



OFFICE OF THE VICE CHANCELLOR FOR RESEARCH  
119 CALIFORNIA HALL #1500

BERKELEY, CALIFORNIA 94720-1500

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Robert M. Price  
Associate Vice Chancellor for Research  
Office of the Vice Chancellor for Research  
119 California Hall #1500

Dear Vice Chancellor Price:

This is the **report of the Committee of Investigation into allegations of research misconduct (specifically plagiarism) against Terrence Deacon**. We considered three allegations against Professor Deacon:

1. That, in his book *Incomplete Nature* (2012), Deacon appropriates without attribution Dr. Alicia Juarrero's original ideas, theories, and concepts found in her book, *Dynamics in Action* (1999). [brought by Juarrero and Dr. Carl Rubino]
2. That, in their co-authored article "Eliminativism, Complexity, and Emergence" (2011), Deacon and Tyrone Cashman plagiarized from Rubino and Juarrero's co-authored book chapter, "Introduction to Emergence, Complexity and Self-Organization: Precursors and Prototypes" (2008). [brought by Juarrero and Rubino]
3. That, in his book chapter "Mememes as Signs in the Dynamic Logic of Semiosis: Beyond Molecular Science and Computation Theory" (2004), Deacon plagiarized from Michael Lissack's 2003 article "The Redefinition of Mememes: Ascribing Meaning to an Empty Cliché." [brought by Lissack]

After a thorough reading of the relevant writings, we found no evidence to support any of these allegations. A more detailed summary of our findings follows. We understand that it is customary for investigations of this kind of complaint to involve interviews with the complainants and the accused. However in this case the evidence of the written materials alone was sufficient to satisfy us that the allegations had no merit.

### 1. Juarrero and Deacon books

We find no evidence that Deacon's book plagiarizes Juarrero's. We do indeed recognize considerable overlap in the issues discussed and in the general point of view defended in the two books. However, we see no reason to ascribe this overlap to any influence of Juarrero's book on Deacon's. Still less do we see any reason to suspect influence of a kind warranting an accusation of plagiarism. Rather, we believe that Deacon's book pursues, independently, a line of thought which is, at a very general level, similar to that pursued by Juarrero. The alleged evidence of plagiarism – the

commonalities in themes discussed and references made – seems to us to result from the two writers having drawn, again, independently, on the same well-known philosophical and scientific sources. Given the similarity in the overall orientation of the two books, it is hardly surprising that Deacon’s book should draw on much of the same source material as Juarrero’s.

Might the similarity in overall orientation be itself an indication of plagiarism? No, because the general line of thought pursued by both authors is not original to either of them. Both authors share the view that seemingly teleological phenomena (in particular life and consciousness) can be understood in terms of forces or processes of self-organization within inorganic or non-sentient matter. This general view does not originate with Juarrero, but has been defended by many thinkers going back (at least) to the mid-eighteenth century. Although Deacon and Juarrero appeal to many of the same scientific results in developing their versions of the view, they differ in focus, in the concepts they develop, and in the particular conclusions they reach. For example, Juarrero is concerned specifically with human agency, and with the difference between “a wink and a blink” (as she puts it), whereas Deacon is concerned with life (human and animal) and consciousness more generally. Deacon is concerned to emphasize the idea of absence as playing a central explanatory role in accounting for the origin of life, an idea which is not at all present in Juarrero’s book. And Deacon emphasizes a distinction between “morphodynamics” and “teleodynamics” in a way that Juarrero does not.

Juarrero has submitted a spreadsheet listing approximately 270 supposed points of commonality between Deacon’s book and hers (and to an article she co-authored with Carl Rubino, on which more below). (The number is approximate because in some cases it is not clear whether a line on the spreadsheet is intended to indicate an actual commonality.) We do not believe that, either individually or in the aggregate, these indicate any influence of Juarrero’s work on Deacon’s. We cannot discuss all of these points individually, but we do describe the first few just to give a sense of the kinds of points at issue.

[1] On p. 6, Deacon mentions the concept of autopoiesis, ascribing it to the work of Maturana and Varela (1980); autopoiesis is mentioned also in Juarrero’s book, in the context of a contrast between allopoiesis and autopoiesis at p. 112. This is no evidence of influence, since Maturana and Varela’s concept of autopoiesis is extremely common in the relevant literature. Moreover, while, as far as we can tell, Juarrero is aiming to use the notion of autopoiesis as part of her exposition, Deacon mentions it in order to criticize it, or more precisely, the work of Maturana and Varela in which it figures. There is no evidence that anything Deacon says about autopoiesis is influenced by anything Juarrero says about autopoiesis.

[2] On p. 6 (the spreadsheet reports it as being on p. 7), Deacon alludes to a contrast between “inside and outside” perspectives. Juarrero relates this talk of “inside and outside” to her own mention of a contrast between “inside” and “outside” on p. 51 of her book. But the contrast is quite different in the two books. In Deacon’s book, the contrast is between two different perspectives: the perspective one has on a system when one observes it from outside, and the perspective that one has from inside the system. In Juarrero’s book, the contrast is between the “inside” of an organism, for example its mind, and the behavior. The only commonality here seems to be the use of the word “inside”.

[3] On p. 18 of his book, Deacon mentions a “child’s muscle movements.” Juarrero relates this to her discussion, at pp. 158-159 of her book, to work by Thelen and Smith on the muscle movements of infants, and the way muscular control develops as a result of positive feedback from the environment. But Deacon uses the expression to characterize the example of a boy skipping stones, which is supposed to be an illustration of the same kind of consciously controlled muscular movement carried out by adults. The point of the example is completely different; the only parallel is in the reference to muscular movement.

[4] On pp. 19 and following, according to Juarrero, Deacon is concerned with the “reduction of teleology and purpose”; Juarrero relates this to her own talk of reductive accounts of purposiveness in ch. 5 of her book. It would hardly be surprising for two books on this theme to discuss the question of whether talk of teleology can be reduced to non-teleological notions. However, it did not even seem to us that Deacon is discussing the reduction of teleology in this passage, and even if he is, his discussion is quite different from Juarrero’s. Deacon is discussing in very general terms the discontinuities between mind and life, and between living and non-living processes. Juarrero’s chapter is concerned with a specific philosophical literature on whether the idea that X does F is for the sake of Y can be analyzed without appeal to the notion of purpose, for example in terms of non-teleological causal and historical relations holding between X, Y, and F.

[5-9] Here Juarrero mentions Deacon’s references to the following: function as multiply realizable, type/token distinction, Aristotle’s four causes, the integration of the parts of a machine, Descartes. Reference to these notions and authors are all commonplace in discussions of life, consciousness, and teleology; there is absolutely no reason to suspect the result of influence.

[10] Juarrero cites Deacon’s introduction, on p. 41 of his book, of “anticipatory processes,” which she says parallels her discussion of the “anticipatory content” of intentions on p. 63 of her book. We failed to see any parallel here. The two passages appear to be discussing quite different things.

[11] Juarrero cites Deacon’s claim at p. 41 that organization explains what he calls “absential” properties, those specific to human thought, and relates this to her own discussion, on pp. 45-46 of her book, of Kant’s views on plants and animals as self-organizing. Since both authors are trying to argue for the widely held view on which consciousness and life emerge out of processes of self-organization, it is hardly surprising that both should make reference to the claim that organization explains consciousness and life. There is no other parallel beyond commitment to this shared thesis; in fact the passages are significantly different in that the Kantian thesis that Juarrero discusses is specifically about life, including plant and animal life, whereas Deacon seems more concerned with organization as the basis of human consciousness.

Of course, these are only the first eleven points. But the superficiality of the parallels in each of these cases is sufficient to cast doubt on Juarrero’s judgment about what counts as a significant commonality. And even if it is allowed that some of the points of commonality are more substantive, they are still just what one would expect given the issues with which both authors are concerned. Juarrero mentions, for example, Deacon’s reference to the following topics or themes: preformationism, folk psychology, reductionism and atomism, mereology, constraints on range of action, processes,

boundary conditions, what could have been, individuation, self-assembly, Kant on motive and formative power, mental agency and causality, the causal structure of agency, constraints, information, levels of awareness, circular causality, wholes as formal causes, and the etymology of the term “evolution.” It is hardly surprising that a book dealing with the explanation of life and consciousness would make reference to these themes. She also cites a series of examples that both she and Deacon use: billiard balls (as exemplifying a certain kind of causal interaction), thermostat, zombies, insect colonies, snowflakes, Bénard cells, whirlpools. These examples, however, are standard in the philosophical literature. Juarrero cites, as further evidence for plagiarism, specific phrases which come up both in her book and in Deacon’s, for example “robustness to perturbation,” “context-dependence,” “élan vital,” “God of the gaps.” Again, these are common in the philosophical and scientific literature prior to Juarrero’s book. (The least common, “robustness to perturbation,” appears 28 times in Google Scholar search results for publications prior to 1999; “God of the gaps” appears 491 times for the same time period; and “context-dependence” is a standard philosophical expression.)

Juarrero also draws attention to Deacon’s references to recent scientific work, in particular that of Maturana and Varela, Edelman, Swenson and Prigogine; to his citing of philosophers such as Aristotle, Kant, Lewes, Mill, Morgan, Alexander and Broad, and to his use of notions such as Maxwell’s demon, Hofstadter’s strange loops, Lorenz attractors, Eigen’s hypercycles. None of this strikes us as indicative of Juarrero’s influence, since these references frequently appear also in the work of authors prior to Juarrero, and are common in discussions of the emergence of life and mind from matter and of the physical theory to which these discussions appeal. For example, work by Edelman, Swenson, Prigogine, Lorenz and Eigen is cited in Stuart Kauffman’s extremely influential *The Origins of Order* (1993); his more popular *At Home in the Universe* (1995) mentions Maturana and Varela.

It might be argued that, even if each of the references and examples common to Juarrero’s and Deacon’s books are to be found in the work of other writers prior to Juarrero, the fact that all of them together are common to the two books could be explained only by the hypothesis that Deacon plagiarized Juarrero’s work. But this argument does not convince us. First, the points at issue in Deacon’s book are integrated into a much larger body of material which does not show commonalities with Juarrero’s discussion. Because of their connection with material elsewhere in Deacon’s book, it seems much more plausible to us that Deacon came up with these points on his own, than that he incorporated them from another source. Second, we find that his treatment of many of the common themes is quite different from Juarrero’s, suggesting that he came up with them by a different route. Third, given the relatively close interrelations among the points at issue, it is not particularly surprising that they should all figure together in two independently written books on the same general topic. We cannot rule out that Deacon came up with some of his specific references and examples through the direct or indirect influence of Juarrero’s book. But even if it did occur to him to follow up a certain reference or use a certain example only because he had heard it mentioned by Juarrero or found it in her book, or because someone who knew Juarrero’s work had mentioned it to him, his use of the reference or example would not amount to plagiarism. And in any case, as already noted, we do not in fact find evidence of Juarrero’s influence, although we acknowledge that the possibility of influence cannot be ruled out.

In an email to you of December 6, 2011, Juarrero summarizes the charge she is making as follows:

[Deacon's] overarching conclusion – that it is possible to reconceptualize teleology (purposiveness, goal directedness) in terms of the intrinsic dynamical constraints of complex dynamical systems theory (complexity theory) is my idea of 12 years ago, which Deacon heard me explain in Cancun – as is also the suggestion that Kant foreshadowed this solution. I also claim that Deacon's premises in support of this conclusion appropriate my own: that autocatalytic processes embody the two types of redundancies (constraints) developed in information theory (Shannon & Boltzmann). That these constraints also thereby embody teleological (final) causation; that higher order, whole-part constraints dissolve the Maxwell demon objection re the second law of thermodynamics; that selfhood, free will, personal autonomy, etc. can also be reconceptualized in terms of such contextual constraints and are irreducible – hence supporting the concept of emergence. Finally, cashing out these part-whole and whole-part contextual constraints as changes in probability distributions – and even the claim that at the lowest level it's a question of the geometry of the molecules and their proximity – is also original to my book.

The conclusion she ascribes to Deacon, and which she claims that he appropriated from her, is not in our view original to Juarrero. The idea that it is possible to reconceptualize teleology in terms of dynamical systems theory has been discussed and developed by many theorists. It may well be that the thesis that Kant foreshadowed this way of thinking about teleology, which Juarrero suggested in her 1985 paper "Self-Organization: Kant's Concept of Teleology and Modern Chemistry," is in fact original with her. But that does not show that Deacon plagiarized Juarrero, since it has become widespread to discuss Kant's views on self-organization in this kind of context. The premises she mentions are, again, not in our view original to Juarrero. The connection between ideas about self-organization and ideas from thermodynamics and information theory has been made by many writers in this area, and we see no evidence that Deacon's specific use of these notions shows any influence of Juarrero's.

## **2. Juarrero/Rubino and Cashman/Deacon articles**

Juarrero and Rubino argue that the "pattern of argumentation" in the two essays is "virtually identical," and that the similarities can only be explained by the hypothesis that Deacon and Cashman were influenced by their own essay. Juarrero also alleges that the final few pages of the Deacon/Cashman essay plagiarize from her paper "Intentions as Complex Dynamical Attractors," in Jesus Aguilar and André Buckareff, *Causing Human Actions: New Perspectives on the Causal Theory of Action* (MIT Press, 2010).

In her allegation, Juarrero claims that both essays have these five steps (which we have numbered for convenience):

[1] Both essays begin with a description of what might be called the Scholastic to Modern world view, which denies the possibility of emergence for fundamental or substantive properties, things or events. All change is only of superficial or secondary qualities – unless it is divine intervention – because all essential traits have been in existence ab initio. One reason for the hegemony of this view was the standard understanding of efficient causality that dates to Aristotle and was uniquely deployed in the Modern age (1600 on), and which rests on the notion that there can be no more in

the effect than in the cause. Both essays include each of these points, and in the same sequence.

[2] The second step in each essay consist in an overview of concept of emergence as first coined by Lewes and discussed by J.S. Mill in response to advances in chemistry, in particular the compositional integrity that characterizes chemical phenomena. Both essays highlight the concomitant problem of part-whole and whole-part relations (of a chemical compound) that are particularly intractable to understanding in terms of efficient causality. Each essay includes each of these points, and, once again, in the same order.

[3] The third step in each essay consists in highlighting the revolution in nonlinear far from equilibrium revolution [sic] brought about by Ilya Prigogine's research. In particular, each essay points out the potential this has for accounting for part-whole relationships and in providing scientific grounding for real emergence, where the future is not just implied in the present and waiting to be unfurled but is the result of the operations of constraint. Each essay includes each of these points, once again in the same sequence.

[4] The fourth step in each essay consists in a brief summary of Immanuel Kant's suspicion that the difference between organisms and machines is their possession of formative (and not just motive) power, and which is due to a peculiar kind of reciprocal causality – not allowed in the modern world view described in paragraph 1 above. Formative power is due to the inherent or endogenous production of constraints. Each essay includes a discussion of Kant, and both essays include each of these points, once again in exactly the same sequence.

[5] The fifth step in each essay consists in a summary of the ideas of British Emergentists. Each essay notes that Lewes coined the term ["emergentism"], and continues with a discussion of C. D. Broad. The paragraphs on Broad are a particularly egregious part of the Deacon-Cashman essay, since the Rubino-Juarrero interpretation of Broad's account of the possibility of discontinuity in causal laws is nonstandard. Each essay includes a discussion of CD Broad, and comes to the same, non-standard interpretation of Broad.

[6] From here the Deacon-Cashman essay divergences in the source of its plagiarism, going from the Juarrero-Rubino anthology to a paper by Juarrero published in the anthology compiled by Jesus Aguilar and Andre Buckareff... that explains the new far-from-equilibrium thermodynamic's understanding of the inherent or endogenous generation of constraints, in particular the normative element these introduce. Both essays concentrate on the interpretive aspect of this normativity as captured in the representational potential of complex dynamical attractors. Both of them speculate that neural processes embody these self-organized attractors and conclude that emergence is embodied in the self- production of a hierarchy of constraints.

We find this description quite misleading. It gives the impression that the two essays discuss the same topics in the same order, and this is simply not true. For example, between [2] and [3] Cashman/Deacon discuss more recent debates over emergentism (Sperry, Kim, Humphries). Between [3] and [4] there are two pages in the Cashman/Deacon piece on "Emergence, configuration, and constraint." [4] does not come immediately after [3] in Juarrero/Rubino either: there is an intervening discussion of Leibniz, Poincaré, Peirce, and Hegel that doesn't correspond to anything in

Cashman/Deacon. Kant isn't discussed for three pages after Prigogine. Finally, the discussion of British emergentists [5] in Cashman/Deacon occurs between [2] and [3], five pages before the discussion of Kant.

So, there is no close parallelism in the structure of the essays. The essays do both touch on many of the same topics, in varying degrees of depth. But we think that these are natural topics for any treatment of the history of emergentism. It is natural to start with a brief summary of the prevailing philosophical views that precluded emergentist views in the modern period [1], including the idea that an effect cannot have less perfection than its cause, the idea that fundamental properties cannot come into existence, and the privileging of efficient causality. It is natural to continue, then, to the early history of emergentism. It is widely acknowledged that this starts with J. S. Mill and continues with the British emergentists (Lewes, Morgan, Alexander, Broad), so [2] and [5] are natural topics. In this connection, it is natural to discuss chemical compounds, since that is Mill's example, and to mention that Lewes coined the term "emergentism." It is also natural to talk about part/whole relations, which are suggested by the chemical analogy and have long been discussed in connection with emergentism (see, for example, Ernest Nagel, "Wholes, Parts, and Organic Unities," *Philosophical Studies* 3, 1952). And it is natural to discuss Kant on teleology, mechanism, formative and motive power, and the reciprocal relation between parts of an organism [4].

Rubino and Juarrero seem to overestimate the originality of their contribution. In an email supporting their allegations, Rubino says:

I refer once again to the example of our discussion of Kant, Mill, Broad, Alexander, Lewes, and Morgan (see our Table of Contents vi-vii and pp. 10-11, 4-5, and 13-16). The Deacon/Cashman piece meticulously tracks that discussion and duplicates our references (pp. 201-202 with reference on p. 205; pp. 195-196, with references on pp. 204-205). I know of no treatment prior to ours that brings together these sources—especially one that associates John Stuart Mill with the so-called British emergentists. (Email to Robert Price, July 25, 2012)

But a widely cited 1992 paper by Brian McLaughlin, "The Rise and Fall of British Emergentism" (in *Emergence or Reduction?*, eds. A. Berkemann, J. Kim, and H. Flohr) cites exactly the same sources, including Mill. Though this article is highly influential (cited 328 times, according to Google Scholar), neither it nor McLaughlin's 1997 article "Emergence" in the *MIT Encyclopedia of Cognitive Science*, which is easily found online, is cited by either Juarrero/Rubino or Cashman/Deacon. McLaughlin notes that Lewes coined the term "emergence," and "drew a distinction between emergents and resultants, a distinction he learned from John Stuart Mill." Indeed, it is not hard to find sources even farther back that connect Mill with the British emergentists: Ernest Nagel, who also discusses Broad and chemical compounds, cites Book III Chapter vi of Mill's *System of Logic* as the "classical source of the doctrine of emergence" (*The Structure of Science*, 1961, p. 372 n. 11), and Lloyd Morgan himself acknowledges a debt to Mill: "The concept of emergence was dealt with (to go no further back) by J. S. Mill in his *Logic...*" (*Emergent Evolution*, 1923, Lecture I, Section I). The idea that Juarrero and Rubino are the first to associate Mill with the British emergentists, then, is absurd.

This leaves the issue of the interpretation of Broad. It isn't clear to us in what way the Juarrero/Rubino interpretation is supposed to be nonstandard. The text certainly doesn't signal anything in particular as an innovation, or discuss how it diverges from earlier interpretations. In any case, here is all that Cashman/Deacon say about Broad:

Broad's conception [of emergence] was close to that of Mill in arguing that the properties that emerged via compositionality could exhibit fundamentally discontinuous causal laws from those that characterized the components in isolation, and that distinct 'bridging laws' are required to link levels of incommensurate causal organization." (p. 196)

This doesn't seem to correspond to anything in the Juarrero/Rubino piece. Juarrero and Rubino talk of laws linking levels only in a section that is describing what mechanists would be committed to (p. 15). It also does not seem to be a nonstandard interpretation of Broad; similar things can be found in the McLaughlin article cited above. We do not see any grounds for thinking that Cashman/Deacon's discussion of Broad, or of any of the British emergentists, is based on Juarrero/Rubino.

As regards [3], both essays do focus on the potential of Prigogine's (and others') work on dynamic systems to give new legs to emergentism, but beyond this general overlap the discussions do not seem particularly similar. The possible relevance of Prigogine's work to emergentism has been noted by many others independently of Juarrero and Rubino. See, for example, Timothy O'Connor's 2002 *Stanford Encyclopedia of Philosophy* article on emergentism,<sup>i</sup> or Claus Emmeche, Simo Køppe, and Frederik Stjernfelt, "Explaining Emergence: Towards an Ontology of Levels" (*Journal for General Philosophy of Science* 28, 1997, at 101-2).

Rubino says (in the email cited above):

As I indicated in my letter, I would also recommend a comparison of the Deacon/Cashman discussions of Prigogine-Stengers (p. 198 and reference on p. 205) and Pepper (p. 196, with no reference—because, I would suggest, we did not give a full one) with ours (Prigogine on pp. 7 et passim; Pepper on pp. 18-19.)

But comparing these discussions does not support the charge of influence. About Pepper, Cashman/Deacon say:

He argued that the British emergentists' theories can't avoid two implicit dilemmas: Since emergence must be understood as a physical change or shift, either there is a causal regularity that links the emergent state to the previous state, or else the properties ascribed to the emergent state are nothing more than the totality of the lower-level properties. And if the emergent state is absolutely unpredictable from the prior state, then it is pure chance and no physical principle is required to account for it, otherwise it must be predictable.

They could not have written this just on the basis of what Juarrero/Rubino say about Pepper's paper, without familiarity with the Pepper paper itself. For example, Juarrero/Rubino say nothing about a "dilemma." Similarly, the discussion of Prigogine-Stengers is different in the two articles. And the mere fact that Cashman and Deacon cite this article, which is cited 1136 times according to Google Scholar, is no sign of influence.

Turning, finally, to [6]: The Aguilar/Buckareff volume in which Juarrero's article appears was published in 2010. We have heard from James Haag, editor of the *Routledge Companion of Religion and Science*, that he received the final draft of the Cashman/Deacon paper on October 30, 2009, and that no changes were made to the article after that. Though this point about the temporal sequence seems decisive on its

own, we should also note that we do not think that the very general similarities mentioned by Juarrero are evidence of plagiarism.

### **3. Deacon and Lissack articles**

Lissack does not seem to be aware that the Deacon chapter is a lightly edited reprint of Deacon's "Editorial: Memes as Signs," published in 1999 in volume 10(3) of *The Semiotic Review of Books*. The later version includes an abstract and a few footnotes that were not in the earlier version. But the body of the paper is essentially unchanged, and could not have been influenced by a paper published four years after it was composed. We checked the added footnotes carefully and could see no sign of influence from Lissack's paper. So this allegation can easily be dismissed.

### **Conclusion**

We cannot prove conclusively that Deacon's work was not influenced by Juarrero's or Rubino's. But, as we have explained above, we do not think that a careful reading of the texts provides any good reason to think that it was.

Would it have been better if Deacon had read and cited Juarrero's book? Yes. We recognize that Juarrero's book is an important prior contribution to the area of research pursued by Deacon. Still, the failure to cite an earlier work with the same subject matter, even an important one, is not by itself research misconduct. (Ironically, the same failure can be held against Juarrero and Rubino. For example, as noted above, in their essay on "Precursors and Prototypes" they fail to cite Brian McLaughlin's well known and comprehensive 1992 treatment of the history of emergentism.)

We conclude that the allegations against Professor Deacon are without foundation.

*[The University has regretfully determined that the identities of the members of the faculty investigative committee must remain confidential. During the past 12 months Professor Deacon and University officials involved in the investigation process have been assailed through a relentless internet campaign. The University is not willing to risk exposing to the same kind of internet attack individuals who worked diligently and without compensation to produce this thorough and reasoned report. The names of the investigators have therefore been redacted.]*

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<sup>i</sup> <http://plato.stanford.edu/archives/win2002/entries/properties-emergent/>.