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Influencing and being influenced: local acts across large distances

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Steve Fuller in *Philosophy, Rhetoric, and the End of Knowledge* develops an account of interdisciplinarity reaching toward what he calls interpenetration.[1] His account is normative in that he finds many practices and presumptions that keep disciplinary projects apart and many epistemic ills in those self-reinforcing distances. He urges us to a more serious interdisciplinarity; further, he provides a set of philosophic tools to help us to see our isolated and isolating condition and to begin to overcome it. Happily for myself and the other members of this symposium, rhetoric is part of his prescription.

Given his characterization of the troubles of disciplinary knowledge production and use in the modern world—troubles that bedevil the humanities as well as sciences and social sciences—his major criterion for evaluating epistemic enterprises is the depth of influence across disciplinary boundaries, what he calls interpenetration. The interpenetrative criterion values not just how much one discipline influences another, but how much one discipline is influenced by others. The ultimate and most valued interpenetration is the reformulation of the projects of two or more specialities into a new one incorporating the projects of each, but transforming them into something higher—a sublation in Hegelian terms. Moreover, sublation is his specific plan for science studies, the social means by which we produce our reflective knowledge of science. The closing chapter of Fuller's book envisions: 'In the world of tomorrow, breakthroughs in the natural sciences are regarded as triumphs of applied sociology and political economy, rather than of, say, theoretical physics, chemistry or biology. It is presumed that a distinctive knowledge product reflects an innovative form of social interaction among knowledge producers and their publics'.[2]

In the spirit of Steve Fuller's project of interpenetratively examining interpenetrations in science, the rhetoricians on the panel have examined putative cases of interpenetration, or cross-disciplinary influence. In line with Fuller's prescriptions, all the cases examined are presented as worthy attempts at interdisciplinarity. Indeed three of the cases (two of texts crucial in the evolutionary synthesis of genetics and evolutionary biology and a third of a text that connected evolutionary theory

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with statistics and astronomy) are presented as unproblematically successful and worthy. The fourth case, that of Lovelock's Gaia hypothesis, is presented as worthy even though its rhetorical execution is presented as problematic and its fate is presented as uncertain. All four are presented as historically important turning points (or in the fourth case an attempted turning point) in reorienting the work of the disciplines involved. Each of the papers, of course, follows Fuller's prescriptions in taking a rhetorical approach to knowledge production, an approach that looks at the features of the text in relation to the audiences, and thus looks at knowledge propositions as socially emergent phenomena rather than as independent truths. Moreover, each of the participants themselves draw on interdisciplinary sources and frame their arguments to some extent as interventions in fields other than rhetoric; that is, the symposiasts are not just engaged in rhetoric as usual (although I will qualify this later).

Yet before we rejoice in this intellectual expansiveness, we need to look a bit more carefully at what interpenetration might be about in concrete terms: when, why, and how it is accomplished; how it may be noticed and described; and what its difficulties are. This too is in the spirit of carrying out the detailed work implied in Steve Fuller's project. As a small step in this direction I would like to worry about a more modest word, *influence*, and how we might understand it operationally. What does it mean in concrete terms for one person to influence another? What does it mean in concrete terms for one discipline to influence another?

Influences and being influenced are of many types. Within tightly organized disciplines and other discursive social formations members are usually expected to influence one another. To identify a new species of ragweed and to have others recognize and use that species in their future attempts to identify plants they find is to influence, and to consider that species as a possible identification of the plant that you have just come across while you flip past the pages of your field manual is to be influenced.

To wonder what roles that plant enacts in the ecosystem where you have found it is to be influenced from another direction, one that perhaps expands your conceptual repertoire and changes your project if you have been trained only as a taxonomist. To collect more samples because of a request from a pharmaceutical company is to be influenced from another direction. To consider with a team of colleagues why the presence of this weed within an ecosystem might be correlated with an absence of a virus that usually inhabits small mammals that are also found in the ecosystem is to influence and to be influenced even more deeply.

Of the preceding scenarios of influence, the first pair, which have only to do with taxonomic identification, are entirely within a well-organized communicative network that facilitates just the practice of identification through training, professional organization, publication, and text circulation. One of the presumptions of Fuller's position is that intradisciplinary influences are so strong and so well-facilitated as to leave little possibility of the interdisciplinary. I am not so sure that as we come to understand influence that we will find intradisciplinary influence to be uniformly easy or unproblematic, despite disciplinary mechanisms aimed at facilitating the co-ordination of work. None the less, as we move across disciplines, and we do not have these disciplinary mechanisms, influence will become even more complicated. To some extent the last three scenarios all require working against the grain of disciplinary networks in specific concrete ways. As we begin to identify precisely how one knowledge practice might influence another and the burdens placed on

each participant by the accomplishment of that influence, we may come to see why some forms of influence might be more surprising or more difficult or more consequential or more useful or more interpenetrative than others. However, I should point out that surprise, difficulty, consequence, use, and interpenetration are not the same and in each case may vary independently of the others.

For scholars of literary studies to trace influence is a well-known activity. As an undergraduate English major I was asked to consider exactly how Shakespeare in writing Hamlet was influenced by Saxo-Grammaticus's *History of the Danes*, Anglo-Saxon beliefs about ghosts and revenge, Renaissance theories of melancholy and the humors, the mechanics of stage presentation, the social and economic organization of his troupe of actors at the Globe, the laughter of the groundlings, and the printing and plagiarism practices of the time. Specific plot points, poetic lines, words, and character motives gained different kinds of meaning as we located the drama within the complex cultural intertext. Over the years of his career Shakespeare was influenced by many things so that his plays moved further and further from the typical and conventional forms of his time and incorporated more and more surprising juxtapositions in novel but tightly wrought relation. In observing these influences at times we students felt locked into dry scholasticism, but in our better moments we recognized the life of literature embodied in the plays.

When people talk of the capaciousness of Shakespeare they are not just saying he knew a lot—his contemporary Ben Johnson knew at least as much, and certainly knew a lot more Latin and Greek. What Shakespeare had was an enormous capacity to be influenced by others, particularly unexpected others, and to bring those influences to life by reinhabiting them in multivocal dramas, as Bakhtin might say. He brought these multiplicities together, somehow within a single dramatic vision, giving all the voices their due. In our reading, as we reinhabit the text of the plays, we may feel as though we are wandering in the deep complexities of life, complexities that overwhelm us but to which we ultimately are reconciled. A Matthew Arnold or a Northrop Frye might characterize this feeling as a sense of maturity, but Samuel Johnson characterized it as 'licentious variety'.[3]

Fuller admires such licentious variety. He believes that our knowledge-producing practices ought to aspire to that richness of influence, always sustaining as much of the complexity as the discourse can bear. He is afraid that modernist attempts to order knowledge production within specialized communities speaking narrow languages and reporting on refined slices of life gathered through the focused inscriptions of methodology are losing that vision of life as ever uncontainable and unbearably rich, requiring the multiple and protean magics of a Prospero to stay afloat. He is afraid that we have become the victims of Bacon's knowledge bureaucracy and Wilkin's philosophic dictionary that turns the world into a technical vocabulary.

However, Shakespeare was able to contain his vastness by being an economically successful maker of fictions and the entrepreneurial manager of a small corporation appealing to a monarchist, patriarchal, elitist, hierarchical, sexist culture. Cultural orders imputed to nature provided the ideological means to allow his plays to end with marriages, reconciliations, coronations, or at least funerals and dirges. Economic and political orders of the day allowed his troupe and audiences to be gathered in a fairly quiet theatre year after year, even as England's monarchy was tumbling toward modernity. If we are now to live with the vastness of experience and its even vaster possibilities of representation, we need to look on the mechanisms of influence and the livable orders we can create out of them with

something of a cool eye. Being influenced puts real burdens on us, as we have to come to terms with those things that we learn from others and as we re-form our own knowledge, practices and perceptions to take seriously the messages that others bear.

So this brings us to the papers gathered in this symposium under the rubric of interpenetration. They each tell tales of influence: the desire to influence, the strategic attempts to influence, the mechanisms of influence, the consequences of influence. What makes each of these stories special, more than just any tale of influence, is that the influence is imagined, attempted, transacted, ingested across disciplinary lines.

Yet while each tale seems to be a crossing of the great disciplinary divides, the influences may not be all of the same order or success. In fact the order and success of any influence, or the nature of anyone's being influenced by those that came before is not easy to determine, as the contentious history of the literary influence industry attests. Influence is even more difficult to examine in rhetorical studies where typically, and as we see here, one is looking only at a single text. As any conversational analyst or any speech act theorist will tell you, you cannot know the meaning of an utterance for another unless you see the uptake or perlocutionary effect. If you cannot know the meaning, how can you even begin to assess the influence? Literary influence studies usually employed at least two texts, the source text and the influenced text, and sometimes a great deal more. Rhetorical studies, however, considering the craft of intentional influence, tend to examine the ambitions and strategies of only the erstwhile influencing text to see how it tries to work.

A second problem arises from rhetoric's typically one-sided view of attempted influence. Viewing influence only from the point of view of the rhetor fosters a simple model of possible influences, built upon the rhetor trying to get the audience to do or believe something the rhetor wants the audience to do or believe. Persuasion, domination, control, at most the building of conviction—these are the one-sided notions of one person reaching out to direct another through verbal art. Concern for the audience's belief, projects, goals, communities are only important as they provide the conditions that one must influence for one's own ends. A speech may be influenced by awareness of the audience, but ultimately the rhetor is seeking to impose an influence in the rhetor's own terms. Even dialectic, which grants more respect to the beliefs of one's opponents and recognizes that the debate with opponents may lead both to new beliefs and convictions, still casts the dialectical interaction as a series of directive interventions, that perhaps wind up at a place that neither side intended, but may be closer to the truth.

However, influence works in strange ways. We may have exactly the opposite effect than that which we hope for, and still have influenced the other person. Our influence may be to put someone on the spot to come up with a plausible account of their own position, or perhaps to deafen them to a set of concerns that we wish they would attend to. Our influence may be to open up a series of puzzles, for which they will create their own solutions. Influence is complex, and our influence may be richest where we do not impose, and others' influence on us may be richest where we do not adopt their vision wholesale. In attempting to speak another's language in order to forge a co-operation we may come to be influenced more than those we hope to influence, as we reconstruct a novel (for us) way of looking at things. The richest influence may be simply in coming to terms with the distinctiveness of another's position and projects.

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We need to operationalize the idea of influence because influence is so multifarious. Just what is it that happens differently for one person having heard another's words or having witnessed their actions? In the case of the accounts presented in this symposium, we must ask exactly what disciplinary activities, beliefs, practices, or trajectories change because of someone attempting to or actually succeeding in sending or receiving messages across the gaps among the different disciplinary communication circulation systems. What happens as a consequence of Simpson or Dobzhansky reading both genetics and evolutionary biology? What happens concretely as a result of each of them forging a narrative out of pieces of both discourses? What has influenced Lovelock to create the great image of Gaia and what should happen if biologists and meteorologists took that representation seriously? What would happen to the concept of Gaia as it takes on a life within the many disciplines it has enlisted? Here we return to something very like a traditional intellectual history, but with a much closer examination of the discursive system and symbolic tools through which the communal thought is enacted, handed about, and transformed. These symbolic tools are in addition to the overt names of objects and concepts, which are the usual units of analysis of intellectual history.

The remainder of this comment will characterize each of the four case studies presented in this issue in terms of what they tell us and do not tell us about the concrete mechanisms of influence across disciplinary resistances. These case studies are to be praised for opening up a rich and complex subject, even as they bring into view all that might be known but that goes beyond the scope of their current investigation. If my observations seem demanding, it is because the subject of influence itself seems to demand so much more of a complex and detailed investigation if we are to understand it.

Sullivan rightfully begins by calling attention to the exigency that initiates the need to be influenced or to influence other disciplines. Each of the four case studies identifies specific exigencies that move people to traverse typical disciplinary domains and practices. The specificity of exigency stands in contrast to a general crisis of knowledge that Fuller believes calls for a general practice of interdisciplinarity. On the other hand, a general crisis could well be expressed in what appears as many local crises. None the less, the kinds of exigencies identified in the four cases suggest distinctive junctures of various historical unfoldings.

In the case of Raup and Sepkoski the exigency is part of an already interdisciplinary movement that drew together geology, astronomy, and paleontology. Modern paleontology, as we can extrapolate from the papers of Journet and Ceccarelli, itself exists at an interdisciplinary juncture of genetics, taxonomy, and geology—and the story is no doubt much more complicated than that. To return to the immediate events retold by Sullivan, the interdisciplinary intersection had included a paper by Fischer and Arthur, a paper by Alvarez *et al.*, and several interdisciplinary conferences (implying many other papers). There must have been many specific interdisciplinary influences over this period that help to form a new interdisciplinary network, presuppositions, and style of communication, all of which would influence exactly how Raup and Sepkoski would have shaped and presented their work. To tease these out would take a far more ambitious study than Sullivan's.

The immediate exigency is the discovery of some patterns through analyses of newly compiled databases that facilitated searches and analyses. However, many specifics must have influenced the creation of the data bases and the specific searches and analyses initiated by Raup and Sepkoski. To what extent and in what

specific ways these influences included the prior papers espousing periodicity and meteoric intervention is not traced out in Sullivan's study, which is more directed to seeing how Raup and Sepkoski influenced others than to understand how they themselves were influenced. None the less, it is hard to define their precise rhetorical task in influencing others unless we have a picture of what mutual influences already had been achieved, so that we can isolate the specific ways in which the new intervention might seek influence. Influence usually does not happen *de novo* and *ex nihilo*, but follows on a complex history of prior influences. In this case, since we are examining influences that change the degree of interdisciplinarity, and since a prior record of interdisciplinarity exists, we need some operational measure of the degree and nature of the existing interdisciplinary discourse and procedures and some way of identifying the further interdisciplinary activity that the paper attempts to initiate.

Journet and Ceccarelli place the exigencies for their cases in similar accounts of events leading up to what we now call the 'evolutionary synthesis', to which both Simpson and Dobzhansky are now recognized to have contributed. In the modern, after-the-fact, retelling relied on by both Journet and Ceccarelli, two research traditions, the descriptive biological (expressed in such fields as paleontology and taxonomy) and the experimental-mathematical (as expressed in genetics) met over evolution, where genetics could provide the concrete mechanisms for evolutionary change. The obvious close proximity of the problems and phenomena considered by the two approaches when combined with the large methodological and theoretical differences had led to many years of acrimony, ridicule, and mutual dismissal. Bridging these was a need that in retrospect all seemed to recognize, but that only some were willing to address. The actual bridge building seemed to await the maturing of the methods and data of each of the fields (but particularly genetics) to provide adequate resources for the synthesis and the emergence of certain individuals who would be capable of making that synthesis in a compelling way.

While there now seems to be a consensus on the exigency and no doubt the problem came to appear similar to a number of mutually-influencing people who worked on the now accepted solution, yet there must have been at the start quite a range of perceptions of the situation, as evidenced crudely by the fact that many people derided work in the other tradition. These varied perceptions of the situation would have been influenced by many factors, about which we have no evidence here. Moreover, testimony cited by both Journet and Ceccarelli suggests the group that emerged to work on the synthesis engaged in a detailed series of interactions. Each not only had the influences of a home discipline, but also particular influences from the other disciplines that helped them to frame the synthetic problem and the resources that might be drawn into the solution. The point here is that the perceived (or multiply perceived, but gradually triangulating) rhetorical situation itself is the result of a complex process of influence within and across disciplinary spaces, about which we have only the most fleeting suggestions.

FalerSweany gives us fewer clues about the exigency of Lovelock's work, placing it within the wider social problems made visible by environmentalism. If indeed Lovelock came to recognize the need for his perspective influenced by the environmental movement with its political, spiritual, technological, and scientific wings, the influence story would be even more complex to trace out, as it moves across social spheres as well as disciplinary distances. Certainly what we learn of Lovelock's professional and economic position as essentially an independent worker with weak,

multiple disciplinary affiliations suggests that what influences him goes beyond the range of the typical sources and practices within a single discipline. The point here is again that we can't begin to understand whom Lovelock hopes to influence in what way, let alone what influences he in fact achieves, unless we understand how he perceives the existing situation based on those influences he himself underwent.

This need for tracing out the prior understandings against which influence is conceived and exerted is particularly salient in considering interdisciplinary or transdisciplinary work, when you can't even pretend to rely on the common beliefs of a field (as perhaps embodied in handbooks, textbooks, and reviews of the literature) to define a commonly held view of the situation and the tasks to be addressed. Interdisciplinarity and transdisciplinarity inevitably imply idiosyncrasy of perception until such a time as the novel work has created a new common wisdom in its wake. To draw an analogy from influence studies in the arts, to study influences on the music of Salieri you perhaps do not have to go much beyond the academy and court of Vienna at his time, but to gain the slightest understanding of what influenced Mozart to compose as he composed requires both much greater scholarship and much greater imaginative reconstruction.

Based on their perceptions of the rhetorical solutions, Simpson, Dobzhansky, Lovelock, or Raup and Sepkoski each attempted to influence others, drawing on the resources that each thought were appropriate and effective. That is, they wrote a paper with rhetorical intent. The rhetorical presentation of each of their books or papers is the main topic of each of the essays gathered in this symposium. Each of the symposiast's papers provides a plausible rhetorical analysis of a specific text, focusing on those features strategically aimed to appeal to audiences of various disciplines (or in the case of Lovelock, failing to appeal). In this spirit, Sullivan examines the multiple disciplinary ethos projected in the Raup and Sepkoski paper; Journet points to the complex of narrative and plot that brings two discourses together and to the adaptation of a graphic display technique of one field to address problems of the other; Ceccarelli identifies a list of appeals to geneticists and appeals to naturalists; and FalerSweany points to Lovelock's attempts to adopt an insider scientific ethos, undercut by his dismissal of scientific dogmatism and lack of common sense. The symposiasts' rhetorical analyses are backed by appropriate evidence from the texts and to some degree by secondary testimony from the scientific authors and their readers.

Presenting these features as good or bad rhetorical moves limits our view of the texts and their operations, as though these features were selected solely and freely for their specific impact on their audiences. Of course, I doubt that any of the four rhetoricians writing these case studies would make so bald a claim about the free play of rhetorical representation in science, but their analyses have no method to rise above the 'Cicero will say whatever he needs to, to carry his audience' mode.

I propose another way of looking at the same features: in order to solve the epistemic problem of their area of study embedded within the relevant disciplinary formations as they see it, these scientists have used a variety of procedures, representations, data, theories and other resources by which they have been influenced in order to create a representation which moves to resolve the problem as they see it. In the course of doing so they must meet the epistemic, methodological, theoretical and other criteria of their various audiences, and so must display the seriousness and propriety of the influences that they have deployed as resources. Since their work seeks interdisciplinary audiences it must not only show competence and

significance in each of the domains, but also must display the work of the other domains as meeting criteria of relevance, significance, appropriateness, etc. in the other. That is, in order to solve a problem that they couldn't solve entirely within a discipline, they had to seek an interdisciplinary space and define for themselves an appropriate solution that respects what they have learned from each of the disciplines that has influenced their solution. Then to gain acceptance from all the relevant disciplines, they have to display their influences in a configuration that makes evident the value and quality of those influences.

For example, we might say that Simpson uses genetic maps to display an evolutionary narrative not just because it is a neat trick to help biologists appreciate genetics, but because such resources helped Simpson himself to see how evolution could be played out through genetic processes. To solve the scientific problem as he saw it, he drew on a kind of mapping that he saw as useful (that is, he was influenced) to represent a process which he had previously seen (and been influenced to think about) only represented in the forms used by systemics or paleontology. By combining the influences, he was able to solve the problem. The rhetorical problem is then to get others to see and respect the various influences he brings together in the form in which he brings them together. In so far as he actually creates a useful means of representing the intersection of evolutionary and genetic processes, and in so far as others pick up on these modes of representations, he will have influenced them in the way he hopes. This looks as though he is persuading them, but operationally this is different from others simply acquiescing to a proposition. This is adopting a tool for use that carries with it certain propositions and which helps to realize certain investigations and analyses that would be in furtherance of those propositions. Moreover, if he influences others to accept and use his new mapping tool, it provides a representational space for them to explore, providing a basis for further learning and investigation in the field.

The kind of account that I have just given suggests that influencing, at least in interdisciplinary work, may be related to being influenced and then providing a means for others to be influenced in some similar way. In this same spirit we might suggest that Raup and Sepkoski not only displayed the ethos of competent paleontologists and statisticians to get paleontologists and statisticians to buy into their claims, but also because they needed the statistics to deal with their paleontological problem, so they needed to be influenced by both fields and carry both out competently. In order to make evident the competence of their solution they need to demonstrate then that it was competently arrived at by the means of both fields—that is, that they took the influences of both fields seriously and respectfully. The ethos, therefore, cannot be detached from the work.

The negotiated settlement that Ceccarelli presents Dobzhansky as forging can also be seen in terms of Dobzhansky's knowledge of the projects and concerns of both fields. We may say that he has been influenced by both sides enough to understand just what formulations and characterizations of projects will allow both to proceed enthusiastically in a new collaborative project, even though they each might be selective in their understanding of the components of that project. While each of the sides may be only partially influenced by the other through the mediating influence of Dobzhansky, it is Dobzhansky, who has to have been influenced by both and to have made the depth of both influences evident for both parties to understand that the synthesis fully includes them.

Part of Lovelock's rhetorical infelicity is that he dismisses the influence of some of

the fields he is trying to enlist and does not treat their procedures and ways of thinking respectfully. If he claims not to be deeply influenced by them, why should they be influenced by him? If his work does not address the dynamics, procedures, and projects of the fields he needs to enlist to create his transdisciplines, how can people within those transdisciplines imagine that their projects and procedures will be served by them giving themselves over to his way of doing science.

Whatever the relation between being influenced and influencing, we can see that each text has different ambitions to influence. The ambition to influence may be thought of as what would happen if the readers, fully convinced and fully moved to action, did exactly what each of the scientists wanted. Lovelock's ambition seems greatest, to ask others to give up their current projects and procedures to follow the higher goal of nurturing the planet as a whole. Presumably they would take up new research questions with new goals and adopt more multifaceted data, gathered through more holistic methods and subjected to more multi-factored analysis to consider each local problem in light of the entire earth system as an interactive whole. That is asking a lot, but if the exigency and desperation are great enough and the paradigm persuasive enough, and the work laid out for each plausible enough, perhaps he might obtain conversions.

For Simpson and Dobzhansky geneticists and paleontologists might carry on their work with more attention to the needs and findings of each other, but the specifics of this are different in each case. For Simpson, the effects might be greatest on paleontologists and other evolutionary biologists who would present their findings in more plot-driven narratives that reveal the underlying genetic mechanisms and who would adopt genetic maps and other genetic representational devices to present the unfolding of the biota as a grand genetic experiment. From Journet's account Simpson seems most interested in influencing the practices of his own field of evolutionary biology to incorporate genetic thinking and findings; it is unclear how he would wish to influence geneticists other than to make them feel good that others have come to see the importance and applicability of their work. On the other hand, from Ceccarelli's account, the most dynamic ambitions of Dobzhansky's book would appear to be directed to his own field of genetics where he calls for geneticists to study natural populations and take on problems directly related to evolution. For biologists, Dobzhansky offers only continuation of their profession when they seemed to be ready to be superseded by a new discipline, according to Ceccarelli. Biologists would be asked to do little different; in fact, they would be protected from being influenced by changes. The difference in ambitions of the two texts is perhaps explained by Ceccarelli's comment about how the synthesis was carried into different fields by different people. Although the synthesis was interdisciplinary the immediate influence in each discipline was wielded by an insider. Those influential insiders co-ordinated with and mutually influenced interdisciplinary colleagues, but all faced back to their own disciplines.

Finally, Sullivan points to Raup and Sepkoski's invitation to astrophysicists to gather data relevant to their hypothesis. This invitation provides a kind of puzzle for the astrophysicists that might create a bit more conventional work for them, but would be unlikely to disrupt their current way of work or thought. For statistics Raup and Sepkoski suggest no consequence other than to create a new market for their techniques, and as for paleontology, the consequences seem limited to a more complete acceptance of what had been a controversial claim. Of course there might be further confirmatory work that might require interdisciplinary evidence and

analysis, but whether in the long run the practice and project of paleontology would be substantially changed is unclear.

In each case, the desired influence is of a specific kind, heading towards specific consequences for the shape and activities of the fields involved. Except in the case of Lovelock, the ambitions are quite focused and modest, even though two were part of a major interdisciplinary convergence in the biological sciences.

The actual influence of a text is of course not necessarily that which is hoped for. The case studies cite testimony of scientists that in broad terms at least three of the texts have been recognized as influential, that an evolutionary synthesis was achieved, that paleontologists changed their narratives, that geneticists and paleontologists did not snipe at each other as much, and that astronomers gathered the kind of data that Raup and Sepkoski wanted. However, the specific influences that each text had on specific readers who acted and thought differently for having read each text remains obscure. We do not know under which conditions for which purposes a word or concept was repeated, an argument was framed with greater plot, a representational tool was imitated. We do not know specifically whether any claim prompted a counter-argument or instigated a follow-up experiment or excited a new field trip. We do not know how many hours individual scientists pondered the consequences of each text and engaged in new discussions with their colleagues, challenged by what they had read. We do not know what new learning occurred, what background reading in other fields was done, what new concepts and projects were born. However, until we know exactly what moves whom to act in what way, we know little about influence.

It may be, for example, that even though on the face of it Lovelock does not mount a rhetorically effective argument for contemporary biologists, his holistic image of Gaia may work its influence in indirect ways. The media attention grabbed by the Gaia hypothesis may reside deeply in the minds of youth who wind up in the biological and earth sciences, providing them with a predisposition to view problems in a more holistic way. It is not implausible that by whatever path of influences Lovelock's vision became translated into the computer game SimEarth, that game, which through purchase and piracy has wound up on the hard drives of many of this school generation's most successful students, will provide both an imagery and notion of system that will stay with a number of budding scientists and policy makers.

The papers at this symposium are a worthy start to the exploration of the communicative means by which interdisciplinarity can be accomplished. Steve Fuller's call to understand, encourage, and facilitate the traversing of disciplinary distances and barriers in pursuit of common concerns and potential common projects is a noble one. However, these first steps need refinement. Influence happens one step at a time, one statement at a time, one action at a time. If we really want to make people more adept at influencing and being influenced, if we really want to break down inappropriate divisions of disciplinary work, we need to start understanding influence down exactly where it happens at the micro-interactional level. Only then might we develop a rhetoric that moves past the one-sided coercions that our current rhetorics encourage us to see. Then we might gain some understanding of the mechanics by which trust develops, the kind of trust that makes deep collaboration and deep mutual influence possible.

Notes

1. FULLER, S. (1993). *Philosophy, Rhetoric, and the End of Knowledge: The Coming of Science and Technology Studies*, University of Wisconsin Press, Madison.
2. FULLER (1993), p. 377 (see note 1).
3. Dedication to *Shakespeare Illustrated*, London, 1753.