Title: A Meta-Discursive Approach to the Relation between the Interdisciplinary Imperative in Scientific Research and Contemporary Epistemologies of Knowledge

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The study of 'complex' systems, as institutionalized by the work of the Santa Fe Institute in Santa Fe, New Mexico, has been since its inception, an endeavor to think the intersections, relations, and even blindspots which lurk between contemporary disciplinary boundaries. As a philosopher invited to attend and participate in the proceedings of the 2008 Complex Systems Summer Session in Santa Fe, interdisciplinarity has been not only the content of my time at Santa Fe, but its form as well, in that I have had to learn whole new languages and methods in order to even be able to understand and participate within the activities of the institute. I taught myself large amounts of calculus and differential equations simply to attend this month-long event, and while I was conversant in many of the vocabularies used to frame research presented at the month-long summer session, this is only due to extensive research for my own works in progress, all of which went far beyond not only the specific subject-areas of my disciplinary training, but furthermore, their very presuppositions as to methods of inquiry in general.

Much of this is due to my current work in progress, a book-length manuscript on the implications of complexity science, and specifically theories of complex networks, for the area within contemporary philosophy known as post-structuralist 'continental' philosophy, and the domain of semiotic theories of language in particular. While there are many homologies between the findings of complexity science and the concerns of contemporary post-structuralist philosophy, those regarding the method of inquiry, of determining important problems and modes of addressing these problems, are not one of these. Rather, few things could be more different than the methodological principles utilized by contemporary post-structuralist philosophies and those which guide scientific research, both in and beyond the field of complex systems.

All of which might allow my position at the proceedings, as a relative outsider, to be perhaps particularly well situated to pose the question of the stakes of interdisciplinarity within the proceedings themselves, at least if interdisciplinarity is taken to include not only work between different modes of scientific inquiry, but inquiry in a broader sense. For it seems that to foreclose the potential implications of complex

systems studies to the realm of the technical is to limit the potential ramifications of the scientific to that of the lab, to the realm of the physical. But while it is much more difficult to quantify the manner in which science effects the population at large in cultural and social terms, few would deny the manner in which ideas from the sciences have had enormous ripple effects onto the terrain of culture at large. For in fact, it is quite possible that as with any other major paradigmatic shift within scientific research, complex systems theories might very well serve to recast, for the broader public the stakes of scientific research as such. That such shifts may impact such non-scientific factors such as grant applications and methods of science education indicate only the two most obvious manners in which such shifts can have feedback effects on the very manner in which scientific research itself is carried out. Researchers within the sciences ignore the larger, social concerns of their work at their peril.

And yet, it might seem anything but obvious that such seemingly non-scientific issues could be of import to science in any but the most incidental of fashions, analogous to keeping track of the political suasions of the various funding organizations. And yet, perhaps there is more at stake, perhaps the relation of the cultural to the scientific is something that science can ignore quite easily when things are going well. But when new paradigms are needed, when results emerge which throw the traditional ways of doing things, the traditional disciplinary differences, modes of scientific training and education, and languages for framing problems and solutions, all of a sudden, those domains which are often eschewed by scientists as being 'mere speculation' become of enormous relevance. For it is the rare scientist that can take results which don't 'fit' standard expectations of the scientific community and use them to sculpt a new world-view. For example, for centuries researchers used epicycles to adjust their computations of astronomical movements so that the theory fit nearly all the data. But it took a Kepler to make the move to elliptical orbits for the planets, and to develop a world-view which truly made sense of Copernicus' grand insight that the sun was the center of the solar system.[1]

At moments in which paradigms change, in which scientists begin to look not only for new answers, but new sets of questions, at that moment when researchers aim to not explain away anomalies but rather use anomalies to recast the field of inquiry, this is when science comes closest to poetry, when researchers begin to think more like artists and philosophers. Ask any quantum physicist, and they will understand the extent to which the creative production of metaphors is a necessary part of their attempts to intuit what sorts of experiments to try, what sorts of places to look for new data. Just as Netwtonian mechanics work wonderfully under 'normal' conditions, but entirely different methods are

required at the margins, so it is with scientific research. For at the margins, science begins to blur with its others, with art, poetry, and philosophy.

The research needed to write my most recent manuscript has approached these issues, but from the perspective of philosophy rather than of science. Might it be possible to find the manner in which philosophy itself begins to encounter its only breaking points through an encounter with science? Surely, to write this new work of mine has been an act of immersion in fields beyond those of philosophy. For to do the sort of philosophy which goes beyond the manner in which philosophy has already been constituted requires such immersion. After all, what is the subject matter of philosophy? To paraphrase things I've heard from some colleagues in the sciences, "a philosopher is a person who feels licensed to talk in general everything, but who knows nothing in particular." And there is a grain of truth here, for if the goal were to study any particular object of knowledge, wouldn't it simply be better to do just that? What Plato famously said of poets, that they write about generals to shipmakers, yet likely neither commanded armies nor built ships themselves, perhaps applies equally as well to philosophers.[2] Are philosophers the 'jacks of all trades, masters of none' of the world of knowledge? Particularly in an age characterized by its massive harnessing of the world by the triumph of science?

Those who would rid the world of philosophers nevertheless often still admit the need for theory within any field, so that researchers can find ways to deal with the more abstract, less concrete, meta-issues which inevitably arise in the pursuit of knowledge. Even if simply to help researchers with varied aims and methods to find ways to work in common, some theory is, like it or not, simply a practical necessity. But the more abstract, the closer one gets to a sort of 'philosophy' of the discipline in question, although it would seem, from this approach, that one would need to know the discipline in question first, and only then could one successfully take on the sort of broad, 'bird's eye view' needed to produce theory that might be useful for the further pursuit of that discipline, or even the advancement of knowledge in general.

And in this sense, there is perhaps no need for something quite as grand as 'philosophy,' for after all, anyone who engages in self-critique, or even self-reflection, has engaged in a sort of theorization of their own practice. Anyone who has seen someone do something differently than themselves, and then altered their own doings so as to try out this new method, or has changed their point of view after hearing the argument of another, has in this minimal sense reflected on their own practice, and thereby

'theorized' what they are already doing. Perhaps this is all there is to philosophy. As Antonio Gramsci has argued, all humans are philosophers, we make meaning of things on a daily basis, we all 'theorize' many times a day, and make use of and argue about the theories of others.[3] From such a perspective, animals are theorists too, and perhaps even plants and all living beings. What can then be said for philosophy?

Without doubt, and like it or not, philosophy is an academic discipline, and with this comes all the burdens of institutionalization, including jobs and budgets, journals and book series, sections of libraries and bookstores, courses and majors and degrees. But maybe we'd all be better off banishing the formerly named 'queen of the sciences,' and let each discipline do its own theorizing for itself. And for those who worry that this would lead to a sort of enshrinement of different disciplinary views of the world, there could even be those who would theorize the sort of meta-issues at stake with doing interdisciplinary or transdisciplinary work. Such a position is what many of my colleagues in the sciences seem to think philosophy, at best, should be, but one should only engage in this questionable pursuit once one has at least training within an established discipline, and then found the need to go beyond it. Starting at the meta-level would lead, these colleagues seems to want to say, to a perpetual scratching of the surface.

Much of the issue here it seems to be stems from the very different notion of what it means to do work in different disciplines. Scientists produce results, and even social scientists, whose very name displays a sort of science-envy, have data, as questionable as its unreliable (human) sources might be. The hard sciences, however, can easily point to experiments and results, ways in which they have changed the world. Science is impersonal, it has a method which one applies, and when one's results are adjudicated as worthwhile, they join are admitted to the edifice known as 'science.' This edifice has been long in the building, and has withstood the disproval of many of its parts, but each time, it has come back stronger and more sound. We are mere contributors, mere builders, but the building itself is strong, beyond us, and without question. It is the result of constant questioning, but that which remains in the building is that which any reasonable, well informed researcher would deem beyond question. Holding together the building, of course, is methodical doubt, the scientific method whose invention by figures such as Galileo Galilei and Francis Bacon is one of the great achievements of humankind.

When it comes to theory, then, the scientific method would reign supreme, as would the language used by science to express its findings, the language in which, according to Galileo, the "book of nature is

written," namely, mathematics. Let us examine these in turn. The scientific method is, according to philosopher John Dewey, the very way in which any and all knowledge is created. As soon as a person sees something they don't understand, they investigate the situation under varying conditions, look for constants, and by means of induction and deduction, eventually arrive at a theory. Dewey even admits a third term, fashioned by one of his major influences, Charles Sanders Pierce (himself a working scientist and mathematician], namely, abduction, or the application of a theory in one realm to that of another by means of analogy.[4] For Dewey, there is nothing unique to this method, it is *the* human method of research about the world.[5] Sharing one's ideas with others, and coming up with communal judgments is a natural next step to making sure that more than one person can use these theories and create changes in an environment which is more than just subjectively understood. Democracy meets with science, for Dewey, in this *sensus communus*, leading to the establishment of a society that is as rational as it is just. Were it so, the world would, however, be a much simpler place. For as Dewey was writing many of his major works, World War II was demonstrating how communal agreement could wreck mass destruction across the globe and take with it millions of lives. This is why the method of inquiry into the world needed democracy as its ethics, so that the tyranny of the majority would not hinder the rights of the minorities. Furthermore, Dewey believed that the method often called 'scientific' was also that which humans applied to all things, not simply the physical world, but to all parts of human life, including philosophy. But for many of my colleagues in the sciences, this would be a path not worth following, as it might corrupt the method by means of its application to areas unsuited for it. For how could one use the scientific method to do research in art? Dewey felt that one could, but to many scientists, this would be a treacherous road indeed, and one that might lead one back, with Dewey the philosopher, to the very sort of philosophy that concerned them in the first place.

Luckily, however, there is within science a built-in meta-theoretical apparatus which is the true 'queen of the sciences,' able to vanquish any claims to that title made by philosophy, namely, mathematics. Math is pure form, abstracted from any content, it is beyond time and place, its truths are absolute and eternal, and stand for any and all culture, beyond and above the weakness whereby it might be expressed, or the languages into which it is paraphrased. Any sort of 'theory,' or dare I say, 'philosophy' of science, should go through the gateway that math provides. Unfortunately, math has its own problems, which many scientists simply try to ignore, as it doesn't have much of an impact on their daily lives of doing experiments. But any mathematician worth their salt will be a little more forthcoming, and tell the sad story of math's attempt to 'ground itself' in the earlier part of the twentieth century. The sad tale is as

follows: two mathematician-philosophers, Bertrand Russell and Alfred North Whitehead wrote a famous book, the *Principia Mathematica*, which aimed to solve, once and for all, some of the fundamental paradoxes at the base of the mathematical edifice. Famously, they failed. In 1932, Kurt Goedel devised his famous 'incompleteness theorum,' and math had to do with either being 'complete' or 'coherent,' just as in physics a few years before, Walter Heisenberg discovered that at the quantum level of observation, one had to be satisfied with what amounted to the same thing.[6] Math itself and the surety of observation had both suffered a major blow, taking with it certainty in the language of science, namely math, and the scientific method, based as it is upon observation, in one blow.

What then is left for science, or math? Many scientists will retort, at this point, that even if the foundations are insecure, this does little to the everyday practice of scientific research, that science simply 'works.' Of course, the question is, works for what? If the criteria is the effect one has on the world, certainly the massive impact of figures such as Jesus of Nazareth, Karl Marx, or Jean-Jacques Rousseau have changed the world as much as any scientist. And if one's criteria is changing the world for the good, one can hardly argue that all scientific change has led to the improvement of humanity, as the use of science for making machines of war has aptly shown. And while one could say that the use of science for war can be seen as a perversion of the indifferent desire for knowledge at the base of the sciences, one could say that the philosophy of Karl Marx or Jesus had been misappropriated as well, for example, by Lenin or Stalin or Mao in the case of Marx, or by the Christian crusaders in the case of Jesus.

Like it or not, philosophy, even if it is 'just making things up,' has had an enormous influence on the planet, and as such, deserves to be studied, just as any irrational pursuit deserves study. 'Somebody has to do it, I guess', I can hear some of my colleagues in the sciences say. But to actively pursue creating new philosophy still seems to many to be folly. 'If things aren't falsifiable, how do you know when you are wrong or right?,' I've heard them say: 'Is there even a method?' At which point I usually congratulate my friends for starting to have engaged in some philosophy, at which time, in frustration, there's an amiable parting of ways. And yet, such a victory for philosophy, if that is what this is, is hollow at best. For while it is possible to achieve a victory at the level of rhetoric or persuasion, if that is all philosophy is, then it has more in common with politics or religion or fashion than with the creation of knowledge.

But if philosophy is more than just rhetoric, then it must have rules, even if 'fuzzy' ones, which can tell you whether or not you're doing well at playing the game. Philosophy, and in fact science as well, have this in common with the use of language – people will tell you if you say things wrong, and may look at you funny until you 'learn how to play the game.' Science has some very rigid rules, but language users can tell you just as quickly when you have misused a slang term, even though the proper rules for doing it correctly vary enormously, and seem to have little more than what Ludwig Wittgenstein (another philosopher) would call a family resemblance. If science is a rigid game, there are many games that humans know how to play which require a greater fluidity, a great degree of uncertainty, which in many ways allows these games to do things that science simply can't. Wittgenstein's famous example, that a person to whom you say 'stand roughly over there' will understand you,[7] is aptly noted, particular as it is precisely this sort of command that continues to flummox robots and other artificially 'intelligent' machines. And Wittgenstein's own story is itself instructive. Originally, this philosopher aimed to reduce all philosophy to propositional logic, and devised the syntax made use of by many computers to make sense of the world, but he later realized that human language not only doesn't work that way, but can do more, not less, than the hyper-logical syntax he developed early in his career. While at first he thought natural language sloppy and imprecise, later he would argue that it was precisely the very logical calculus he designed to fix that which was lacking. Philosophy, like language, plays by rules which adapt to the environment, and are 'fuzzy,' but that doesn't mean they are necessarily imprecise. While there is no simple way to get things right, anyone familiar enough with the history of philosophy can tell you if what you've done is clearly off the mark, just like anyone versed in slang can tell you when you've botched. Both of which cases refer us to the history of use, and how the game has evolved over time.

In this sense, and to some extent like science, it seems that general esteem over time that one is using the rules of the game to make an 'acceptable move' is more important than any sort of momentary acclaim that one has achieved. For example, Jean-Baptiste Lamark's theories were widely esteemed in their day but given little esteem today, just as the philosophy of Auguste Comte was enormously influential in the late 19th century in Europe, and yet he is considered a minor figure to contemporary philosophers. Of course, how this esteem is generated seems to change, as the rules of the game of argument seem to change. If one were to write like Plato or Hegel today, one might not be taken seriously, but in the times in which they wrote, one would be. In fact, there is something about philosophy which, like science, requires a certain timeliness. Discovering the existence of Pluto today might be a wonderful discovery for yourself, but not for 'science,' while discovering Pluto in the year 1700 would be

a feat indeed. But the game of the generation of esteem has rules, and we seem to navigate and know them, even if that knowledge, to use terms employed by Pierre Bourdieu, is more 'practical' than theoretical, a part of our 'habitus,' that is, the set of practices whereby we maneuver ourselves through the world.[8]

Both philosophy and science, in this sense, have a certain relation to the 'not yet.' There is the 'not yet' discovered in science, that which has not yet been able to be discovered, just as in philosophy there is that which has 'not yet' been thought. Still, for both fields, it remains difficult to tell the difference between that which has 'not yet' been done, and that which 'cannot' be done. Both of these notions, as well as the inability to tell the difference between them except by virtue of hindsight, can be captured by the particle 'un,' as in the 'undiscovered' or the 'unthought.' And this is perhaps where we need to start.

As Martin Heidegger has argued, philosophy is perpetually called to think the fact that it is not yet thinking.[9] Maurice Blanchot has coined this the attempt to 'think the unthought,' and Michel Foucault has described this as 'thought of the outside.'[10] And Foucault is an interesting case which can help us shed light on this entire debate. Foucault has long been accused of being a 'faceless' author, and this was a notion he more than fostered, arguing that an author 'should disappear behind their work.' As a queer man who had many sexual practices which might have been seen as scandalous at the time to his peers, Foucault may have had more than one reason to try to appear 'faceless.' Still, one should not reduce a contribution such as Foucault's to some afterhought, particularly as he is widely esteemed to have been one of the great philosophers of the century. For a great philosopher, however, he is notoriously hard to categorize. He is, in fact, a master of masks. Foucault wrote works which are detailed histories of a variety of topics. His skills as an archivist rival those of professional historians, and some consider him a sociologist as much as anything else. Despite lack of training in the classics, his later works remain contentious among classical scholars to this day. And his histories have impacted debates in countless disciplines in the humanities and even fields as distant as psychiatry. And his one massive treatise on method, curiously titled mid-career work *The Archaeology of Knowledge*,[11] is often seem as a lesser work compared to the massive yet unorthodox histories he produced. It has often been described as a book he needed to write perhaps more for himself, to clarify his own goals, and yet, the chapter on method in his *History of Sexuality, Volume I*,[12] is in many ways a more satisfying statement of principle. And while Foucault has generally been called a philosopher, few of his works read like philosophy, in fact, they most often seem like strange attempts at writing history. And Foucault rarely, in

fact, uses the specialized terms employed by philosophers, nor did he generally discuss the history of philosophy, or its current or past debates. Despite the fact that he is often claimed for philosophy, can we rightly call Foucault a philosopher? And did Foucault have a method worthy of the name philosophy?

Foucault did theorize his practice in places other than *The Archaeology*, and many would argue that this text is as faceless an attempt at describing his own practice as it was possible to create, and that Foucault's own method vanishes, like he does, behind the text. Still, there are glimpses into the principles behind the practice. Foucault's praxis, I would argue, makes use of a form of *immersion* which leads to what, in his essay on Maurice Blanchot, he calls a "thinking of the unthought." This leads, I will argue, to what is at the foundation of endeavors to do philosophy as much as endeavors to do science, as well as attempts to theorize the practices engaged in by both.

What does it mean to immerse oneself in thinking, so as to begin to think the unthought? First, one needs to leave philosophy, at least, all philosophy as it is constituted at the time. And one needs to go knee deep into an area outside of that which has already been said to be the domain of the philosophical. One needs to adopt a new area of learning, a new area of the world, as one's own. It doesn't matter if this new area is a recognized discipline or not, what matters is the immersion, the learning of a new sets of rules to new games, and learning these rules at such a deep level, that one has a *practical* knowledge of them, one can feel these rules in one's bones. When you get to the point at which specialists in that discipline talk to you almost like they talk to one of their own, when they wonder at how you could get a sense of the language and methods without the sort of training they had, then you know you have achieved a sense of the rules at play. In fact, one needs to immerse oneself so deeply in a set of rules outside those of philosophy, that when one returns to the world of philosophy, it is unrecognizable. And your fellow philosophers see you and recognize neither you, nor what you say when you say it framed by practices you learned with these new rules. Unless philosophy begins to look strange to you, and philosophers begin to look at you strangely, you have not immersed yourself enough to take the next step, namely, that of return.

When you get to the point at which all that connects you to philosophy is what (using some terms from Gilles Deleuze) could be called 'the thinnest of threads,' only then is the time ripe to return to philosophy. For it is only then that you can pose the question of what remains unthought in the place you have just been, a place in which there is a 'zone of indiscernibility' between philosophy and that within which you

have been immersed. And this unthought has two parts to it, namely, that which is 'not yet thought' [or what Deleuze would call a 'relative limit'], and that which can never be fully thought [or the 'absolute limit].[13] These two become indiscernible anytime one attempts to truly think the unthought, in philosophy or elsewhere. What makes philosophy distinct from other approaches to knowledge, however, is that in order to think the unthought, it needs to do so *through* another discipline or approach to knowledge, just as any discipline which attempts to think its own unthought necessarily does so through philosophy, whether in name or not. Philosophy, in this sense, is the attempt to think the unthought, that which, for Heidegger, has kept us from thinking.

For Deleuze, as for Foucault and many other so-called 'post-structuralist' philosophers, any attempt to think the absolute unthought will fail. But by thinking the absolute unthought, one can develop insight into a particular, relative form of the unthought, one which tells you more about yourself, and the particular games your are trying to play, than about the absolute unthought itself. And philosophy has always done this, for even for Plato, there is no way to do philosophy without doing so via recourse to science, religion, and all the other aspects of the human world. To think the unthought cannot be done simply through philosophy, for is only itself when it is immersed in something else and, like a bandit, brings a stolen treasure to light.

Of course, there are differing degrees of immersion, and Plato is perhaps an example of a person who while immersed in daily life, was not immersed in anything like what we today we could science. And this is where a case like Foucault is instructive, for Foucault felt that only by immersing himself in the field determined by a series of historical questions could he bring to the surface a shared zone of relative unthought, one which existed at the border between philosophy and its others. Philosophy has, in a sense, always been this practice, but while some philosophers have pursued this with a face turned more towards philosophy, few have pursued the other tack as thoroughly as Foucault. For it is only when the philosopher produces what Deleuze would call a 'monstrous child,' a hybrid product which reveals a relative unthought at the border between philosophy and another field, releasing a relative unthought but thereby also tracing the outline of a more absolute unthought, that the philosopher has begun to think what deserves the name thinking.

And this is precisely what philosophy can bring to science, and to other fields that it encounters, namely, if done well, an encounter with the unthought. And while the unthought, at least in its relative face, can

bring about a shift of paradigms, famous within the history of science since Thomas Kuhn, this is a byproduct rather than a goal.[14] For as post-structuralist philosophers like Foucault and Deleuze have worked to show, the unthought is the foundation of all that there is to think, it is the foundation of knowledge, that from which knowledge flows, and the perpetual attempt to think the unthought is what produces new ways of knowing the world. Thus, the scientific method at the basis of empirical science, or the axiomatic method at the basis of math, both were born of attempts to think the unthought present within their discipline. If they had completely succeeded, there would be nothing left to think, and this is why in their attempt to gain the absolute side of the unthought, they only retrieved its relative face. And this is precisely what philosophy, in its attempt to think its own unthought, continues to do when it works to think via immersion in objects of knowledge. Philosophy is perpetually a hybrid, and can be nothing but, for this is what is proper to thinking the unthought, which is what it attempt to do. This is all philosophy can have to offer to any approach to knowledge, or to itself.

What then of the rejection of philosophy by science? Any field that rejects an attempt to think the unthought, whether called science or philosophy or anything else, ceases to think, and ceases to know anything other than what it has already learned. When philosophy becomes an academic discipline and fails to be curious about science or the world outside, it has ceased to be philosophy, just as when science ceases to be curious about the world outside its border, it ceases to think. Both science and philosophy in such a state become mere techniques.

Ultimately, there can be no real philosophy without science, and no real science without philosophy, despite what names and institutions name themselves with these terms. The question rather is to find out what it takes to think that which remains unthought. When any of us begins to think this sort of thought, we produce a gift to the world, be it the world of philosophy, or science, or simply the world we live in. For this takes immersion, immersion in the world. To think the unthought in a relationship is the task of love, just as to think the unthought of the strife between groups is the task of politics. As Alain Badiou has argued, anytime there is an event that calls to us, there is a thought that needs to be brought into the world about the meaning of that event, and that thought is always predicated on an unthought.[15] To think our unthought relation to evental sites in the world, this is the infinite task to which we are called. It is an ethics, a politics, and a practice. Science and philosophy are two names we give to aspects of this task, and any aspect of this task can begin to see itself as the center of the world, and yet each can learn of their own relative unthought by immersion in another. Philosophy is perhaps the odd

approach which starts from the center and must move outwards, while other approaches start at the outside and move towards the center, but neither center not outside contain the whole. And the whole is what remains to be thought, and which is what is at stake in the unthought. And this is what remains to be done.

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