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# *The Claims of Generalized Darwinism*

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*Generalized Darwinism (GD) claims to be a conceptual and theoretical framework for researching evolutionary change processes in organizations. This paper examines the claims of GD. It finds that in contrast to Darwin's theory of evolution by natural selection proper, the GD framework is not an explanatory deductive argument form. What it is that GD actually generalizes and intends to explain thereby becomes somewhat moot. It is proposed that the so-called 'generalization' that the GD framework supplies might be best understood schematically. Two general schemata that purport to distil commonalities between processes of organizational evolution and biological evolution are thereby identified. But in considering the applicability of the two schemata to organizational evolution, criticism reveals one to be problematic, whereas the other one, to which the GD programme collapses if the problematical schema is dispensed with, has been long associated with another so-called 'evolutionary approach' to the understanding of social change: Sir Karl Popper's 'evolutionary epistemology'. The paper concludes that if the research problem is to account for the evolutionary character of social and organizational change, then theorists need not commit to the GD framework. They may elect to use Popper's evolutionary epistemology instead.*

Key words: Organization, Evolution, Darwin, Popper.

## ***Introduction: Time, Tide and Evolution***

That '*time and tide wait for no man*' is one of England's ancient proverbs; but the wisdom that it encapsulates is as readily applicable to organizations and entire societies. Who amongst us now knows anything about *Briars Rail and Engineering* or the *Hohenlohe Iron and Steel* companies? Yet apparently, a century or so ago, these two were amongst the world's largest businesses (Ormerod 2005). Similarly, who amongst us now knows of the *Beothuk* tribe? Apparently, they once inhabited what, with some irony, we now call *Newfoundland*. All these once existed, but no longer; to each the passage of time did not bring 'good tidings'—'tidings' being the events that unfold across time and tide.<sup>1</sup> Many have therefore entertained the idea that it is through time and tide that we go on with our lives, '...pushing in to that tiny bit of the future that our "now" slides into' (Magee 2016 p. 4), always knowing next to nothing about how the organizations in which we may work, or the societies in which we dwell, will change as that future unfolds into the continuum of moments that we call 'now'. What we do know is that the future will inevitably happen, but not, according to the proverb, as a single episode or event, nor in a way that any one man can design or have the power wholly to control. Indeed, English, with its rich etymology, has a word for this idea too. It is derived from the Latin word '*evolutio*'—unrolling. Today, we know it as '*evolution*'.

Quite naturally, social theorists attempt to account for the *evolutionary* character of social change. One such account, that was presented recently as the very latest thought on how to understand what its proponents variously call 'organizational evolution' (Hodgson 2013a p. 973), 'organizational ecology' (Dollimore 2014a p. 282) and the 'evolution of socioeconomic populations' (Dollimore 2014a p. 305) is the research programme of so-called 'Generalized Darwinism'. Generalized Darwinism (GD) makes a very bold claim: that the Darwinian theory of biological evolution may be distilled and generalized

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<sup>1</sup> 'Tide' in old English was a word of Germanic origin and it meant a period of time or season. That meaning survives wherever today's English speakers wish 'good tidings' to one another.

beyond biological phenomena. Thus, to GD, social change is ‘evolutionary’ not only because it continually unrolls to no one’s design, it is ‘evolutionary’ because it also shares commonalities with Darwin’s theory of natural selection. A process of socio-economic Darwinian ‘organizational evolution’ is thereby postulated and held to be worthy of further research, generating a putative research agenda that is based upon its concepts and principles.

Imaginative and bold theoretical conjectures ought always to be welcomed in a science. For only a creative thought can move us from a known problem to an unknown solution. Indeed, scientific explanation has been presented as the ‘...the reduction of the known to the unknown’ (Popper 2002a [1963] p. 83), or the logical derivation of a known fact or known theory from a hitherto unknown generalization or theory of higher universality. And if a conjectured explanatory theory is something that we actually did ‘know’ all along, but had underestimated by not fully appreciating its explanatory power and reach, then that is also to be welcomed. For this is to discover that the theory had a higher level of universality than was initially realized. Nevertheless, so far as an empirical science is concerned with stopping a falsehood from passing muster, a bold conjecture or idea ought also to be criticized and tested once it has been entertained (Popper 2002a [1963], 2002b [1959], 2005 [1983]; Miller 1994, 2006).

This paper examines the claims of GD. In order to make that task manageable for a paper of this scope, I elect only to examine the recent presentation of GD to the readership of the journals of *Organization Studies* (Hodgson 2013a) and *Philosophy of the Social Sciences* (Dollimore 2014a). These two presentations were both programmatic statements designed specifically to introduce GD to researchers interested in the philosophy of social sciences and organizational studies. Certainly, I found both papers to be long, complex, and packed with footnotes and citations. Consequently, if the proponents of GD are serious about advancing our scientific understanding of processes of ‘organizational evolution’, then they will surely welcome the critical scrutiny of these specific programmatic statements—for surely that is why they were not only offered, but also offered presumably in their strongest and most carefully formulated form. Here, without losing sight of the papers, I reduce the GD framework that they presented to four more crisply formulated claims. These then become a ready-made hook on which to hang a discussion without it becoming encumbered by references to the original literature that seemingly developed the GD framework, or indeed to the extensive literature on associated topics such as evolutionary economics, organismic perspectives and models of organization, or organismic and evolutionist-type social theories more generally. Both papers have in fact already attracted what I consider to be useful critical commentaries (Scholz and Reydon 2013; Reydon and Scholz 2014), but that criticism was, or so I shall argue, rather too narrow. The principal business of this paper is therefore to add to it and then to offer an assessment of where the GD framework does, and does not, work.

## ***The Claims of Generalized Darwinism***

### ***Organizational evolution is to be understood as a Darwinian process***

Prior to the development of GD, Geoffrey Hodgson (2013a) considers the usage of the term ‘evolution’ in organizational research to be conceptually confused, imprecise, and even devoid of meaning. He writes that:

Many organizational researchers refer to ‘evolution’ or ‘co-evolution’ while being insufficiently clear what they mean...Terms such as ‘evolution’ or ‘co-evolution’ are often used with gravitas, as if they signify something important; but without further specification they actually mean very little...If generalized Darwinism is rejected, then what is intended by ‘evolution’ or ‘co-evolution’ must be clearly specified...persistent misuse and imprecision of terminology have obstructed the introduction of theoretical insights from generalized Darwinism (Hodgson 2013a pp. 973-974).

In contrast, Hodgson (2013a p. 974) claims that a ‘generalized Darwinism...can be useful as an overall framework for helping to understand organizational evolution’. It is:

...the only complete over-arching theoretical framework available for understanding worlds with populations of entities that are struggling for locally and immediately scarce resources. No viable alternative general conceptual framework for addressing evolution in complex population systems exists (Hodgson 2013a p. 974).

Similarly, for Hodgson’s co-worker Denise Dollimore ‘...generalized terms now exist that facilitate the conceptualization of Darwinian entities and processes in the socioeconomic domain’ (Dollimore 2014a p. 284). She presents these as remedying the defects in a previous attempt to apply Darwinian ideas to the domain of organizational science: the research programme of so-called ‘organizational ecology’ (Dollimore 2014a). For whereas the programme of ‘organizational ecology’ had failed to demonstrate its Darwinian credentials *proper* because it had no counterpart to the genetic and reproductive relations that are required to produce a properly Darwinian process of population-level change through biological natural selection (Reydon and Scholz 2009), GD claims that it is able, in a fashion, to do precisely this

(Dollimore 2014a). Moreover, GD claims that it is also able to accommodate the change brought about in an individual organization's characteristics by intentional adaptation to environmental factors at the level of the individual organization, via, for instance, managerial deliberation and volition (Hodgson 2013a; Dollimore 2014a). Thus the GD account of 'organizational evolution' incorporates a so-called 'Darwinian' population-level selection effect *and* an effect created by so-called 'Lamarckian' adaptation. For Dollimore (2014a p. 284; p. 307) this means that:

...organization scientists can finally begin to construct evolutionary accounts that accommodate both selection and adaptation effects in the business world and account for the role of knowledge transmission... The crucial point here is that organizational ecologists need to recognize that adaptation and selection are intertwined, not separate, evolutionary processes. It is correct that adaptation at the population level is the outcome of a selection process, but for an evolutionary explanation of diversity, we must include explanation of the production and replenishment on the variety on which selection operates... By constructing a theory that explicitly models replication and inheritance processes, organizational ecologists will be able to claim a proper Darwinian selection process.

Before considering the content of the 'generalized terms' (Dollimore 2014a p. 284) that purport to substantiate these claims, it will perhaps be useful to digress temporarily from the Hodgson (2013a) and Dollimore (2014a) accounts of GD and recap, in a little more detail than they do, on the logically deductive rudiments of Charles Darwin's (1968 [1859]) theory of biological evolution by natural selection. In simplistic terms, that omit various auxiliary hypotheses needed to make the derivations valid, Darwin's theory had three deductive arguments at its core:<sup>2</sup>

$GRI+LR \rightarrow SE$

Where: 'GRI' is a geometrical rate of increase in the population of an organism and 'LR' are the limited resources to sustain life; the conjunction of these implies a struggle for existence, 'SE'.

$SE+M \rightarrow NS$

Where: 'SE' is the struggle for existence and 'M' is genetic mutation (or in Darwin's day, heritable variation) that is transmitted from generation to generation through the potential to propagate here and now; the conjunction of these implies natural selection, 'NS', or the differential loss of differently constituted individuals in the population of organisms.

$NS+T \rightarrow NR$

Where: 'NS' is natural selection and 'T' is time; the conjunction of these implies natural retention, 'NR', and change in the genetic composition of the population as the generations succeed one another and some disadvantageous variations are selected against.

Darwinian natural selection is therefore to be understood as a process that operates on a *population* of organisms. Also, as already noted, it is a theory that requires auxiliary premises. For instance, that there are regularities in the environment and that the population is relatively isolated. This allows the variants within a gene pool to be selected and differentially propagated, rather than be overwhelmed by an influx of genes from outside the pool. As Donald T. Campbell (1974a p. 415) wrote:

The advances produced in the course of evolution are now seen as due to natural-selection, operating upon a pool of self-perpetuating variations which the genetics of the breeding group provide, and from within this pool, differentially propagating some variations at the expense of others... Considered as improvements or solutions, none of these variations has any a priori validity. None has the status of revealed truth... whatever degree of validation emerges comes from the differential survival of the winnowing, weeding out process.

Campbell memorably distilled the Darwinian evolutionary sequence into a conceptual triplet: '*variation, selection, and retention*' (Campbell 1974a p. 421, 1974b p. 143). And it is here that we may return to the Hodgson (2013a) and Dollimore (2014a) account of GD and the manner in which they substantiate their claim that organizational evolution is to be understood as a Darwinian process.

### ***A Darwinian process must be represented by two generalizations***

GD, as an account of 'organizational evolution', has two pillars. Pillar one is the use of Campbell's (1974a, 1974b) '*variation, selection, and retention*' phrase to support the claim that Darwin's theory of biological evolution may be distilled and generalized beyond biological phenomena, thereby moving toward the meaningful account of 'organizational evolution' that GD promises. Hodgson (2013a p. 978)

<sup>2</sup> Adapted from Flew (1984 p. 37). For a discussion, see for example, Huxley (1974 [1942] Chapter 1); Mayr (1982 Chapter 11); Howard (1982 Chapter 3).

calls Campbell's conceptual triplet the 'Darwinian principles of variation, selection and retention'. The principles are held to be common to both the social and biological domains and reference is duly made to Donald Campbell (Hodgson 2013a p. 978; Dollimore 2014a p. 301). Pillar two, which was originally developed within modern evolutionary biology to highlight some useful conceptual distinctions within it, is the *replicator-interactor* distinction (Hodgson 2013a p. 976; Dollimore 2014a p. 295). This distinction supposedly enables the identification of counterparties in the social world to the genetic and reproductive relations that are present in the biological world. GD takes both pillars to be 'generalizations' (Dollimore 2014b p. 377; Hodgson 2013a pp. 978-979); hence, a 'Generalized Darwinism'.

Let us examine each pillar in turn.

'Organizational evolution' is supposedly Darwinian not because it is biologically based, but because there is the prospect of 'common ontological features' between 'complex population systems' in both nature and society (Hodgson (2013a p. 978). By 'common ontological features' across 'complex population system', Hodgson would seem to have in mind:

...sets of individually different and demarcated entities that interact with the environment and each other. By definition they face immediately scarce resources and struggle to survive, whether through conflict or cooperation. They adapt and may pass on information to others, through replication or imitation. Examples of complex population systems are plentiful both in nature and society. They include every biological species...And importantly they include human organizations, as long as organizations are cohesive entities having some capacity for the retention of information. An economic example is an industry involving cohesive organizational entities such as business firms (Hodgson 2013a p. 978);<sup>3</sup>

This idea of 'ontological communality' between 'complex population systems' (Hodgson (2013a p. 973, p. 978; see also Dollimore 2014a p. 302) thereby enables GD to transport its 'Darwinian principles' of '*variation–selection–retention*' from the biological world to the social world:

...the evolution of a complex population *must* involve the three Darwinian principles of variation, selection and retention...These abstract principles do not themselves provide all the necessary details, but nevertheless they must be honoured, for otherwise the explanation of evolution will be inadequate. In particular, investigations into complex populations must address (a) the sources of replenishment of variety in the population (b) how information is passed from one entity in the population to another, and (c) why some entities are more successful in surviving or passing on information than others (Hodgson 2013a p. 978 [emphasis in original]).<sup>4</sup>

Thus, GD claims that the principles of *variation, selection and retention* apply wherever there are mechanisms to enable (a), (b) and (c) above. And in pursuit of the identification of those mechanisms, GD adds a second pillar to support its account of 'organizational evolution': the neo-Darwinian *interactor-replicator* distinction (Hodgson 2013a; Dollimore 2014a). To GD, the applicability of this distinction also represents a 'generalization' across the social and biological domains. Hodgson explains that modern neo-Darwinian biology identifies the genotype as a mechanism for storing and passing on information, how it is hosted by a phenotype, and how it guides the development and behavior of the phenotype in its interaction with the environment (Hodgson 2013a p. 976; see also, Dollimore 2014a pp. 295-296). Consequently, the genotype is a *replicator* and the phenotype is an *interactor*. Environmental interaction selects the interacting entity, causing the replicator to be differentially reproduced (Dollimore 2014a pp. 295-297). In biology, the *interactor-replicator* distinction is therefore a conceptual one; it is designed to emphasize the *function* of the genotype and phenotype in natural selection: what gets selected and what thereby gets differentially retained and perpetuated. But this being a conceptual distinction, GD proceeds to claim that it may be applied abstractly to *any* complex population system of individually different and demarcated entities that possess a potential to pass information to one another and which interact with each other in a resource-constrained environment, including, as claimed previously, an industry involving cohesive organizational entities such as business firms. Hence the *interactor-replicator* distinction, or so it is claimed, is applicable to businesses and organizations:

The term replicator is a generalization of genotype, and the interactor is a generalization of phenotype...These concepts are important when we address social entities hosting information-retaining and developmental mechanisms...an interactor (is) a relatively cohesive entity that hosts replicators and interacts with its environment in such as way as to lead to changes in populations of interactors and their replicators. Social organizations are obvious candidate interactors (Hodgson 2013a p. 976).<sup>5</sup>

And to emphasize the commonality with biology, the parallel process in biology is emphasised:

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<sup>3</sup> See also, Denise E. Dollimore, (2014a p. 291).

<sup>4</sup> See also, Dollimore, (2014a pp. 301-303)

<sup>5</sup> On the identification of interactors, Dollimore (2014a p. 296) is more categorical: 'In biology this is the organism, and in the business world, this is the organization of the firm'.

A genome is a biological replicator. But there are other replicators, such as routines in organizations... which also hold information and guide behaviour. Replication refers to the passing of such problem-solving or developmental information from one entity to another. Replication and inheritance are treated as synonyms... the mechanisms of replication are very different in the biological and social spheres. But some crucial problem-solving information is copied and transmitted from organization to organization, and this amounts to social replication (Hodgson 2013a pp. 976-977).<sup>6</sup>

As can be seen from this quotation, GD has a name for what is produced by the ‘...crucial problem-solving or developmental information’: ‘routines’. Routines ‘...refer to capabilities of organizational teams to carry out sequences of actions. Routines are hosted by organizations as their interactors’ (Hodgson 2013a p. 977). More specifically:

Routines may be defined as organizational dispositions to energize conditional patterns of behaviour within teams, involving repeated sequential responses to cues that are partly dependent on social positions in the organization... Establishing a routine in a firm means building or using internal relations and positions that enable sequential behaviours. These in turn help to develop particular habits and other conditional dispositions among individuals (Hodgson 2013a p. 980).

According to Hodgson (2013a), the transmission of routines from organization to organization happens in two ways. Firstly, a routine may be *diffused* over existing organizations by means of imitation procedures. Secondly, a new organization may *inherit* its routines through a spin off or a franchise arrangement:

... the difference between the *diffusion* of routines from organization to organization, on the one hand, and their *inheritance* through business spin-offs is crucial... This difference becomes clear through the replicator-interactor distinction, where routines are the replicators and organizations the interactors. Both processes involve replication. But diffusion involves existing interactor B copying a routine from interactor A. By contrast spin-offs mean that interactor A itself leads to the creation of a new interactor B, which carries some routines from its parent (Hodgson 2013a pp. 982-983).

And what the ‘diffusion’ and ‘inheritance’ of routines helps to develop, as noted above, are habits in the living, breathing organisms of a social organization:

Habits are the most elementary replicators in social evolution. They are learned dispositions to behave in a particular way in a particular circumstance. They are hosted by individuals (their immediate interactors)... The process of habit replication relies on behavioural imitation. In all cases of habit replication, and unlike genes in biology, there is no direct copying from replicator to replicator (Hodgson 2013a p. 977).

Thus, for GD, the abundance of business routines, as a store of copy-ready information that is capable of guiding the development of an organization, is taken to be an important factor in the growth of the modern economy and in the shaping of worker behaviour within it. Indeed, the role of routines is illustrated by a “...‘routines as genes’ metaphor” (Hodgson 2013a p. 977). Hodgson (2013a pp. 981-982) proposes that it is necessary that ‘...copy error during replication is minimized’, but that if this is done by ‘...cloning existing arrangements exactly as possible’ then ‘...tried and tested knowledge’ can be disseminated across an economy by ‘business replication strategies’; the practices of several retail and service business such as Intel, McDonalds, Ikea, Novotel are mentioned to support this contention (Hodgson (2013a p. 982).

### ***The generalizations allow for organizational-level adaptation***

Yet the question arises as to how this exact ‘cloning’ image fits with the first element of the triadic ‘*variation-selection-retention*’. A part of the answer would seem to be that the ‘replication strategies’ of routines do not produce uniform outcomes. Hodgson (2013a p. 981) writes that there is a ‘...difference between the information encoded in the replicator and its context-dependent expression in the developing interactor’ and that ‘...small differences in adaptive capacity from firm to firm may be crucial to survival’ (Hodgson 2013a p. 981). As to the origin of the ‘small differences’, Hodgson thinks that they can be the product of other routines, such as strategic scenario planning, that encourage ‘the innovation of routines’ thereby making the first-order routines more adaptable: ‘Scenario planning involves routines to encourage the innovation of routines and to make existing routines more adaptable’ (Hodgson 2013a p. 983). But, the claim that a routine may alter another routine raises the prospect of either an infinite regress of hierarchically-organized routines or some form of overarching master routine. Neither Hodgson nor Dollimore acknowledge this difficulty, but in any event they avoid it. This is because they also claim that ‘...firms can alter their routines (replicators), whereas (outside modern genetic engineering) no biological organism can manipulate its genes (replicators)’ (Hodgson 2013a p. 983); and that ‘...emphatically, habits and routines do not imply the absence of choice’ (Hodgson 2013a p. 984; see also, Dollimore 2014a pp. 307-308). In short, there is also variety proliferation by means of the ‘...learning and intentional decision making of organizational leaders’ (Dollimore 2014a p. 308). This enables the

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<sup>6</sup> See also, Dollimore (2014a pp. 296-297).

deliberate adaptation of organizational routines to environmental factors within any particular organization.

We may define organizational adaptability as the capacity of an organization to change its strategies, structures, procedures or other core attributes, in anticipation or response to a change in its environment, including changes in relations with other organizations (Hodgson 2013a p. 980)

### ***The generalizations allow for population-level organizational selection***

The *interactor-replicator* distinction, as the second pillar of GD, is supposed to enable a meaningful account of ‘organizational evolution’ to be placed atop it; an account that Hodgson thinks may quite properly be called ‘Darwinian’:

The identification of distinct social replicators and interactors is a key step in elaborating the proposition that abstract Darwinian principles apply to evolution in both nature and society (Hodgson 2013a p. 979).

And this is because population-level selection occurs:

Selection occurs because organizations differ both in their inherent characteristics and their local environments. Some firms go bankrupt. Some are so successful that their routines are copied by other firms. Others lead to successful spin-offs. In principle, such differential success and replication amounts to selection... Selection is a major reason for changes in the overall profile of a population of organizations (Hodgson 2013a p. 979).<sup>7</sup>

And to emphasize that this is a so-called ‘generalized Darwinism’, we are once again reminded of the different albeit similar process in biology:

...selection does not operate on genes themselves. Selection operates on entities whose development was guided by genetic replicators in an environmental context. The objects of selection are interactors. Selection leads indirectly to changes in the population of hosted replicators... Although the detailed processes are very different, similar remarks apply to organizations and the replicators (habits and routines) that they host. Selection operates directly on organizations and individuals, which individually are outcomes of development in particular contexts (Hodgson 2013a p. 980).

### ***Two Critics, Two Criticisms***

Marcus Scholz and Thomas Reydon (2013) supply an insightful critique of Hodgson’s (2013a) paper. They press two principal criticisms against it. First, they ask what exactly it is that GD seeks to explain—if GD is the *explicans*, then what, precisely, is the *explicandum*? Second, they question GD’s Darwinian credentials by highlighting its failure to supply an adequate account of how organizational populations or ‘species’ are to be identified—given that a biologist’s notion of a reproductive community would seem to be inapplicable to organizations. The duo emphasize that a population of organizations cannot be defined as a *set* whose members share some common traits; for in a population that is so defined, no fundamentally novel traits can be the subject of population-level selection without placing the organization *outside* the population.

Hodgson (2013b p. 1002), in his response to the first element of this critique, characterized GD as ‘...an overarching meta-theoretical framework for... developing theoretical explanations’ and not a ‘...complete theory to explain specific phenomena’ (2013b p. 1003). To him, it is ‘...a repository for contingent auxiliary theories and models... a general framework in which additional and context specific explanation may be placed’ (2013b p. 1003). As for Scholz and Reydon’s other criticism—the identification of a population of organizations—Hodgson reiterated the importance that GD places upon the ‘*replicator-interactor*’ conceptual distinction and the possibility that in the social world routines may be replicated by either ‘diffusion’ or by ‘inheritance’ (2013b pp. 1003-1004). Hence, for Hodgson:

Given these possibilities, one option would be to define a species-population of organizations as a set where every member can potentially transfer a routine to or from one other member, by diffusion among existing organizations or by the creation of a new organization (Hodgson 2013b p. 1004).

Subsequently, in an exchange with Dollimore, the criticism that GD lacks properly Darwinian credentials was elaborated by Reydon and Scholz (2014). They stressed the importance of a reproductive community to Darwin’s theory of natural selection in biology; that is, that natural selection is a process that operates on a population of organisms as the individuals that comprise it either fail or succeed to reproduce their likeness over time. Thus, in a properly Darwinian process, the differential survival of interactors in an environment must cause, over time, a differential perpetuation of the replicators that they host.

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<sup>7</sup> See also, Dollimore (2014a p. 303).

Furthermore, they stressed that the reproductive community must be relatively isolated for the logic of Darwinian natural selection to take effect. The duo argued that:

Biological populations are the systems *within which* replicators can multiply and minute beneficial variations at the replicator level can accumulate to cause novel traits. The existence of reproductive relations between interactors and of populations of interactors as comparatively stable and buffered reproductive systems thus is crucial for the occurrence of Darwinian evolution... Explaining how routines are transmitted between organizations will not solve the problem. Rather the problem is that successful organizations (interactors) do not give rise to offspring organizations that closely resemble their “parents”—that is, that organizations do not “breed true” and, indeed, do not breed at all. There is no reason to think that routines are transmitted preferably to organizations of the same kind or set... organizations or firms are interactors in the weak sense of entities interacting with their environment, but they are not interactors of the right sort, that is, interactors capable of forming evolving populations, because they do not reproduce their kind (Reydon and Scholz 2014 pp. 370-371 [emphasis in original])

In her reply, Dollimore (2014b) found no reason to address Reydon and Scholz (2014) observation that reproductive communities must be stable and buffered (i.e. relatively isolated) for differential retention to take effect over time. She argued that ‘Slavish adherence to biological analogy for elements of this generalized conceptual structure is simply not necessary nor is it helpful’ (Dollimore 2014b p. 378). Dollimore proceeded to elaborate how the replication of a routine can occur. Seemingly she thinks that none of the following involve a biological analogy:

Spin-off enterprises offer clear examples of firms giving rise to *offspring* firms that closely resemble their *parents*... recent research on spin-offs... highlights the importance of *inherited* know-how from the *parent* firm (Dollimore 2014b p. 379 [emphasis added]).

Franchises offer another example of firms giving rise to new firms that resemble the *parent* (Dollimore 2014b p. 380 [emphasis added]).

Finally, mergers and acquisitions can be seen as a form of “*mating*” (Dollimore 2014b p. 380 [emphasis added]).

## ***Without Answers***

My own sense is that the Scholz and Reydon critique of GD is effective, but that it is rather too narrow. It leaves many questions concerning the status and content of GD unasked and therefore without answers.

For instance, Scholz and Reydon (2013) ask what it is that GD seeks to explain. But their question ought really to prompt another: what is the logical and scientific status of GD in comparison to Darwin’s own theory? They do not explicitly pose this question and Hodgson (2013b p. 1003) is therefore able simply to reiterate his view that GD is a ‘meta-theoretical framework’ or ‘general framework in which additional and context specific explanation may be placed’. Thus Hodgson (2013b) dismisses the expectation that the detailed processes of ‘organizational evolution’ ought to correspond to the details of Darwin’s theory. In turn, my own sense is that this would seem to make the basis of Scholz and Reydon’s criticism of GD to be purely verbal. That is, a dispute over just how much a theory must resemble Darwin’s own before it may legitimately be called ‘Darwinian’. But if this is a fair characterisation of Hodgson’s response to Scholz and Reydon (2013) then their exchange requires a denouement. For an underlying question remains: what is it that GD ‘generalizes’, or more specifically, what is the *scientific status* of its purported generalizations in comparison to Darwin’s own theory of natural selection?

Equally, for Scholz and Reydon (2013), a properly Darwinian process of population-level selection requires a stable and buffered reproductive community with ancestor-descendent and mating relations between its members. Organizations, they claim, do not meet these criteria. So the strength of what I have called the ‘second pillar’ of the GD account of ‘organizational evolution’—the *interactor-replicator* distinction—is to them completely undemonstrated. But, in their respective responses, Hodgson and Dollimore simply reiterate their view that the so-called ‘diffusion’ and ‘inheritance’ of business routines in a resource constrained environment are sufficient to establish a population-level selection process wherever there are organizations capable of imitating one another, or wherever there are organizations capable of establishing new organizations through franchise, merger, or spin-off arrangements. But this stand-off also leaves many questions unasked and therefore without answers. In particular, if the *interactor-replicator* pillar of the GD framework is dispensed with—Ockham’s razor style—then the first pillar, the so-called Darwinian principles of *variation-selection-retention*, would seemingly, in some sense, remain. So might GD’s notion of the ‘diffusion’ and ‘inheritance’ of routines be conceptualized using these terms alone? And, if so, in what sense might that account also be called ‘*evolutionary*’, perhaps even a ‘*Darwinian*’ theory of ‘organizational evolution’, and perhaps even a ‘*generalization of Darwin*’, but perhaps not a ‘*Generalized Darwinism*’?

Next, I shall attempt to answer these various questions.

## *The Scientific Status of Generalized Darwinism: Schemata or Testable Hypothesis?*

As previously noted, Charles Darwin (1968 [1859]) used a deductive argument to explain the mechanisms of evolutionary change in a biological population. His argument thereby contained an explanation of phenomena that are empirically observable. For instance, phenomena such as the extinction of life forms, the divergence and increased differentiation in the structure and behaviour of life forms, the teeming variety of life on earth. All importantly, Darwin's deductive argument showed how seemingly designed or mind-directed phenomena may be the product of chance variation and natural selection. Consequently, many of Darwin's more colorful terms are best understood metaphorically—for nature knows nothing of a *struggle for existence* nor of a process of *natural selection*. What exists are material organisms which leave offspring. And Darwin's theory, in a nutshell, is that some organisms are more likely to leave offspring than others (Flew 1984; Popper 1999).

Antony Flew (1984 p.17), in his assessment of the philosophical and scientific status of Darwin's theory, had little hesitation in classifying it as 'truly scientific'. He used Karl Popper's (2002b [1959]; 2005 [1983]) proposed criteria of *falsifiability* to demarcate those statements that belong to an empirical science from those that do not. For instance, Flew argued that if Darwin's theory were true then evidence of extinction and something other than present life forms would be implied by a fossil record (Flew 1984 p. 18). Also, for Flew (1984 p. 25), the theory of natural selection prohibits the retention of any characteristic that places a species at a competitive disadvantage in the struggle for existence.

Nevertheless, Karl Popper, the originator of the *falsifiability* criterion for demarcating science from metaphysics, was more circumspect in his assessment of Darwin's theory (Popper 2002c [1974]; Popper 1987). Popper (2002c [1974]) viewed Darwin's theory as a system of conjoined statements with the hypothesis of natural selection at its core. Consequently, for Popper, how to distinguish what is predictable by *that* specific hypothesis from the gradual change that genetic mutation would entail *with* or *without* natural selection presents a difficulty. One might say, as did Flew (1984), that with natural selection such change cannot be, over time, disadvantageous in the struggle for existence. But another problem that Popper (2002a [1974]) identified was how to define the retention of disadvantageous changes if non-retention is also the very definition of a change being disadvantageous. On the other hand, Popper (1987) noted that if Darwin's theory is formulated more boldly as a series of strictly universal statements—for instance, that *all* complex organs and *all* forms of behavior have evolved by natural selection because they are useful to survival—then it would seem to be refuted by those organs and behavioral programs whose retention has not been attributed to natural selection. That said, Popper was fascinated by Darwinian biology and wrote that '...the theory is invaluable. I do not see how, without it, our knowledge could have grown as it has done since Darwin' (Popper 2002c [1974] p. 199).

GD, in comparison, does not wrestle with these difficulties because it only ever gestures toward the explanation of any particular state of affairs. Although Hodgson (2013a p. 979) may compare its generality to the way that Newton's laws of motion apply to billiard balls, spacecraft and planets, he fails to formulate an explanation of any particular state of organizational affairs in the form of a deductive argument with testable implications. The supposed 'general framework' that GD supplies is not derived from a strictly universal statement and Hodgson's preferred label for it—'meta-theory'—does not make GD a higher-order explanatory theory or a theory of greater universality to Darwin's own. Crucially, in that sense, GD does not encompass Darwin's theory and more besides.

My own sense is that it is Dollimore who comes closest to disclosing accurately GD's scientific status. In discussing what it is that makes GD a 'generalization', she writes:

Whereas analogy is about mapping knowledge from one domain to another, generalization resists any analytical bias and begins by observing complex mixes of different entities, processes, and systems of relations and striving to identify essential features held in common. In this way, scientists draw out general principles unconstrained by the detailed mechanisms of any one domain and then formulate these at fairly high levels of abstraction (Dollimore 2014b p. 377).

Aside from her implicit claim that generalizations rest upon an inductivist empiricist method, which for present purposes may be ignored, Dollimore's description fits with my own sense that GD is comprised of 'schemata'. By a 'schema' I mean some form of conceptualization that suggests that different things or processes have something in common. Although neither Dollimore nor Hodgson use this term, it is schemata, I think, which GD supplies with its '*variation-selection-retention*' conceptual triplet and its '*interactor-replicator*' conceptual distinction. Such schemata, of course, do not specify a mechanism of change for any particular phenomena because they are not, in and of themselves, explanatory theories of a particular phenomenon. A theory, however, may fall under the rubric of a schema—as is demonstrated by the fact that the '*variation-selection-retention*' triplet was used by Donald Campbell (1974a p.421, 1974b

p.143) to capture the similarity between Darwin’s theory of evolution by natural selection and Popper’s philosophy of science and methodology of empirical falsification.<sup>8</sup> In Popper’s philosophy of science, there may be an unjustified and unjustifiable heterogeneity of theoretical forms that are freely conjectured by the human mind, a systematic, critically-eliminative, winnowing and weeding-out from among the variations, and the retention of selected variations. And just as in Darwin’s natural selection hypothesis, the question as to whether a retained theory is in some sense justified is as irrelevant as any question about whether any biological mutation is justified—mere survival does not guarantee the future of the survivor (Bartley III 1987). In Popper’s (2005 [1983] p. 64) terms:

...like Darwin, I did not assume that something (whether an animal or a theory) that has shown its fitness to survive tests by surviving them has shown its fitness to survive all, or most, or any future tests. In fact, I believe that a theory, however well tested, may be refuted tomorrow—especially if somebody tries hard to refute it, and especially if he has a new idea about testing it.

Indeed Popper (1974) was impressed by Campbell’s (1974a) interpretation of his philosophy as an ‘evolutionary epistemology’ because it anticipated the content of some of his (at that time) unpublished papers. These came to be collected in the book *Objective Knowledge: An Evolutionary Approach* (Popper 1979 [1972]). Moreover, Popper (1979 [1972]; 1994a) summarized the evolutionary epistemology that Campbell had distilled into his ‘*variation-selection-retention*’ schema with his own formulation. It may be elaborated in many ways and I introduce one form of it here because I shall make further use of it in the final section of this paper:

$$P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$$

Where: ‘ $P_1$ ’ is a theoretical or practical problem; ‘ $TT$ ’ are the conjectural trial theories, tools or technologies which are creatively offered in order to solve that problem; ‘ $EE$ ’ is a process of error elimination by way of systematic tests, comparative appraisal and rational criticism; and ‘ $P_2$ ’ is the new problem that evolves from the critical activity.

Although an outline of this schema was first offered in Popper (1940), he came to use it to summarize his ideas about the evolution of knowledge in all kinds of different contexts: empirical science, technology, philosophy, history and ideology ((1979 [1972]; 1994a; 1994b). This so-called ‘evolutionary epistemology’ or ‘philosophical Darwinism’ came to be widely discussed in the literature on epistemology (Campbell 1974a; Radnitzky and Bartley 1987; Popper 1999; Munz 1985, 1993, 2004; Rowbottom 2011).

## ***Where Generalized Darwinism Does, and Does Not, Work***

If the two pillars to GD’s account of ‘organizational evolution’ are understood as schemata, then where the account works, and where it does not, becomes clear.

GD claims that organizations are subject to a population-level selection process. And GD uses the *interactor-replicator* distinction to schematically summarise its supposedly Darwinian nature: *organizations-cum-interactors* are selected causing a differential replication in the *routines-cum-replicators* that the organizations host. But as Reydon and Scholz (2014) note, the underlying process that is supposedly distilled by that schema cannot resemble its biological equivalent. Organizations, in the GD account, may be called *interactors*, and their copy-ready routines may be called *replicators*, but these interactors do not populate stable and buffered reproductive communities with ancestor-descendent and mating relations between members. They cannot therefore breed *organization-cum-interactor* offspring, and this means that there cannot be differential reproduction of heritable *routines-cum-replicators* over time—with latter generations of *organization-cum-interactors* inheriting the traits of their forerunners. Reydon and Scholz (2014) are surely correct to emphasise these differences as compared to neo-Darwinian biology. In that respect GD’s usage of the *interactor-replicator* schema refers to an underlying process that is dissimilar to what is found in neo-Darwinian biology. Indeed, *by those lights*, GD’s claim that ‘organizational evolution’ is to be understood as a Darwinian process does not work.

But if, as GD claims, the *interactor-replicator* distinction does in fact apply to non-biological social organizations at a high level of abstraction, then what mechanisms is it schematically summarising? As previously noted, on the one hand it is used to cover the idea that *routines-cum-replicators* may be

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<sup>8</sup> Campbell (1974a p. 415 [emphasis added]) wrote: ‘The advances produced in the course of evolution are now seen as due to natural-selection... Considered as improvements or solutions, none of these variations has any a priori validity. None has the status of revealed truth... whatever degree of validation emerges comes from the differential survival of the winnowing, weeding out process... Popper’s first contribution to an evolutionary epistemology is to recognize the process of the succession of theories in science as a *similar* selective elimination process’.

*diffused*—by imitation—from one existing *organization-cum-interactor* to another. And on the other hand, it is used to cover the idea that *routines-cum-replicators* may be *inherited* by a new *interactor-cum-organization* from an extant *interactor-cum-organization*—by means of a business spin-off or franchise arrangement. A market-based selection process of organizations supposedly then makes for the differential diffusion and inheritance of routines. *By those lights*, or so GD claims, there is a form of ‘Darwinian’ evolution.

But for my own part, I fail to see the significance of GD’s distinction between ‘diffusion’ and ‘inheritance’—aside from the fact that the latter invites the invocation of *biological* metaphors such as ‘parent’, ‘offspring’, and ‘inheritance’. Granted that both of the so-called ‘diffusion’ and ‘inheritance’ scenarios would seem to require the replication of information, but that is really just a short-hand description of what is actually happening. What both require is a person understanding a routine as a solution to a business or organizational problem, either on the basis of their own subjective memory of its prior application, or with the assistance of it being recorded as an objective knowledge product that is external to their mind; for instance in a handbook, textbook, manual, or plan. Thus, just as routines influence the affairs of the organization and the material world *through us*, they are also transferred from organization to organization *by us*. Subjective thought processes and acts of thinking are the intermediary through which abstract business plans or franchise models are put into effect. It is a *person* who carries routines from one situation to another, attempting to trial and/or imitate their application in a new context. Speaking of an organization as an ‘offspring’, that ‘inherits’ information from a ‘parent’ simply obscures this with a biological metaphor. In short, what is the use of the *interactor-replicator* schema if its proponents seem unable to grasp the details of this process *without* making recourse to the very biological metaphors and analogies that the schema is intended to transcend?

Indeed, I think that what we are talking about here is the interaction between what Popper (1979 [1972]; 1994a) called ‘World 1, 2 and 3’. World 1 being comprised of physical material objects, world 2 of mental states, and world 3 by the objective products of the human mind—such as the aforementioned contents of handbooks, textbooks, manuals, or plans. World 3 objects, according to Popper (1979 [1972]), possess a reality that is autonomous from the material media on which they may be recorded. The GD account, I argue, implicitly recognizes the interaction of worlds 1, 2 and 3. We are told that routines are ‘...organizational dispositions to energize conditional patterns of behaviour within teams’ (Hodgson 2013a p. 977). And we are told that ‘...firms can alter their routines (replicators), whereas (outside modern genetic engineering) no biological organism can manipulate its genes (replicators)’ (Hodgson 2013a p. 984). But this presupposes, I argue, a complex ontology that is hardly captured by the vague notion that organizations possess an ‘ontological communality’ (Hodgson 2013a p. 978). What it seems to require, once the ontological dots are connected together so to speak, is that: firstly, a routine is something that is able to inform an individual’s subjective dispositions (i.e. world 3 interacts with world 2); secondly, those subjective dispositions have a consequent energized effect on the material world (world 2 interacts with world 1); thirdly, the routines are something that are amenable to alteration by becoming the focus of criticism (world 2 interacts with world 3). A routine must therefore be an autonomous, objective knowledge product that is open to criticism via interaction with the human mind. Only then can a routine be open to further adaptation in its own right. And of course, the GD account makes room for this because it claims that it allows for so-called organizational-level adaptation—the deliberate adaptation of routines to environmental factors within any particular organization. But in itself this shows the inadequacy of the *interactor-replicator* schematic picture: that it is organizations as *interactors* that interact. In actuality, the supposed *routine-cum-replicators* may be interacting with the critical acumen of an organization’s people all of the time.

But if the *interactor-replicator* generalized term is a poor schema with which to represent what is going on, one that fails to capture any striking commonality between Darwin’s theory of evolution by natural selection and the mechanisms that drive the supposed evolution of organizations, then GD’s account of evolutionary change collapses to its first schema: *variation-selection-retention*. And indeed, I argue that the notion of routines being ‘diffused’, ‘inherited’ and ‘altered’ is easily accommodated by this. This is especially obvious when the conceptual triplet of *variation-selection-retention* is elaborated, not by the *interactor-replicator* distinction, but by Popper’s (1979 [1972], 1994a) schema of  $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$ .

Take, for instance, the case of the deliberate adaptation of organizational routines to environmental factors—what GD claimed to be organization-level adaptation through the intentional decision making of organizational leaders. How might Popper’s schema summarize this? The leaders receive reports of a problem situation,  $P_1$ . They creatively formulate trial theories  $TT$ —conjectured without any *a priori* justification—of how to alter routines to resolve the problem situation. Error elimination,  $EE$ , follows—by way of the critical testing of the new routines in the organization and an assessment of whether they improve the problem situation. Any aspect of the testable  $TT$  that has seemingly withstood the testing and criticism may be selected and retained. A new problem situation,  $P_2$ , arises. If  $P_2$  is very different to  $P_1$  the organization may have changed a lot; if not it may have changed very little—perhaps having only

eliminated the prospects for *TT*. Making no changes, by doing nothing other than what has previously been done, may also be considered to be a trial theory—albeit perhaps a dogmatically held hope that  $P_1$  will improve of its own accord. On the other hand, a  $P_2$  that significantly differs from  $P_1$  may present an enormous environmental problem of a very different magnitude *to a competitor* of the organization in focus. The very existence of  $P_2$  may demonstrate that its products and mode of organization are now defunct, or will, at best, come to occupy only a niche. Consider, for instance, the predicament of the horse-drawn buggy manufacturers at the advent of the Ford motor car. Indeed, this may also illustrate why often we replace the label ‘evolutionary’ market change with the label ‘revolutionary’ market change.

Or take the replication of extant routines by so-called ‘diffusion’ or ‘inheritance’—which I have argued above do not really differ. Here, the problem is simply one of imitating and copying the performance of a routine as exactly as possible—either from the subjective memory of its prior performance, or from its objective recording in a plan, handbook, or manual. This will in itself be a special case of  $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$ , where it is discernible copy-error that requires elimination (EE). Of course, given the case outlined above, even a perfect copy may be useless if the routine is unsuitable to the new environmental circumstance to which it is applied.

Or take GD’s idea that what the so-called ‘diffusion’ and ‘inheritance’ of routines helps to develop, at an elementary level, are habits in the living, breathing, organisms that populate a social organization:

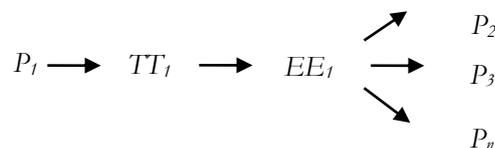
Habits are the most elementary replicators in social evolution. They are learned dispositions to behave in a particular way in a particular circumstance (Hodgson 2013a p. 977).

Here, following Popper (2002c [1974] p. 52), we may say that, given a theory *T* that a particular practical action should be done in a problem circumstance *P*, there is the repeated practical performance of the action. Change then follows, through a process of error elimination *EE* until the performance of certain actions or reactions become almost automatic within an individual. Think of a soldier who is able to strip and reassemble a rifle even when blindfolded.

As these illustrations may indicate, the use of Popper’s  $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$  schema highlights something other than GD’s emphasis on the adaptation or replication of ‘problem-solving or developmental information’ (Hodgson 2013a p. 977). For that underplays *the growth of objective knowledge as it moves from old problems to new problems:  $P_1 \rightarrow P_2$* . GD’s image of population-level change through the winnowing out of interactors with disadvantageous routines hardly captures this aspect to social change. Popper (1994a p. 11) offered the example of Henry Ford:

Henry Ford’s original problem was: how can we provide transport for the vast spaces of the United States? This was his  $P_1$ . He proposed the theory: by building a cheap motor car. This led through various trials and errors to a new problem: how can we provide the roads and parking spaces needed for our cars? The original problem  $P_1$  was the problem of transport. The new problem is the traffic problem—a problem of frustration.

Hence the diagrammatic schema might resemble figure 1, where the development of objective knowledge concerning the original problem,  $P_1$ , proliferates new problems  $P_2, P_3, \dots, P_n$ . In the case of the motor car these might be: road traffic congestion, pollution, urban planning, the supply of fuel, travel safety etc.



**Figure 1: Popper’s evolutionary schema applied to a practical technology.**

Others speak of the ‘revenge effect of technology’ (Tenner 1996).

Thus, physical tools, social technologies, managerial methods, information technologies... all may have repercussions and unintended consequences. In *The Open Society and Its Enemies*, (1966 [1945] p. 162) Popper wrote:

...we are making...experiments all the time. The introduction of a new-kind of life insurance, of a new kind of taxation, of a new penal reform, are all social experiments which have their repercussions throughout the whole of society...Even a man who opens a new shop...is carrying out a kind of social experiment on a small scale; and all our knowledge of social conditions is based on experience gained by making experiments of this kind.

Finally, is it legitimate to use the labels ‘evolutionary’ or ‘Darwinian’ to describe these distinctly ‘Popperian’ schematic representations? As was earlier noted, it was the American psychologist, Donald Campbell, who first used the label ‘evolutionary’ (1974a p. 413) to characterize Popper’s epistemology. He did so because he thought that Popper’s philosophy of science incorporated the three conceptual core elements that he associated with the Darwinian evolutionary sequence: ‘*variation-selection-retention*’ (Campbell 1974a p. 421, 1974b p. 143). Campbell (1974a p. 434) also recognized, although perhaps in a more circumspect way, the same sequence in Popper’s ideas about the growth of *World 3* objective knowledge more generally. Popper (1994a p. 63) also described his own schema of  $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$  as a ‘... theory of emergent evolution through problem-solving’ and even as ‘... a generalization of Darwin’. But Popper explicitly presented this theory as a *schema*. Unlike a scientific theory, neither Campbell’s conceptual triplet nor Popper’s schema possess first-order explanatory power. Thus, as Popper (1994b p. 63) says, they represent a ‘*generalization of Darwin*’. This seems to me to be a better characterization of their schematic basis than the more scientifically sounding ‘*Generalized Darwinism*’.

## **Conclusion**

Generalized Darwinism (GD) claims to be a conceptual and theoretical framework for researching evolutionary change processes in organizations. But how this framework ought to be interpreted requires careful consideration. In contrast to Darwin’s theory of evolution by natural selection proper, the GD framework is not an explanatory deductive argument form. What it is that GD actually generalizes and intends to explain thereby becomes somewhat moot. My own conclusion is that GD is best summarized by two general schemata that purport to distil supposed commonalities between processes of ‘organizational evolution’ and biological evolution. That terminology may dispel any confusion about GD’s epistemological and methodological status. But in considering the applicability of the two schemata to the social domain, criticism reveals one to be problematic, whereas the other, to which the GD programme collapses if the problematical schema is dispensed with, has long been associated with another so-called ‘evolutionary approach’ to the understanding of social change: Sir Karl Popper’s ‘evolutionary epistemology’. Thus, contrary to the impression that is given by the proponents of GD, organizational theorists need not commit to the GD framework before appropriating the term ‘evolution’. Indeed, if organizational theorists are interested in formulating an account of the evolutionary character of social and organizational change, then they may do so by using the objective knowledge epistemology of Sir Karl Popper. His is an epistemology that has been widely described as both ‘evolutionary’ and ‘Darwinian’.

## **Conflict of Interest Statement**

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Rod Thomas was born in Bridgend, Wales. He was educated at Brynteg Comprehensive School and the University of York, UK. Presently he teaches in the Organisation and Human Resource Management subject group of the Newcastle Business School, Northumbria University, UK. Prior to this he worked as a manager in NHS England. He has had papers published in the *Cambridge Journal of Economics*, *Kybernetes*, *Philosophy of Management*, *The Journal of Management in Medicine*, *The Journal of Organisational Change and Social Transformation*, and elsewhere.

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