knowledge production processes and attitudes are necessary ‘to listen’, to ‘hear’, the locals? What kinds of knowledge production is considered ‘legitimate’ and are forms of knowledge not manifested in ‘expected’ forms (from the point of view of donors’ situated context) ‘missed’?

Yet, the process of knowing standpoint theorists set out is not unproblematic. Arguably, it is rather optimistic in expected outcomes and vague on process. Rather problematically, standpoint epistemology relies on ability of the self to know oneself and crucially also to ‘reach’ beyond to ‘speak’ to others and to ‘understand’ them. It is this optimism that postmodern feminists or even standpoint theorists such as Haraway[[28]](#footnote-28) have criticised.[[29]](#footnote-29) The optimism, per se, is not the only problem that arises. A more fundamental issue concerns me here: the practicalities of ‘reaching out’ to others, beyond situatedness. How do we exactly ‘stretch’ our knowledge to communicate with others but also should we also seek to go ‘beyond’ others’ knowledge or our own in reaching for strong objectivity? If we are situated in ways which hinder our knowledge of our context, how do we stretch outside this boundedness? Little attention is given to this seemingly important challenge situated knowers must constantly be faced with: the challenge of being situated but also needing to reach ‘beyond’ in order to make sense of situatedness. In the following, I wish to suggest that to help with these questions turning to reflections from physicists and cosmologists can help. Their thoughts are particularly helpful in allowing us to think more carefully about *stretching* that may be implied in situated knowing.

**Stretching situated knowledge: reflections from physics and cosmology**

I want to propose that in thinking through puzzles of standpoint epistemology adopting a different mind-set or perspective can help. I propose that we approach situated knowing in a wider context, as a problem of all knowledge construction in the cosmos, rather than as a particular problem troubling (feminist) social theorists and philosophers. This is because many physicists and cosmologists – I focus here on Richard Feynman or Lee Smolin – directly or indirectly speak to and seek to actively deal with the issue of situated knowing. I do not wish to suggest that these scientists have thought through all aspects of *social* situatedness; yet, they have thought about situatedness of knowledge beyond ‘social’ contexts. Appreciating this can be helpful not only in ‘undoing’ unhelpful boundaries between natural and social sciences, but also in thinking through the puzzles of situatedness pointed to above.

*Physics and cosmology as situated knowledge*

It is often not appreciated that for many ‘natural scientists’, and among them theoretical physicists and cosmologists especially, situated knowledge is a real issue: it is for these scientists an everyday problem, a horizon, a condition of theorising, thought and experimentation. This is because in their fields it is simply impossible to escape the consequences of situatedness of knowledge: scientists are situated in social settings but even more challengingly they must and can only know ‘nature’ from also being situated in it in ways which necessarily affects their perspective and ability to grasp it. Both physicists like Richard Feynman and cosmologists like Lee Smolin emphasise the need to reflect on the delimitations of knowledge construction humans suffer from in nature and in the cosmos. Richard Feynman, for example, specifically highlighted the dangers humans’ use of ‘common sense’ can lead to in sciences. As Feynman powerfully emphasised, a lot of physical theories are very difficult for humans to conjure up and to accept because, to be useful, they have to be far removed from what appears to humans (as situated knowers in nature) as ‘common sense’. ‘It is not a question of whether a theory is philosophically delightful, or easy to understand, or perfectly reasonable from the point of view of common sense. The theory of quantum electrodynamics [for example] describes Nature as absurd from the point of view of common sense. And it agrees with experiment.’[[30]](#footnote-30) The challenge of physical theorising by situated knowers is then to challenge common sense notions.

From a different perspective, Lee Smolin emphasises the challenges of cosmological knowledge. This is the ultimate realm of situated knowing: considering we only have one universe, which we are ‘of’, how is it that we can come to ‘know’ it?

The attempt to extend physics to cosmology brings new challenges that require fresh thinking. A cosmological theory cannot leave anything out. To be complete, it must take into account everything in the universe, including ourselves as observers. It must account for our measuring instruments and clocks… It is impossible to get outside the system we’re studying when that system is the entire universe.[[31]](#footnote-31)

Unlike for social scientists, who constantly emphasise that they are embedded ‘in’ a ‘social world’ which structures their thought, the problem for the physicists is in a sense deeper. They as knowers of nature are ‘in the world’ faced with the ultimate problem of situated knowledge for they cannot escape the fact that we (as observers/theorists) are all situated in a (particular visible) Universe, a particular cosmological horizon, its particular laws of physics and time-space configuration; we are also within this cosmos situated in a particular what we call ‘local’ cluster of galaxies and dark matter; a particular galaxy; and particular rather isolated spot in one of its spiral arms. Within this very local context we are also situated in the very ‘parochial’ context of our solar system’s third planet, where the Moon is as far as we have ‘physically managed it’ so far. We are also situated in ‘time’, a curious relative characteristic or dimension as it is: by our calendars we live some 200 000 or so years since the evolution of our species, a relatively young species then, in the context of evolution of life (in its most basic form some 3.7 billion years ago). Humans have had higher culture and writing for some five thousands of years or so; libraries and stores of information for roughly as long, and for the last 100 years or so we have benefitted from mechanical and electronic stores of information and dissemination. For about two hundred years serious ‘scientific’ effort has taken place to try to understand our place in the universe.

All our knowledge – and these scientists do not sidestep this, for they would do it at their peril – is *limited* and crucially it is *situated* in ‘nature’ and ‘the cosmos’.

It is important to note that it is precisely because of the deep challenges of situated knowing in the cosmos and on this planet that physicists like Feynman or Smolin have very interesting understandings of ‘physical laws’. In social sciences, physical laws are often discussed as if they were ‘universal’ in their reality or at least (mathematical description) (which of course is then for many the standard social sciences cannot aspire to[[32]](#footnote-32)), but for Feynman or Smolin, physical laws are more subtle notions. Because of situatedness of knowledge, laws are in fact always ‘approximate’ at best. As Richard Feynman emphasised: ‘That is the same with all our […laws] – they are not exact. There is always an edge of mystery, always a place where we have some fiddling round to do yet’.[[33]](#footnote-33) Smolin emphasises a similar sentiment, which in turn informs as a central notion, his cosmological theories: any laws are only applicable in a very tentative manner.[[34]](#footnote-34) Of course while Newton’s laws and Einstein’s theory of relativity, or the theory of quantum electrodynamics, seem to be correct at a particular time, within particular instrumental frames of reference, and within the context of technological invention we have, they may not only be proved wrong but even more fundamentally are always necessarily *approximate,* and necessarily approximated at by limited knowers. They are crucially not ‘transcendent’*.*[[35]](#footnote-35)The tendency, even by some physicists, to treat ‘physical laws’ as blue-prints getting at Platonic truths which ‘transcend’ this world is understandable but is ‘at root a religious aspiration’[[36]](#footnote-36). As Smolin explains: ‘The yearning to be liberated from death and from the pains and limitations of our lives is the fuel of religions and of mysticism.’[[37]](#footnote-37) It also fuels mathematical models for transcendence amongst some physicists. Against this urge, Smolin warns: ‘It is far more challenging to accept the discipline of having to explain the universe we perceive and experience only in terms of itself’.[[38]](#footnote-38) It is a less romantic, a more restricted route, but ultimately the more successful, he argues.

For physicists and cosmologists laws are of course only constructedby us, a relatively wise but infinitely limited species of beings on a specific planet in a specific evolutionary moment. As such, they are always laws by situated knowers; there is no ‘outside’ perspective we have of them. As Lee Smolin powerfully points out, much like social scientists, physicists and cosmologists have to recognise the fact that they live in the only ‘case study’ they have of the universe and this puts them in a rather curious situation:

If we believe that the task of physics is the discovery of a timeless mathematical equation that captures every aspect of the universe, then we believe that the truth about the universe lies outside of the universe. This is such a familiar habit of thought that we fail to see its absurdity: If the universe is all that exists, then how can something exist outside it for it to be described?[[39]](#footnote-39)

Despite the development and use of logic and mathematics, physicists should not, and ultimately cannot, assume some sort of a ‘God-like view’ from which we survey the external ‘reality’ of the universe. Indeed, even Platonists in physics, who explicitly believe in the ‘reality’ of a mathematical structure in the universe, emphasise that ‘our’ social constructions create a crucial barrier to our understandings of whatever ideal structure might exist.[[40]](#footnote-40) This is especially inescapable for cosmologists for ‘abstracting beyond’ is not an option available for them: we live in the only ‘case study’ of a cosmos and we are ethnographically situated beings within one specific site in it[[41]](#footnote-41) as well as being ‘of it’[[42]](#footnote-42).

Now it is of course curious that many physical laws would appear to be unbreakable in our part of the universe – indeed, many physical laws postulated by humans seem pretty well verified and ‘stable’, whether it is speed of light or relativity effects of spacetime – but breakable in principle they are, for one thing that has been learned by physics is that we have to expect that the more we know the more unknown parameters arise ‘shaking’ our situated understanding and also our ability to experiment (and to find out we may be ‘wrong’ or in need of ‘re-approximating’ in theory).

Crucially, it is the approximate nature of knowledge situated knowers can have of it that motivates the study of nature: we only ever partially get at, conceptualise, and indeed are able to understand – with our limited context-evolved brains and our concepts – but this is why it is interesting to try and ‘improve’ our concepts, methods, understandings. Science is about thinking ‘new ideas’, about new guesses, having of which is ‘extremely difficult’ for it ‘takes fantastic imagination’.[[43]](#footnote-43) Approximate knowledge by apes developed on a specific marginal planet needs to be open to revision and imaginative as well as testable by experiment.

I want to suggest below that, as a result of the emphasis in innovative imagining in the context of situatedness, physics theorising and cosmology may provide us with some important provocations not only to think through limitations of situated knowledge but also the curious issue of ‘stretching’ situated knowledge.

*Stretching situated knowledge*

Extrapolating from the above, these physicists and cosmologists are constantly in the process of trying on the one hand to consolidate knowledge through theoretical ‘metaphors’ that make sense ‘to us’ and can somehow approximate ‘the world’ or experimental results, but at the same time are seeking to break up and ‘stretch’ the tools and conceptual visions we work with. Moving away from common sense, imagining world anew through new concepts and notions which do not necessarily quite ‘make sense’ for ‘us’ as situated knowers is, as Feynman emphasised, the core purpose of science, even as imaginative notions should be somehow computable in terms of what they mean and thus subject to experiment.[[44]](#footnote-44) Dealing with situated knowledge then seems to imply not just recognition of situatedness but also ‘stretching’ it; as difficult, indeed impossible, as this can be. This is of course because conceptual descriptions are considered always approximate and never ‘there’. Even mathematics is no easy escape from the world but is a human construction and crucially hampered by our conceptual construction of the universe.[[45]](#footnote-45) Even if we have good maths we still need to conceptualise the world, which is why descriptions of everyday language are still ‘created’ and ‘recreated’ in physics to try to ‘capture’ the things. It is in this process of conceptualisation that ‘stretching’ situated knowledge is implicated in interesting ways I want to suggest.

Let us discuss a couple of examples of the ways in which some physicists have stretched concepts.

Einstein’s revolutionary relativity theories developed over and ‘beyond’ the Newtonian ones explicate this stretching well. Within a Newtonian universe where we can predict the movement of things in relation to their mass and gravitational attraction, the Einsteinian model sought to ‘stretch us’ away from the ‘situated knowledge’ within which Newtonian paradigm situates us. Yes, gravity works roughly like Newton postulates – that is, his equations seem to relatively accurately describe the movement of bodies (to such a good approximation that they are even today used to calculate paths of space travel by NASA) – but if we conceptually stretch ourselves away from what seems intuitive within Newtonian concepts – and both naturally and socially – we come to ‘see’ a very different kind of ‘reality’ of forces. Indeed, it is only by breaking with society’s norms and physicists’ ‘intuitions’ that we gain better understanding, or approximation, of how to ‘model’ the universe. We would not naturally come to such unintuitive set of notions as four-dimensional ‘spacetime’, but the language of mathematics which ‘pulled away’ from the conceptual bounds of societal descriptions pointed in the direction of breaking our language conventions and urged the creation of a new conceptions, or approximation, of what ‘is going on’ with ‘gravity’.

It may take a socially unconventionally positioned person to reconceptualise and capture a ‘new’ way of describing the world in concepts. Certainly, it seems to take ‘pushing’ at our intuitive categories as well as established physical thought to make ‘break-throughs’ in physics. Indeed, as animals, which perceive the world through three-dimensional experience having relatively recently acquired our visual and reasoning skills (and in a very specific evolutionary context where visualising predators was essential), we still do not quite ‘get’ many physics concepts, such as spacetime. Yet, we know that experimentally Einsteinian vision makes ‘much more sense’ and also is, experiments tell us, approximately (though not ‘finally’) a better vision or conceptual stretch too for a species ‘like us’. In fact, for apes like us it is quite an achievement, even as relativity theory continues to be challenged and ‘pushed’ at by various cosmological and physical alternatives.

Another example I wish to discuss arises from field theory. The concept of fields is central to physics today: both classical physics dealing with things like electro-magnetic force and quantum physics trying to grapple with the ‘matter fields’ which make up the ‘particles’ in the universe. Now, ‘field’ as a concept was envisioned by Michael Faraday in the 19th century, not as a description of reality as much as a concept, a metaphor, to illustrate something interesting about electromagnetism. To call it a field implied a physicality to its ‘being’ but also emphasised, mathematically, fields’ continuity in space and time (they take value in all regions of space). This concept was and is inherently ambiguous for what ‘fields’ ‘are’ is still a mystery in physics.[[46]](#footnote-46)

What is interesting is that the ambiguity of the field concept has made the concept of the field not un-favoured but rather popular in physics. Indeed, quantum physics also hangs on the use of the metaphor field. Matter fields, from which particles arise, is central to understanding how quantum systems are constituted and how ‘particles’ decay and interact. There are in essence no such things as particles, instead there are, physicists remind us, only fields. As Sean Carroll emphasises:

When we talk about particle physics, we don’t usually emphasize that we’re actually talking about field physics. But we are. The point…is to reorient our intuition, in order to appreciate how quantum fields are the ultimate building blocks of reality as we currently understand it. The fields themselves aren’t ‘made of’ anything – fields are what the world is made of…Magnetism is carried by a field, as are gravity and the nuclear forces. Even what we call ‘matter’ – particles like electrons and protons – is really just a set of vibrating fields.[[47]](#footnote-47)

Despite the fact Carroll emphasises that the world ‘really’ consists of ‘fields’, please note also his emphasis on ‘as we currently’ understand the world. This emphasis on what the world really consists of should not be taken as a postulation of a final reality but rather as emphasis on our best metaphorical and conceptual bet.

What these illustrations exemplify is that in doing ‘physics’ we are trying to ‘stretch’ our situated knowledge. We *can only do so in a situated sense*, yet physicists’ efforts are also trying to *push beyond* our intuitive horizons, while only being able to do so in always limited and always situated. Some stretches are very difficult, for of course it is very difficult to stretch a species very far from its intuitive way of knowing the world. We also stillhave to find ‘human words’ to describe things, metaphors which ‘do’ the job ‘for us’. Further, we are inherently limited knowers in a real material sense of what we are and where we are: this is why physicists have to also deal with the real problem that we might not be in the position to know very much about our universe. Just because we are ‘of’ the universe does not mean we have privileged access to its mysteries.

*Implications*

Coming at situated knowledge from this somewhat unusual perspective, highlights at least three things in relation to thinking through ‘social’ situatedness.

First, it highlights the *ubiquitousness of the problem of situated knowledge*. Far from being a unique problem of social scientists in social contexts it is around us all the time by the virtue of the cosmos itself. It is not a problem of social epistemology alone: situated knowledge is a condition of knowledge and indeed of being in the cosmos. It is an ontological condition as well as an epistemological limit.

Second, the limitations raise important questions for us: we think we ‘know’ about ‘social world’ because we are in it: but we are equally ‘in the cosmos’ and still know little about it. Scientific cosmology highlights the potential hubris of relatively confident sciences, such as the social sciences, where it is assumed that we can ‘intuitively’ grasp the world. As Rouse points out:

The presumption that we know what we mean, or what our verbal performances say, more readily than we can know objects those sayings are about is a Cartesian legacy, a linguistic variation on Descartes; insistence that we have a direct and privileged access to the contents of our thoughts which we lack towards the ‘external’ world.[[48]](#footnote-48)

Third, physics thinking highlights the need to be open to tools and concepts to stretch ‘beyond’ what we have to describe our situated knowledge. We need to avoid fixed methods and fixed conceptual categories. As Richard Feynman and Smolin have so well clarified: we need to guess, innovate, conceptually stretch our understandings to bring about ‘new ways of looking at things’, which we then try and work out the observable or detectable consequences of, before we then go and ‘look at’ the world (potentially in new kinds of ways if the new way of looking at the world so requires).

Crucially, the implication is that science is not equal to ‘method’ per se: ‘Science is a way of trying not to fool yourself. The first principle is that you must not fool yourself, and you are the easiest person to fool’.[[49]](#footnote-49) Scientific methods then too should push us ‘against ourselves’ but are not what we should ‘follow’. Looking at the world, experimenting, is crucial but follows conceptual innovation, imagining ‘beyond’.[[50]](#footnote-50)

Also, this perspective points out that we cannot necessarily rely on our own descriptions, or our own self-reflexivity, to ‘get at’ that which we are in.[[51]](#footnote-51) I want to suggest that developing ‘stranger’ metaphors, ones which are still ‘social’ but vague or uncomfortable in their meaning, suggestive of social meanings we metaphorically wish to pose against the ‘norm’, can be a useful strategy of stretching. Instead of working with existing concepts, explicitly stretching them away, to describe something anew is what situated knowing in a sense ‘implies’.

This discussion highlights the double-edged sword nature of situated knowledge: situatedness of knowledge both delimits and forces us to be humble but also our situatedness arguably creates a potential for experiential hubris, for we can only know from our contexts. It is because of this latter danger, ultimately, that recognising the inherently ‘stretchy’ nature of any situated knowledge is important. What I mean by this is that we need to recognise that situated knowledge implies and must imply that we ‘stretch’ our knowledge, are open to going beyond our own situated knowledge. Situated knowledge then cannot simply mean self-reflection, or causal analysis of context or democratic dialogue: it must also mean active efforts to stretch knowledge beyond. It is for this reason that we need to emphasise not just that situated knowledge implies dealing with ‘shared experience that is specific to a social ‘situation’’[[52]](#footnote-52) but also that crucially that it must also imply stretching beyond the situation we are in.

**Conclusion**

Where do these insights leave us? Do they help us in IR analysis?

They may help meta-theorists, empirical researchers and also critical theorists in emphasizing a few key points. First, we recognise that situated knowing should not be reducible to theorising social situatedness, self-reflection, causal understandings of our context and democratic dialogue on knowledge. It should also be about, or speak to, conceptual stretching ‘beyond’ the ‘social world’[[53]](#footnote-53) knowers inhabit. We need to engage in ‘theorising the impossible’. To have situated knowledge, to deal with this condition, one has to also ‘stretch’. This stretching is never really outside of our experience, yet it is an essential part of the process of knowing in the world.

The reason this is significant to note is that this sort of an insight bolsters the kind of arguments that Bruno Latour[[54]](#footnote-54) and others[[55]](#footnote-55) have been making recently: arguments that emphasise that somehow we need to address the problems of how we ‘abstract’, what kind of social categories we work with, because if we do not our language of ‘social structures’ or ‘social forces’ reify a ‘social world’, which may not really exist outside of the practice of abstraction. While speaking to their concerns, at the same time, the notion of situated stretching developed here also implies that a Latourian solution to the problem is also troublesome, for empirical observation of practices which he suggests we turn to, does not ‘solve’ the problem of socially inherited and reificatory theorising. Looking at these critiques from the point of view of ‘stretchy’ situated knowledge, we come to the view that despite the problems of our knowledge we need to also abstract ‘beyond’, to dare to ‘stretch’.

What makes standpoint theory interesting then is not necessarily the solution it provides to the problem of knowledge, this is in fact incomplete, but the fact that standpoint theory’s emphasis on situatedness points to an interesting set of limits to social knowledge. Situated knowledge, especially when conceptualised as requiring stretching, emphasizes the limits of our knowledge, while *still* calling for the courage to abstract, to conceptualise, as situated beings in the universe must to ‘deal with’ their situatedness*.*

Methodologically, it is also interesting to observe that this perspective suggests that focus of social science should be on maintaining ‘open’ imaginative horizons and that in fact ‘methods’ should not be pre-defined but rather be seen as a tool of stretching, or rather tool for evidencing plausibility of different kinds of stretching, imagining beyond. That is not to say that one cannot use various methods as one complement to ‘stretching beyond’. Indeed, methods can be ways of ‘stretching’ us, of confronting our situated prejudices and thus tools of ‘pulling us out’ of our situated context.[[56]](#footnote-56) That said, it is conceptual imagination that is at the heart of this form of ‘stretchy situated knowledge’, not method per se. Methods follow conceptual imagination.

What does this all mean for the practical interest of IR scholars? What does this exploration of situated knowledge bring to analysis of, and engagement with, international political actors’ knowledge production processes? It seems that we have come to see that at stake in application of situated knowledge to, say, democracy promotion in the Middle East is more than ‘how do we understand local actors’ by ‘listening better’ or even ‘positioning better’ and ‘understanding ourselves better’. It seems that at stake is what is required conceptually to undertake this predicament of situated knowledge, that we all only know from contexts, which are both shared and not, and that this process might in fact take a lot less ‘listening’, ‘self-reflection’, and ‘democratic dialogue’ and in fact a lot more ‘conceptual stretching’ to open horizons of understanding at present open to none of the situated actors. We need to in fact be wary of glorifying our or others’ situated knowledge and think of its limits, our limits, and those of others. Indeed, perhaps the problems of democracy promotion are not one of lack of ‘listening’, or even ‘positioning’ of knowers, but rather reflective of lack of ‘stretching’. Perhaps there are dangers in being too situated as in so doing we fail to grapple with what it takes conceptually to bridge Middle East and EU, not to some ‘common shared understanding’ but an understanding that neither necessarily ‘shares’ or ‘holds’. What this means in concrete terms remains to be examined and worked out but it certainly serves to attach warning signs to the process of applying situated knowledge.

Three tentative recommendations then arise for IR theoretical research from this exploration:

1. Situate knowledge, but do so in a way which also stretches you and your horizons, not just those you seek to convince of the importance of your situated knowledge. Situated knowledge must stretch you and ideally also others: it aims not at situated knowledge of ‘them’ or ‘us’ but stretching our knowledge or conceptual tools of understanding. It is not about ‘listening’ to locals or ‘reflecting on hegemonic practices’ but also about reframing, rethinking horizons of thought.
2. In stretching, we should focus on conceptual ‘stretching’ of the metaphors we use. Indeed, arguably ‘stretching’ what is ‘intuitive’ or ‘reconstructing the intuitive’ through new metaphors (e.g. spacetime, fields) is a ‘tool’ for dealing with situated knowledge. Social sciences must avoid slipping into ‘hubristic’ confidence in ‘socially’ intuitive descriptions ‘capturing’ the social world. Emphasis on our limitations as knowers – felt palpably in physics – can assist alongside emphasis on stretching.
3. Translation of knowledge means recognition of multiple paradigms from which we can ‘know’. Thus, we should avoid fixing concepts, or methods, including avoiding fixing them to be applicable in unique ‘social realms’. Methods too should follow conceptualisations and since conceptual horizons should be open, so should methodological ones. Yet, pluralism is not enough; stretching also means ‘moulding’ new horizons through new concepts and methods which go beyond the multiple perspectives and, if not ‘subsume’, reposition perspectives in new understandings or approximations of the world. We must dare to abstract while being open to unsettling.

It is hoped that these provocations, speculative as they are, are helpful for those interested in knowledge construction in IR as well as scholars seeking to explore the implications of situated knowledge for analysis of world political knowledge practices. They are also hopefully of some use in thinking through the problems of critical theory and critique in social sciences and IR: a subject of renewed interest in recent years[[57]](#footnote-57).

None of this is to deny that standpoint epistemologies have important criticisms to make of physicists’ applications of concepts. Many important insights of socially situated knowledge indeed fail to be understood by physical scientists as recorded by feminist epistemologists. Yet, it may be that while the full insights of socially situated knowledge are yet to be introduced to the scientists, the scientists’ insights on cosmologically situated knowledge are yet to be appreciated by social scientists. A productive dialogue between social and natural knowers in the situated condition we share is both possible and desirable, if always subject to the limitations of situated knowing.

1. Donna Haraway, ‘Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective’, *Feminist Studies*, 14, no. 3 (1988): 594 [↑](#footnote-ref-1)
2. Inanna Hamati-Ataya, ‘Reflectivity, Reflexivity, Reflexivism: IR’s ‘Reflexive Turn’ – and Beyond’, *European Journal of International Relations,* 19, no. 4: 671 [↑](#footnote-ref-2)
3. Steve Smith and Ken Booth, eds. International Theory: Positivism and Beyond (Cambridge: Cambridge University Press, 1996); Yosef Lapid, ‘The Third Debate: On the Prospect of International Theory in a Post-Positivist Era’, *International Studies Quarterly,* 33, no. 3 (1989): 235-254; Thomas Biersteker, ‘Critical Reflections on Postpositivism in International Relations’, *International Studies Quarterly*, 33, no. 3 (1989): 263-7 [↑](#footnote-ref-3)
4. Martin Hollis and Steve Smith, Explaining and Understanding International Relations (Oxford: Clarendon Press, 1990); Colin Wight, Agents and Structures in International Relations (Cambridge: Cambridge University Press, 2006); Milja Kurki, Causation in International Relations: Reclaiming Causal Analysis (Cambridge: Cambridge University Press, 2008); Patrick Thaddeus Jackson, Conduct of Inquiry (London: Routledge, 2011) [↑](#footnote-ref-4)
5. For excellent summary see Hamati-Ataya, ‘Reflectivity’; Inanna Hamati-Ataya ‘Transcending Objectivism, Subjectivism, and the Knowledge in-between: the subject in/of ‘strong reflexivity’, *Review of International Studies* 40, no. 1 (2014): 153-75. [↑](#footnote-ref-5)
6. Cynthia Enloe, Bananas, Beaches and Bases: Making Feminist Sense of International Relations (Berkeley: University of California Press, 1990) [↑](#footnote-ref-6)
7. See for example Terrell Carver et al, ‘Gendering Jones: Feminisms, IRs, Masculinities’ Review of International Studies, 24, no. 2 (1998): 283-97 [↑](#footnote-ref-7)
8. See e.g. Jacqui True, ‘Feminism’ in Burchill, Linklater et al. Theories of International Relations (Basingstoke: Palgrave, 3rd edition, 2004). [↑](#footnote-ref-8)
9. Christine Sylvester, Feminist Theory and International Relations in a Postmodern Era(Cambridge University Press, 1994); Steve Smith, ‘Positivism and Beyond’ in Smith and Booth, International Theory, 11-46 [↑](#footnote-ref-9)
10. Hamati-Ataya, ‘Reflectivity’ [↑](#footnote-ref-10)
11. Best set out by Sandra Harding, ‘After the Neutrality Ideal: Science, Politics and Strong Objectivity’, *Social Research* 59, no. 3 (1992): 567-87 [↑](#footnote-ref-11)
12. For discussions of Adorno see for example Daniel Levine, Recovering International Relations: The Promise of Sustainable Critique (New York: OUP, 2012). [↑](#footnote-ref-12)
13. Bruno Latour, *Reassembling the Social: Introduction to Actor-network Theory*. (Oxford: OUP, 2005). Bruno Latour, ‘Why has Critique Run out of Steam? From Matters of Fact to Matters of Concern’, Critical Inquiry, 30, no. 2 (2004): 225-248. [↑](#footnote-ref-13)
14. Krishna Kumar, *Evaluating Democracy Assistance* (Boulder: Lynne Rienner, 2012) [↑](#footnote-ref-14)
15. Jackson, Conduct on Inquiry; Wight, Agents and Structures; Heikki Patomaki and Colin Wight, ‘After PostPositivism: the Promises of Critical Realism’, *International Studies Quarterly* 44, no. 2 (2000): 213-37; Heikki Patomaki, After International Relations: Critical Realism and the (re)construction of World Politics(London: Routledge, 2002); Milja Kurki, Causation in International Relations (Cambridge: CUP, 2008) [↑](#footnote-ref-15)
16. Harding, ‘After the Neutrality Ideal’, p 569 [↑](#footnote-ref-16)
17. Sylvester, Feminist Theory; True, ‘Feminism’ [↑](#footnote-ref-17)
18. See e.g. Wight, Agents and Structures; Patomaki, After International Relations, Kurki, Causation. Critical realist texts do not build bridges to standpoint even as they could; nor, arguably, do they learn from its provocations regarding the problem of abstraction. This conversation is interesting but not rehearsed here for sake of space. [↑](#footnote-ref-18)
19. Sandra Harding, The Science Question in Feminism.Ithaca: Cornell University Press, 1986); Sandra Harding, Whose science? Whose knowledge? Thinking from Women’s Lives. (Ithica: Cornell University Press, 1991). Harding, ‘After the Neutrality Ideal’; Donna Haraway, ‘Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective’, *Feminist Studies*, 14, no. 3 (1988): 575-599; Donna Haraway, *Modest\_Witness@Second\_Millenium.FemaleMan\_Meets\_OncoMouse*(Abingdon: Psychology Press, 1997); Nancy Hartsock, ‘The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism’, In *Feminist Theory Reader: Local and Global Perspectives,* Ed Carole R McCann & Seung-Kyung Kim. New York: Routledge, 2010 [1983]: 316–331 [↑](#footnote-ref-19)
20. Hartsock, ‘The Feminist Standpoint’; Milja Kurki, ‘Politics of Philosophy of Science’, *International Theory* 1 (3): 440-454 [↑](#footnote-ref-20)
21. Harding, ‘After the Neutrality Ideal’ [↑](#footnote-ref-21)
22. Harding, ‘After the Neutrality Ideal’ [↑](#footnote-ref-22)
23. Standpoint theory of course involves various strands of thought with disagreements or at least differences of emphasis. This is my exposition of the key moves suggested by key standpoint epistemologists such as Harding, Hartsock and Haraway. [↑](#footnote-ref-23)
24. Haraway, ‘Situated Knowledges’ [↑](#footnote-ref-24)
25. Jennifer Tannoch-Bland, ‘From Aperspectival Objectivity to Strong Objectivity: the Quest for Moral Objectivity’, *Hypatia,* 12 no. 1 (1997): 155-78 [↑](#footnote-ref-25)
26. Stanford Encyclopedia of Philosophy (2011) ‘Feminist Epistemology and Philosophy of Science’, 3 Available at: <http://plato.standford.edu/entries/feminism-epistemology#Sitp> [↑](#footnote-ref-26)
27. Haraway, ‘Situated Knowledges’ [↑](#footnote-ref-27)
28. See especially Haraway, Modest Witness [↑](#footnote-ref-28)
29. See eg Sylvester, Feminist Theory [↑](#footnote-ref-29)
30. Richard P. Feynman, *Quantum Electrodynamics.* (London: Penguin, 1985), 10 [↑](#footnote-ref-30)
31. Lee Smolin, *Time Reborn: from the crisis in physics to the future of the universe.* (New York: Mariner, 2014), xxiii [↑](#footnote-ref-31)
32. Peter Winch’s is perhaps the clearest statement of this. Peter Winch, The Idea of Social Science and Its Relation to Philosophy (London: Routledge, 2007) [↑](#footnote-ref-32)
33. Richard P. Feynman, *The Character of Physical Law* (London: Penguin), 33 [↑](#footnote-ref-33)
34. Smolin, Time Reborn, xx [↑](#footnote-ref-34)
35. How this relates to a realist theory of laws is an interesting point of concern. Smolin’s approach to laws can be read as realist, Feynman’s perhaps less easily so. That said, the concern here is not realism of laws but how situated knowers relate to them. [↑](#footnote-ref-35)
36. Ibid, 11 [↑](#footnote-ref-36)
37. Ibid, 11 [↑](#footnote-ref-37)
38. Ibid, 11 [↑](#footnote-ref-38)
39. Ibid, xvi [↑](#footnote-ref-39)
40. Max Tegmark, *Our mathematical Universe* (Lawrence, Kansas: Allen Lane, 2014) [↑](#footnote-ref-40)
41. Smolin, Time Reborn [↑](#footnote-ref-41)
42. Karen Barad, *Meeting the Universe Half-way:* Quantum Physics and the Entanglement of Matter and Meaning.(Durham: Duke University Press, 2007) [↑](#footnote-ref-42)
43. Feynman, Character of Physical Law, 172 [↑](#footnote-ref-43)
44. Ibid, ch 7 [↑](#footnote-ref-44)
45. Tegmark, Our Mathematical [↑](#footnote-ref-45)
46. Ernan McMullin, ‘The Origins of the Field Concept in Physics’, Phys. Perspectives, 4 (2002): 13-39, available at: <http://physics.gmu.edu/~rubinp/courses/416/pip_fields.pdf>; Meinard Kuhlmann, ‘What is Real’, *American Scientist*, 31 no. 2 (2013). [↑](#footnote-ref-46)
47. Sean Carroll, Particle at the End of the Universe: the Hunt for Higgs and the Discovery of a New World (London: Oneworld, 2012), 117 [↑](#footnote-ref-47)
48. Rouse, cited in Barad, Meeting the Universe, 49 [↑](#footnote-ref-48)
49. Richard Feynman, ‘The Value of Science’, address to the National Academy of Sciences, Autumn 1955. [↑](#footnote-ref-49)
50. Feynman, Character of Physical Law, ch 7 [↑](#footnote-ref-50)
51. This is the same point incidentally that critical realists make: philosophical assumption of reality is important because it stretches us away from ‘our’ conception of the world. There is an ethics of stretchy situated knowledge in philosophical realism then too – which is why many remain committed to despite the many criticisms by conventionalists. [↑](#footnote-ref-51)
52. Hamati-Ataya, ‘Reflectivism’, 173 [↑](#footnote-ref-52)
53. The ‘social’ world is of course always implicated in ‘natural’ world; these categories by this way of analysing things are quite meaningless. See Barad, Meeting the Universe; Haraway, Modest Witness [↑](#footnote-ref-53)
54. Latour, ‘Why has Critique’ [↑](#footnote-ref-54)
55. Patricia Owens, ‘[Human](http://sro.sussex.ac.uk/39927/) Security and the Rise of the Social’, *Review of International Studies*, 38, no. 3 (2012): 547-567. [↑](#footnote-ref-55)
56. A point made powerfully by Andrew Bennett at the Millennium conference. [↑](#footnote-ref-56)
57. Owens, ‘Human Security’; Latour, ‘Why has Critique’; Levine, Recovering International Relations [↑](#footnote-ref-57)