Wholes that cause their parts: Organic self-reproduction and the reality of biological teleology

Thomas Teufel

Department of Philosophy, VC 5-288, Baruch College, The City University of New York, One Bernard Baruch Way, New York, NY 10010, USA

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A B S T R A C T

A well-rehearsed move among teleological realists in the philosophy of biology is to base the idea of genuinely teleological forms of organic self-reproduction on a type of causality derived from Kant. Teleological realists have long argued for the causal possibility of this form of causality—in which a whole is considered the cause of its parts—as well as formulated a set of teleological criteria of adequacy for it. What is missing, to date, is an account of the mereological principles that govern the envisioned whole-to-part causality. When the latter principles are taken into account, we find that there is no version of whole-to-part causality that is mereologically, causally and teleologically possible all at once, as teleological realism requires.

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1. Introduction

In his 2001 What Functions Explain, Peter McLaughlin argues that the principal role of function ascriptions in biological discourse is to explain the causal processes involved in organic self-reproduction. Toward the end of his book, McLaughlin notes that, if processes of organic self-reproduction are thus, epistemically speaking, what functions explain, then what explains functions, metaphysically speaking, must be the existence of objects exhibiting the relevant causal processes. This metaphysical criterion of adequacy for a theory of biological function ascriptions would appear to be quite unproblematic, if we take function ascriptions to be explicable in selectionist or systems-theoretical terms. Function bearers, on those accounts, just are the products of evolutionary processes or the complex biological systems under investigation in biological research.

But the metaphysical demand for entities and processes that justify our use of function vocabulary is not as easily satisfied on McLaughlin’s account. This is because he spends the bulk of his book arguing, convincingly, that function ascriptions are sui generis and cannot, without remainder, be reduced to selectionist or systems-theoretical terms. So much the worse for our function ascriptions, the selectionist might say. The burden of McLaughlin’s argument is to show that this reply is unsatisfactory. Without functions we cannot explain what functions explain. Specifically, a reductivist naturalism about biological functions cannot explain genuine organic self-reproduction or the feature that we presumably are biological naturalists about in the first place. There is, in short, a “metaphysical price” to be paid for functional explanation in biology and it is “somewhat higher than contemporary naturalism has envisioned” (McLaughlin, 2001, p. 212). That price, according to McLaughlin, is commitment to the existence of a seemingly paradoxical type of entity—one whose identity over time consists in perpetual, self-induced change, or an entity that “stays the same by rebuilding or re-producing itself” (ibid., p. 211). This is a commitment to a non-reductive form of naturalism about biological functions and, accordingly, to a form of teleological realism.

McLaughlin contends that the metaphysical cost in question does not price us out of the biological market because genuinely self-reproducing entities, however peculiar, are neither experiential...
The requisite metaphysical warrant for their possibility comes from an argument McLaughlin finds in Immanuel Kant’s treatment of part-whole interactions in biological systems in the teleological half of the Critique of the Power of Judgment. According to McLaughlin, Kant there establishes the possibility of wholes that not only causally interact with but renew—hence, bring into existence successive tokens of—the parts that compose them (McLaughlin, 1990, pp. 153, 162, 173; 2001, pp. 27, 211). It is the metaphysical possibility of this form of whole-to-part causality that is to ground the commitment to teleological realism McLaughlin believes is implicit in functional explanation in biology.

McLaughlin’s appeal to Kant’s considerations in the third Critique is a prima facie promising avenue for coming to terms with the metaphysical difficulties presented by what McLaughlin identifies as “basically Aristotelian” (McLaughlin, 2001, p. 211) intuitions about the reality of functions in nature. McLaughlin concedes that “[t]here is, however, still quite a bit of work to be done on the question of the identity of organisms and their traits” (ibid., p. 212). John Zammito, who has, in recent years, emerged as one of the staunchest defenders of a post-positivist naturalism about the “intrinsic purposiveness” (Zammito, 2006, p. 754, passim) of biological phenomena (see Zammito, 2004, 2006, 2008, 2009), echoes the sentiment of hard work ahead: “If biology must conceptualize self-organization as actual in the world ... the (naturalist) philosophy of biology has urgent work to undertake ...” (Zammito, 2006, p. 766).

And Zammito’s principal suggestion for how philosophy of biology might undertake that work appeals to “McLaughlin’s [Kant-inflected] recourse to Aristotle” (ibid., p. 764). Others, too, build on McLaughlin’s work, adding that it is not merely self-organization but “the orderliness and regularity” (Ginsborg, 2004, p. 52; see also Quafoed, 2004, pp. 202–204) exhibited by organized matter that requires uniquely teleological forms of explanation. But the latter accounts have yet to spell out just what (beyond self-reproduction) the regularity that thus distinguishes organized from non-organized beings might consist in (evidently, an unanalyzed notion of organization cannot yield a non-question-begging account). In the absence of a clear alternative to self-reproduction as the thing that functions explain, McLaughlin’s appeal to whole-to-part causality emerges as the current best non-reductive bet for settling the metaphysical cost functional explanations in biology allegedly incur.

In what follows, I grant that function ascriptions are sui generis. Moreover, I do not dispute the merits of McLaughlin’s interpretation of Kant’s third Critique as providing an argument for the possibility of whole-to-part causality. Instead, I propose to take a closer look at the Aristotelian cost McLaughlin believes we can and must pay in this Kantian coin. My claim is that McLaughlin does not sufficiently analyze that cost and, as a result, overestimates what’s in our wallet. I begin my account with a summary of Kant’s views on the causal interpretation of material part-whole relations (see 2). Next, I give an analysis of the type of whole-to-part causality a non-reductive naturalism about genuine organic self-reproduction requires (see 3). Following that, I present two reasons why the Kantian views discussed cannot satisfy the naturalist requirement in question (see 4). The first reason concerns the conflicting identity conditions on which the idea of a persisting whole that perpetually exchanges the parts that compose it relies (see 4.1). The second reason concerns formalist, mereological constraints on the type of whole-to-part causality that is to govern such an entity (see 4.2).

The latter mereological constraints present the main philosophical problem for the type of teleological realism investigated here. Even granting that whole-to-part causality is a causal possibility, this does not eo ipso establish the possibility of a genuinely teleological form of self-reproduction (i.e., the one that only functional—as opposed to selectionist or systems-theoretical—explanations could capture). For, a teleologically and causally adequate form of whole-to-part causality must, moreover, be a mereological possibility. But an analysis—based on minimally demanding principles of mereology, causality and teleology—reveals that: i. the form of whole-to-part causality that is both a teleological and causal possibility is a mereological impossibility; ii. the form of whole-to-part causality that is both a mereological and teleological possibility is a causal impossibility; iii. the form of whole-to-part causality that is both a causal and mereological possibility is a teleological impossibility. There is, in short, no form of whole-to-part causality that is merely causally, causally and teleologically possible all at once—as a teleological realist interpretation of organic self-reproduction requires. It follows that, short of a revision of our basic understanding of what a part is, what a cause is or what an end is, a genuinely teleological form of organic self-reproduction emerges as a metaphysical impossibility. A naturalist philosophy of biology that seeks metaphysical warrant for irreducible function ascriptions in biology, accordingly faces what increasingly looks not merely like a laborious but an impossible task.

2. Kant and the causal interpretation of material composition

The theory on which non-reductive naturalism about the ‘intrinsic purposiveness’ of biological phenomena currently rests its hopes for metaphysical support (McLaughlin, 2001; Zammito, 2006) is Kant’s account of material composition in the Critique of the Power of Judgment. Kant’s discussion of material composition in the third Critique differs in important ways from his earlier discussion of material composition in the Critique of Pure Reason and is best understood in light of that development.

2.1. Critique of pure reason: composition as constitution

Kant originally discusses material composition in the “Third Analogy” of the Critique of Pure Reason, concerning the “Principle of Simultaneity, according to the law of interaction or community” (Kant, 1910–, vol. 3, p. 180). Kant’s main line of argument in the Third Analogy is that, given the successive nature of our representations, a perception of simultaneity—namely, the perception of “substances ... in space as simultaneous” (ibid.)—must be predicated on causal interactions between those substances (see ibid., p. 182). Simultaneity, in other words, is not primitive; it is not an observational given. Instead, simultaneity depends on an antecedent conception of the candidates for simultaneous existence as “reciprocally [causally] determining[ing] their positions in one time” (ibid., p. 183). Kant calls substances, thus considered, a “dynamical communion” (ibid., p. 182) or a “real community (communium) of substances” (ibid., p. 183). Thus serving as the determining ground for experiences of simultaneity, Kant notes that the principle of the dynamical communion of substances gives us, in the first place, the mere accidental co-occurrence—or “communio spati” (ibid., p. 182)—of substances. Yet, Kant notes that such accidentally co-occurring substances nevertheless “constitute a whole” (ibid., p. 183) or “compositum reale” (ibid.). This suggests that Kant, in the Third Analogy, subscribes to a relatively unrestricted view of material composition according to which any group of contemporaneous substances constitutes a whole, given that perception of any such group or aggregate is necessarily predicated on causal relations (however remote) between its members or parts.
Differences in the strength of the actual compositional bond between the parts and the whole of a *compositum reale* can then be explained in terms of differences in the strength of the *causal* bond between the parts. Thus, the mereological sum constituted by the shoes, pants, and shirt I wear is a genuine whole, albeit an ontologically considerably more precarious one than the organic whole they clothe, because of the vastly tighter causal bonds between the parts of the latter than between the parts of the former.

The important thing to note, for present purposes, is that the composition–relation between the parts and the whole is not itself a *causal* relation. Composition (along with simultaneity) is *predicated* on causal relations between the parts of the whole, it is not a causal relation between the parts and the whole. The relation between the one hand, causally interacting substances that assign each other a position in one time (i.e., the parts), and, on the other hand, the *compositum reale* this creates (i.e., the whole), accordingly remains a purely formal constitution relation.

### 2.2. Critique of the power of judgment: composition as causation

By the time of the third *Critique*, Kant’s view has changed. He now insists that “[i]n accordance with the constitution of our understanding... a whole of nature is to be regarded only as the *effect* of the competing motive forces of the parts” (Kant, 1910–, vol. 5, p. 407, my emphasis). Kant no longer considers causally interacting parts as merely formally constituting the whole, he considers them as materially causing the whole. Consistent with this causal take on material composition, Kant now insists that the causality by which the parts cause the whole is a type of mechanism: “if we consider a material whole, as far as its form is concerned, as a product of the parts and of their forces, then we represent a mechanistic kind of generation” (ibid., p. 408).

It is a much discussed question just what Kant means by ‘mechanism’ in the third *Critique*. But the answer to this question is rather simpler than one might expect upon reviewing the competing options discussed in the literature.3 Mechanism, for Kant, is nothing more, nor less, than the category of causality under conditions of corporeality. In the Introduction to the *Critique of the Power of Judgment* (as well as, four years earlier, in the 1786 *Metaphysical Foundations of Natural Science*), Kant explains that mechanism is what we get when, in the transcendental causal principle (i.e., the category of causality), we substitute, for the pure ontological predicate of a “changeable substance” “[ibid., p. 181], “the empirical concept of a body (as a moveable thing in space)” (ibid.). By thus presupposing corporeal motility, the *transcendental* causal principle is transformed into (what Kant now calls) the “metaphysical” (ibid.) causal principle. According to this metaphysical causal principle “we can know entirely a priori” (ibid.), that all “alteration [of motile bodies in space] must have an external cause” (ibid., emphasis Kant’s). That is to say, under conditions of corporeal motility the transcendental causal principle logically entails the *externality* of causal relations and, hence, causal mechanism. Accordingly, the metaphysical causal principle in the introduction to the third *Critique* is Kant’s principle of mechanistic causality.6

There need be no tension, here, between the externality which thus characterizes mechanistic causality and the *internality* (*qua* relation within a substance) of the constitution relation Kant now considers mechanistic. First, the externality of mechanistic causality is defined, strictly, in terms of ‘bodies as moveable things in space’—and wholes, as well as their parts, are just that. Second, the externality of mechanistic causality is fully consistent with action at a distance and the possibility of instantaneous causal relations (see 4.2, below). Because of this, Kant’s conception of mechanism (as the law-governed change-of-state of motile bodies in space) manages to govern gravitational attraction just as well as billiard ball causality. *A fortiori*, interpreting composition relations mechanistically does not commit Kant to the metaphysically suspect assumption of a point at which the parts must somehow ‘bump’ into the whole they form. Composition relations are *prima facie* no less plausible as candidates for mechanistic explanation than planetary motions (see, e.g., Searle, 1984, pp. 20–22).

### 2.3. Two species of corporeal causality

It will be helpful, at this point, to introduce a modicum of technical vocabulary in order to help us navigate the intersection between causal and mereological considerations. This vocabulary will reveal its principal utility later, as we add further conceptual distinctions (between synchronicity and diachronicity, as well as reflexivity and non-reflexivity) in order to fine-tune the discussion of causal interpretations of material part–whole relations. But the vocabulary already comes handy here, as it helps explain, with precision, the change in Kant’s conception of material composition between the first *Critique* and the third *Critique*.

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1 The reason why commentators believe that Kant’s notion of mechanism in the third *Critique* is not entirely straightforward has to do with two widely shared—but flawed—assumptions about Kant’s Antinomy in the *Dialectic of the Telological Power of Judgment*. These are the assumptions: i. that the regulativity of the ‘maxim of mechanistic judging’ in the Antinomy entails that the adoption of this maxim is optional, hence, non-necessary, ii. that the principle of mechanism reduces to this regulative maxim. Both assumptions are false. First, while the ‘maxim of mechanistic judging,’ qua subjective principle of (cognitive) action, must be regulative and cannot be constitutive, the maxim is nevertheless analytically entailed by the (metaphysical) causal principle. Its adoption is thus both rationally required and practically necessary. Kant, in the third *Critique*, accordingly makes a distinction that was at best implicit in the first *Critique*: the regulativity of a principle does not, of itself, mean that its adoption is optional; regulativity does not entail merely heuristic status (the main reason why this is often overlooked is that the regulative principles Kant in fact discusses in the first *Critique* happen to be heuristic principles as well). This is evident, among other things, from Kant’s explicit, repeated, and unavowning affirmation of the necessity of the ‘maxim of mechanistic judging.’ Second, the ‘maxim of mechanistic judging’ is an application of the principle of mechanism to a contingent research project (see n. 6, below). Identifying the principle with the maxim is, therefore, illegitimate and must lead to confusion. The failure to appreciate Kant’s sophisticated conception of regulativity in the third *Critique* as well as his unchanged commitment to the necessity of the principle of mechanism prompts the (un-called for) re-interpretations of Kant’s notion of mechanism that the literature supplies.

2 Hannah Ginsborg argues that mechanism, in the third *Critique*, is something more than transient, corporeal causality (Ginsborg, 2001, p. 238). According to her view, Kant’s notion of mechanism also covers his dynamical theory of matter in terms of attractive and repulsive forces. Kant, however, does not mention his dynamical theory explicitly in the third *Critique*; rather simpler than one might expect upon reviewing the competing options discussed in the literature.3 Mechanism, for Kant, is nothing more, nor less, than the category of causality under conditions of corporeality. In the Introduction to the *Critique of the Power of Judgment* (as well as, four years earlier, in the 1786 *Metaphysical Foundations of Natural Science*), Kant explains that mechanism is what we get when, in the transcendental causal principle (i.e., the category of causality), we substitute, for the pure ontological predicate of a “changeable substance” “[ibid., p. 181], “the empirical concept of a body (as a moveable thing in space)” (ibid.). By thus presupposing corporeal motility, the *transcendental* causal principle is transformed into (what Kant now calls) the “metaphysical” (ibid.) causal principle. According to this metaphysical causal principle “we can know entirely a priori” (ibid.), that all “alteration [of motile bodies in space] must have an external cause” (ibid., emphasis Kant’s). That is to say, under conditions of corporeal motility the transcendental causal principle logically entails the *externality* of causal relations and, hence, causal mechanism. Accordingly, the metaphysical causal principle in the introduction to the third *Critique* is Kant’s principle of mechanistic causality.6

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5 McLaughlin argues that mechanism, in the third *Critique*, is something less than transient, corporeal causality. According to his view, Kant’s limits the notion of mechanism to part-to-whole causality. See 2.4, below.

6 It is important to note that this constitutive ‘principle of mechanism’ (i.e., the metaphysical causal principle) is not identical with the regulative ‘maxim of mechanistic judging’ which Kant invokes in the thesis-position of the ‘Antonym of the Reflecting Power of Judgment’ at the heart of the *Dialectic of the Critique of the Telological Power of Judgment*. The regulative ‘maxim of mechanistic judging’ is what becomes of the ‘principle of mechanism’ (i.e., the metaphysical causal principle) when it is used to govern contingent research projects, specifically, inquiries into the “generation of material things and their forms” (Kant, 1910–, vol. 5, p. 386). The claim of the resultant maxim is, roughly: ‘if you chose to investigate causal origins, then you must (by the principle of mechanism) seek all and only mechanistic causes.’ This maxim stands opposed to the teleological maxim, which permits appeal to non-mechanistic causes in investigations of causal origins. The maxim of mechanistic judging is a regulative, not a constitutive principle: while it may be rationally required as well as practically necessary to judge causal origins mechanistically (given that nature is mechanistic), it is not a condition of the possibility of experience to judge causal origins—mechanistically or otherwise. Transcendental philosophy, in other words, does not require, as a condition of the possibility of cognition, that we become students of natural history.
I call 'intra-ontological-level causality,' causality that holds within a given level of compositional complexity (e.g., among the sub-parts of the parts of a given whole). Intra-ontological-level causality is, accordingly, a form of 'inter-substantial causality'—where what counts as the causally interacting substances in question depends on the level of compositional complexity under consideration (e.g., in organic nature, candidate substances might be the molecules of a cell, the cells of an organ, or the organs of an organism). Relative to the target-level of compositional complexity, such inter-substantial, intra-ontological-level causality can then be divided, broadly, into: i. inter-substantial, intra-ontological-level part-to-part causality; ii. inter-substantial, intra-ontological-level whole-to-whole causality. If the parts or wholes (hence, the substances) in question are bodies in space (as they are in Kant’s discussion in the Third Analogy), inter-substantial, intra-ontological-level causality can be characterized, simply, as transseunt causality.

I call ‘inter-ontological-level causality,’ causality that cuts across levels of compositional complexity. If inter-ontological-level causality is invoked in order to explain material composition (as it is in Kant’s third Critique), such causality is, accordingly, a form of immanent or ‘intra-substantial causality’—where what counts as the substance in question is determined by what is considered the whole (e.g., in organic nature, a candidate whole might be the cell, the organ, or the organism). Depending on the mereological direction of this form of causality, it comes in two varieties: i. intra-substantial, inter-ontological-level causality that goes in a mereologically upward direction from the parts to the whole (or, more simply, intra-substantial part-to-whole causality); ii. intra-substantial, inter-ontological-level causality that goes in a mereologically downward direction from the whole to the parts (or, more simply, intra-substantial whole-to-part causality).

With this conceptual framework in place we can now say that the only form of causality Kant appears to recognize in his discussion of material composition in the Third Analogy is inter-substantial, intra-ontological-level part-to-part causality. As a consequence of this constraint, Kant cannot treat material composition (as it is in Kant’s third Critique), such causality is, accordingly, a form of immanent or ‘intra-substantial causality’—where what counts as the substance in question is determined by what is considered the whole (e.g., in organic nature, a candidate whole might be the cell, the organ, or the organism). Depending on the mereological direction of this form of causality, it comes in two varieties: i. intra-substantial, inter-ontological-level causality that goes in a mereologically upward direction from the parts to the whole (or, more simply, intra-substantial part-to-whole causality); ii. intra-substantial, inter-ontological-level causality that goes in a mereologically downward direction from the whole to the parts (or, more simply, intra-substantial whole-to-part causality).

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2.4. The possibility of whole-to-part causality

Even as Kant thus insists on a mechanistic interpretation of material part-whole relations, he is, however, adamant that such mechanism remain a one-way street and only go in the direction from the parts to the whole. In the First Introduction to the third Critique Kant notes that “it is entirely against the nature of physical-mechanistic causation that the whole is the cause of the possibility of the causality of the parts” (Kant, 1910–, vol. 20, p. 236). While intra-substantial part-to-whole causality is supposed to be consistent with causal mechanism, intra-substantial whole-to-part causality is not.

Kant’s insistence that parts can only cause their whole (and not vice versa) appears to be evidence against the view (central to current defenses of teleological realism) that Kant, in the third Critique, establishes the possibility of a form of causality that goes the other way, down the mereological ladder, from the whole to the parts. In order to show that Kant nevertheless countenances just that possibility of an intra-substantial whole-to-part causality, McLaughlin argues that Kant’s mechanistic interpretation of material composition is indicative of a rather more significant change in his conception of mechanism than the one I have suggested (see McLaughlin, 1990, 2001, 2003). Rather than see Kant as literally expanding mechanism’s scope so as to cover—in addition to part-to-part and whole-to-whole causality—also part-to-whole causality, McLaughlin sees Kant’s mechanistic interpretation of material composition as severely restricting mechanism’s scope: reducing it to part-to-whole causality and excluding other (a fortiori non-mechanistic) forms of causality. Kant, on McLaughlin’s view, thus considers mechanism to be a mere sub-species of causality (inter-substantial, intra-ontological-level part-to-whole causality).

Whatever the scholarly merits of McLaughlin’s interpretation, having thus concluded (not to mention convinced the majority of recent commentators) that Kant, in the third Critique, reduces mechanism to intra-substantial part-to-whole causality, McLaughlin asks, sensibly, what Kant’s motivation for this might be. He answers that Kant must have sought to open up conceptual space for a distinction between mechanism and causality. Specifically, McLaughlin claims that, since Kant now narrowly conceives of mechanism as intra-substantial part-to-whole causality, and since non-mechanism must, accordingly, be (the converse) intra-substantial whole-to-part causality, Kant’s limiting of mechanism to a mere variety of causality must stand in the service of allowing non-mechanism to return to the causal fold (see McLaughlin, 1990, p. 153; McLaughlin, 2003, p. 214f.). Kant, in other words, seeks to establish intra-substantial whole-to-part causality as a genuine—albeit non-mechanistic—form of causality.

This leaves McLaughlin with the problem of explaining why Kant would nevertheless insist that, according to the nature of our understanding, we must regard a whole as the effect of its parts and not vice versa. McLaughlin suggests that this limitation of “our understanding” (McLaughlin, 1990, p. 171) is a limitation only of our capacity to explain the parts as effects of their whole, not of our capacity to experience the parts as effects of their whole. He motivates this idea of a distinction between what we can experience and what we can explain by observing, correctly, that whole-to-part causality is not a causal impossibility. Specifically, the time-determination of the category of causality (according to which an effect can occur simultaneously with, or after—but not before—its cause) does not analytically entail the mereological direction of intra-substantial,
inter-ontological-level causal relations. As McLaughlin puts it: “The concept of a cause, even Kant’s own concept . . . is quite compatible with the causal influence of a whole on the properties of its parts” (McLaughlin, 2003, p. 214f.). And again: “[I]n any case, it does not follow analytically from the concept of causality that the parts condition the whole; nor is a contradiction involved in the assertion that a whole conditions its parts” (ibidm, 1990, p. 153.). This is true (if trivially so) since an unqualified notion of causality simply makes no reference at all—implicitly or explicitly—to wholes, their parts or their interdependence. Whole-to-part causality, then, emerges as a genuine causal possibility.

McLaughlin notes that, if whole-to-part causality is thus causally consistent, then it must, by Kantian lights, be a distinct experiential and, a fortiori, ontological possibility—even if Kant nevertheless insists that we remain oddly incapable of fully explaining it. McLaughlin concludes that “it is at least possible that there may be objects of experience that are not explainable for us” (ibid., p. 162, my emphases). And he suggests that “there is a difference between experiencing something and explaining it scientifically” (ibid., p. 173, my emphases) such that “I might not be able to understand and explain everything that I stumble upon” (ibid.). It is this alleged experiential availability of an explanatorily nevertheless unavailable non-mechanistic form of causality that is supposed to underwrite the metaphysical possibility of a genuinely teleological form of organic self-reproduction.

But there is a problem. The inference from the premise that whole-to-part causality is not in conflict with the category of causality, to the conclusion that it is, therefore, free from contradiction, is not valid unless it can be shown that there are no other sources of conflict. Two potential sources readily come to mind. First of all, whole-to-part causality not only draws on causal but evidently also on mereological considerations. Accordingly, in order to establish that the idea of whole-to-part causality is free from contradiction, one must establish not only its causal coherence but also its mereological coherence. Second, the specific form of whole-to-part causality that is to provide metaphysical warrant for genuinely teleological self-reproduction must, ex hypothesi, be teleologically adequate. In the next section, I consider the latter, teleological constraint on the desired form of whole-to-part causality (see 3). Following this, I consider what mereological constraints apply and discuss whether—given these causal, mereorelogical and teleological demands—there can be a form of whole-to-part causality that satisfies all of them (see 4).

3. Non-reductive naturalism’s desiderata for whole-to-part causality

3.1. Downward causality

The notion of intra-substantial whole-to-part causality to which non-reductive naturalism in philosophy of biology turns in order to bankroll the alleged metaphysical cost of function ascriptions is closely related to the notion of downward causality discussed in the literature on emergence, both in the philosophy of mind and in the philosophy of biology (Craver & Bechtel, 2007; Kim, 1999; Robinson, 2005; Yates, 2009). The comparison between the latter downward emergent causality and the form of downward causality envisioned by teleological realism, is highly instructive. For, even though downward emergent causality describes the causal influence of emergent properties of a whole on properties of the whole’s emergence-base or parts (and thus resembles teleological realism’s notion of whole-to-part causality),11 downward emergent causality is at the same time eminently non-teleological. This helps pin-point a ‘something more’ that teleological realism requires from whole-to-part causality in order that it may serve the metaphysical role of grounding the alleged ‘intrinsic purposiveness’ of biological phenomena.

The first thing to note, however, is that, by comparison with the discussion of downward causality in the literature on emergence, the teleological realist account of downward causality discussed thus far is metaphysically rather simplistic. Specifically, it does not consider the ontology of the causal relata, including the relative benefits of conceiving of those relata as events, facts, properties or objects. McLaughlin simply speaks of wholes as causing their parts or more cautiously, of wholes as affecting the “properties” (McLaughlin, 2001, pp. 27, 210, 211) of their parts. Since the changes in the parts McLaughlin is primarily interested in are, however, not simply changes in the physical properties of those parts, but genuine exchanges of the physical particulars that instantiate those properties—as McLaughlin’s talk of “replacing,” “rebuilding,” “re-producing” suggests (ibid., p. 211)—it would appear that McLaughlin conceives of the parts in whole-to-part causality not merely as properties of objects but as objects. It is less clear whether McLaughlin also conceives of the wholes themselves (which thus bring into being the parts that compose them) as objects. This might seem natural (after all, it is difficult to see what other sort of entity parts, qua physical objects, could possibly stand in a causal relation with), but McLaughlin gives no clear indication of whether he indeed conceives of wholes as metaphysical extras (i.e., objects over and above the parts that compose them), properties of their parts, abstractions, or something else.

Given this, one may doubt the fruitfulness of comparing McLaughlin’s account of downward causality with the more advanced literature on emergence. But the simplicity of his story actually proves to be helpful for present purposes. While, a defense of non-reductive naturalism’s conception of whole-to-part causality would presumably have to engage the literature on downward causality, a critique of it need not. This is so, because the problem with teleological realism’s version of downward causality remains the same, whether the causes and effects in question are construed as sophisticated “Kim events” (Yates, 2009, p. 111) or as mom-and-pop wholes and parts. Thus, even if we spell out that downward causality is a relation between an emergent property-instance E of a whole W and the physical property-instances P of W’s emergence base B at t, the relevant teleological and mereological constraints on this putative causal relation are no different than if we spoke, simply, of wholes causing their parts. For ease of exposition, then, I focus on the nature of the constraints on the relation, as discussed in the literature on emergence, without importing the sophisticated emergentist account of the relata. I thus consider downward emergent causality through the simplifying lens of McLaughlin’s teleological realist analysis as intra-substantial whole-to-part causality.

3.2. Causal adequacy: the backwardly causal bathwater

Most discussions of intra-substantial whole-to-part causality in the literature on emergence try to domesticate it (Craver & Bechtel, 2007, p. 557ff.; Kim, 1999, p. 28ff.; Robinson, 2005, p. 132ff.). Specifically, such discussions seek to escape the metaphysically toxic idea of ‘backward causality,’ which threatensthe notion of a whole that causes its parts. More specifically still, they seek to escape the

11 To be sure, discussions of downward emergent causality are not always framed in explicitly mereological terms. See, e.g., Yates (2009, p. 113). But mereological considerations are invariably implicitly present. For, emergent properties require an emergence-base characterized by a certain level of structural complexity (ibid.). Accordingly, emergent properties are properties that complex systems (or their sub-systems) exhibit (only) as wholes—as opposed to properties they exhibit because the latter are antecedently and independently possessed by their parts.
idea of causally backward (as opposed to temporally backward) ‘backward causality’ (see Faye, 2005). Causally backward ‘backward causality’—or a ‘causal loop’—describes a form of causality in which an effect is not only caused by its cause but also, in turn, causes that cause (possibly through an intervening chain of causes, such that a causes b, which in turn causes c, which in turn causes a).12 Causally backward ‘backward causality’ need not be temporally backward since the cause’s causation of its effect and that effect’s causation of its cause can, in theory, be instantaneous. By contrast, a causal relation that runs backward in time need not necessarily run backward in causality. Thus, on a reverse-time scenario, it is conceivable that a causally forward causal relation (in which a cause causes its effect) nevertheless runs temporally backward in the sense that the effect now precedes (but is not, for that reason, the cause of) its cause. Such temporally backward ‘backward causality’ is not of interest here, since most accounts of biological phenomena assume a uniformly forward direction of time.

Now, the standard sanitizing move by which philosophers try to escape the threat of causally backward ‘backward causality’ when discussing intra-substantial whole-to-part causality is one that McLaughlin cannot fully go along with—because it throws out the teleological baby with the backwardly causal bathwater. This standard move is to grant, first, that causality may indeed, in principle, go ‘down’ ontological levels in a multilayered universe (from higher to lower, or from whole to part). It is to argue, second, that the only thing bound to get you in serious trouble here is causality that goes down ontological levels ‘reflexively’ and ‘synchronically’ (i.e., from a whole to its parts, instantaneously; see Kim, 1999, pp. 28–31). Thus, while there is no problem with the idea that global changes to a system can, over time, have downward local effects on sub-systems (e.g., that the contraction in the global economy caused tent cities to go up in California), there is a problem with the idea that a whole can alter the properties of—let alone bring into being—the very parts that, at that time, make up that whole. A whole can have effects on parts and their properties, so long as it does not simultaneously compositionally depend on them. That is to say, it can have such effects, so long as the whole that does the causing and the whole composed by the (now) changed (or even ex-changed) parts succeed each other in time (diachronically) and are thus neither temporally nor compositionally quite the same whole (this, of course, does not rule out the possibility of an alternative description that abstracts from the compositional identity of these successive wholes—as made up of different sets of parts—and on which these successive wholes can, accordingly, still be considered the same substance; see 4.1, below). Let’s call such diachronic, non-reflexive, intra-substantial whole-to-part causality ‘downstream’ causality. You can’t kick the same investment banker twice. So much for the backwardly causal bathwater.

3.3. Functional adequacy: the teleological baby

Non-reductive naturalism about biological functions cannot fully go along with this chastened version of intra-substantial whole-to-part causality. The reason is that diachronic, non-reflexive, intra-substantial whole-to-part causality (or downstream causality)—in spite of its downward mereological direction—still walks and quacks like good old mechanism. It is a non-reductive type of mechanism, to be sure, tolerant of various levels of ontological organization as well as of causal interactions between them. Still, if the difference in mereological direction between part-to-whole and whole-to-part causality were all there is to the distinction between mechanism and teleology, then it is unclear how the teleological realist’s position could avoid collapsing into an account of universal mechanism after all. An accidental difference in the mereological valance of the relata can hardly account for a substantive difference in the type of causal relation that obtains between them. Causally speaking, the distinction between mechanism and teleology would then be a distinction without a difference. Accordingly, there has to be some further characteristic that distinguishes the causally unremarkable ‘downstream’ version of whole-to-part causality from an irreducibly teleological version.

The ‘something more’ that is needed is suggested by the conception of biological organisms as genuinely self-reproducing systems. If we are not simply to reduce organic self-reproduction to a form of mechanism, then what is needed is that the whole that ‘reproduces itself by reproducing its parts’ stay the same in a more robust sense than downstream causality allows. True self-reproduction cannot simply consist in the ongoing production of descendant token wholes of the same type through the ongoing regeneration of parts. To explain that process, no irreducibly teleological form of causality would be needed. What, then, does the teleological baby look like?13

As both Hume and Kant remind us, causality (like Toynbee’s history) is just ‘one damned thing after another’ (granted, Kant tells us that instantaneous causality is possible too, but the element of temporal succession is what is important for now). A fortiori, that’s all there can be to teleological causality as well. Teleology, however, adds the twist that the damned thing in question has to (in some sense) come before the damned thing that came before it. The teleological realist’s philosophical challenge is to close this teleological loop naturally (all the while keeping temporally and causally backward ‘backward causality’ at bay). By that measure, several interpretations of organic self-reproduction must be disqualified. First, selectionist explanations turn what is, really, an intra-generational (and indeed intra-organic) problem into an inter-generational problem (and fail to resolve the matter even then, as they do not actually close the teleological loop but only push the problem back through the ages; McLaughlin, 2001, pp. 172ff., 186ff.). To say, second, that in organic self-reproduction an idea (or plan; or design) of the whole precedes the production of the whole, while this does close the loop, is either a non-natural explanation (if it appeals to actual mental episodes) or a nonsensical one (if it doesn’t).14 Finally, an appeal to information-storing, self-replicating macro-molecules is a teleological losing battle since the machinations of these molecules can be explained in entirely mechanistic terms—that’s the beauty of it! Life’s just one damned bit of DNA after another (Robinson, 2005, p. 128f.).

McLaughlin, then, has little choice but to take the whole’s temporal antecedence to its parts in a self-reproducing system literally. And since the temporal antecedence here must not entail a time-reversal, McLaughlin argues that true self-reproduction requires that we ‘stretch’15 (McLaughlin, 2001, pp. 173, 212) the self-reproducing whole, i.e., that we “consider [...] the whole to be the same whole over time and thus to be prior to some of its assimilated components” (ibid., p. 173, my emphasis). If such mereological stretching were indeed possible “then causality could theoretically go downward or inward from the whole to the parts” (ibid., p. 27). This form of self-reproduction, while intra-substantial, would

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12 For this conception of causally backward ‘backward causality,’ see, e.g., Mellor (1998, p. 131).
13 Creating room for a unique form of teleological causality is, however, only the first step in securing an empirical foothold for teleology in the world. Specifically, it does not yet address the question of the intrinsic normativity of teleological systems. The second step, is to argue that systems that exhibit a teleological form of causality must be conceptualized as ‘having a good’ (McLaughlin, 2001, Ch. 9) and, thus, as having intrinsic, natural ends. It is only in virtue of the latter ends, that McLaughlin believes function ascriptions to self-reproducing systems can ultimately be justified. For the purposes of this paper, I focus on the first step.
14 Setting aside Platonism, to say that the idea in question is not a mental episode is to say that it is not an idea. See Fodor (1997).
escape causally backward 'backward causality' by going down 
diachronically 
merological levels (because the whole would not 
cause changes in parts on which it, at the time of causation, 
compositionaly depends), yet it would nevertheless be reflexive (be-
cause the whole would persist through those changes in its parts 
and would, therefore, be causing changes in, or to, itself).

Unfortunately, beyond thus further spelling out the teleological 
realist’s desiderata by insisting that the conditions of diachronicity 
and (yet) reflexivity characterize the envisioned intra-substantial 
whole-to-part causality—and calling the form of causality thus 
characterized “holism” (ibid., p. 27, see also pp. 210–213)—
McLaughlin does not provide a positive account of how those 
two conditions can possibly govern the same entity. He simply in-
sists, at the end of What Functions Explain, that a self-reproducing 
system’s “identity over time is constituted by the activity of con-
stantly replacing its parts. It stays the same by rebuilding or re-
producing itself” (ibid., p. 211)\(^{15}\). This leaves the matter at the same 
intuitively appealing but philosophically unexplored level of an en-
tity that is “related to itself reciprocally as cause and effect” (Kant,
1910–, vol. 5, p. 372, see also p. 373) that Kant had reached at the 
end of the Analytic of the Critique of the Teleological Power of Judg-
ment. That is, before embarking on his own critical attempt to come 
to a solution to the problem of teleology in the Dialectic.

McLaughlin all but concedes the point, noting that “… it has 
still to be seen whether the apparent holism of self-reproducing 
systems can really be stretched in time and thus reduced away” (McLaughlin, 2001, p. 212).\(^{16}\) And it is in this context that John 
Zammito registers the inconclusiveness of the teleological realist’s 
personal copy to date and the need for further labor (see Zammito, 2006, 
p. 766).

4. Problems for teleological realism

I want to close with two considerations which, I think, in combi-
nation render the envisioned empirical reality of a teleologically 
‘loopy’ form of causality rather doubtful. The first concerns the 
identity conditions of the sort of self-reproducing whole that teleo-
realism posits (4.1). The second concerns mereological con-
straints on the whole-to-part causality that is to govern such self-
reproduction (4.2).

4.1. Identity conditions

To consider a material thing as a whole is—by the principle var-
iously known as the “Uniqueness of Composition”\(^{17}\) or the “Essen-
tialist Assumption”\(^{18}\)—to consider it as composed by a unique set of 
token material parts.\(^{19}\) In all compositional strictness, a material thing, qua whole, thus cannot survive a change (specifically, an addi-
tion to or a subtraction from) the set of entities comprising its parts.
Instead, by the uniqueness of composition, an altered set of token 
material parts entails a new whole. Qua whole, the identity of a 
material thing, thus reduces to its compositional identity.

It follows that, on an interpretation according to which a whole 
can be temporally prior to some of its own parts, we are no longer 
considering this whole in any strong mereological sense. In all 
compositional strictness, the idea of such a whole would be a 
contradiction in terms: if to be the same whole is to be composed 
by a unique set of token material parts, then a material thing can-
not ‘survive’ successive sets of different parts and, nevertheless, re-
main the same whole. If there really is to be a sense in which a 
whole can be stretched over time, then it must appeal to looser, 
non-compositional criteria of identity. Candidate criteria might in-
clude identity under a substance sortal,\(^{20}\) or Chisholmian identity 
in terms of an ens successivum.\(^{21}\)

Whatever criterion of identity we choose, however, it will now 
capture the identity of a ‘whole’ in name only. Such a nominal 
‘whole’ can certainly be considered temporally antecedent to some 
of its parts. For example, my car, considered loosely as a ‘whole,’ 
undoubtedly preceded many of its current mechanical compo-
ments. But this is true only in a sense that deliberately sidesteps 
strict compositionality: a ‘whole’ in this sense is identical over time 
only considered in abstraction from its relation to its parts.

The first comment on the proposed metaphysical possibility of 
genuinely self-reproducing wholes, then, is this. If we consider a 
material thing as identical across changes in its compositional 
made-up, then we consider it independently of its strict composi-
tional identity as a whole. On a causal interpretation of material part-whole relations, we, a fortiori, consider it independently of the 
causal relations which (on that view) constitute its composi-
tional identity as a whole. It follows that we cannot, then, turn 
around and consistently claim that this whole, considered inde-
pendently of its causal relations with its parts, causes its parts.
Either one considers a whole qua whole as composed by a unique 
set of token material parts—and then this whole cannot precede 
any of those parts—or one considers the whole more loosely qua 
enduring substance and thus with criteria of identity independent 
of its compositional relations (including putative causal relations) 
to its parts. But then the idea that that ‘whole’ causes those parts, 
as advocated by proponents of the metaphysical possibility of gen-
unely self-reproducing wholes, confuses two different levels of 
summation. It enlists what are, ex hypothesi, non-mereological pre-
misses (i.e., premises framed in terms of non-compositional criteria 
of identity) in order to derive mereological conclusions (i.e., con-
clusions that presuppose compositional criteria of identity). 
Accordingly, it attempts to combine two incompatible perspectives 
on material reality.

4.2. The asymmetry of ‘Proper Parthood’

A second and still more important consideration that casts 
doubt on the idea that organisms are governed by a unique form 
of teleological causality, has to do with fundamental mereological 
constraints on intra-substantial whole-to-part causality.

Causal interpretations of material mereological relations char-
acterize those relations as instances of simultaneous causality.
E.g., when Kant says that “a real whole in nature is to be regarded 
only as the effect of the competing motive forces of the parts” 
(Kant, 1910–, vol. 5, p. 407), this “effect” is not an event that fol-
ows upon the preceding assembly of parts, like motion in one bi-
lliard ball follows upon motion in the other. Rather, the moment 
the parts are in place, the whole is in place with them. Highlighting 
the seamless instantaneous of intra-substantial causal relations 
reinforces McLaughlin’s earlier point that the time-determination

\(^{15}\) In conversation, McLaughlin has added the Lockean suggestion that additional layers of ontological complexity could be employed in order to make the ‘stretching’ of the whole work.

\(^{16}\) Note that the desire McLaughlin expresses to ‘reduce away’ such holism is not inconsistent with teleological realism’s non-reductive naturalism. The reduction sought is not supposed to issue in a mechanistic kind of explanation, it is supposed to issue in a teleological kind of explanation not subject to causally backward ‘backward causality.’

\(^{17}\) Syder (2007, p. 71).

\(^{18}\) Bea (1965, p. 527).

\(^{19}\) See, also, Peter Simons’ discussion of ‘sum principles.’ Simons (1987, pp. 35, 45, 109).

\(^{20}\) Geach (1962).

\(^{21}\) Chisholm (1969).
of causality does not entail the patent mereological direction of intra-substantial causal relations (see 2.4, above). Judging by the character of causality alone, the instantaneous intra-substantial causality dependence of the whole on its parts could just as easily go the other way around.

Why then does McLaughlin not advocate synchronic, intra-substantial whole-to-part causality (hence, the idea that the whole causes its parts instantaneously)? The answer, of course, is that this would entail causally backward ‘backward causality.’ But why should it? The answer is that causally backward ‘backward causality’ becomes a problem for synchronic, intra-substantial whole-to-part causality because the parts we thus consider caused by their whole we, moreover, already consider to be causing that whole, i.e., because we consider a reverse (merologically upward) form of synchronic, intra-substantial part-to-whole causality to be already in place.

But why do we make that assumption? Given that the upward mereological direction of instantaneous intra-substantial causal relations is not causally determined, it must derive from a mereological constraint. If it did not—i.e., if only causal considerations came to bear—then the threat of causally backward ‘backward causality’ could just as easily arise in the opposite way. Thus, we might want to say that in the case of objects whose parts causally depend on the whole (notably in the case of organisms), it is, therefore, impossible that the whole, at the same time, causally depend on those parts. It would here be the (typically innocuous) interpretation of a whole as an effect of its parts—and not the interpretation of parts as causally dependent on their whole—that leads to causally backward ‘backward causality.’ Now, of course, the threat of causally backward ‘backward causality’ does not arise in this non-standard way. But why not? The (entirely natural) response is that when we interpret relations between parts and their wholes causally, we automatically import mereological principles that constrain our causal stories. Thus, even if Kant’s position in the third Critique were correct and the constitution-relation between material parts (or particles) and the wholes that they form cannot be captured by merely formalist mereological considerations and must, instead, be given a causal interpretation, we now find, entirely predictably, I think, that the consequent causal relations nevertheless remain bound by fundamental formalist constraints. Causal interpretations of material part-whole interactions simply cannot cut against the mereological grain.

The mereological constraint that our causal interpretation of material constitution-relations runs into is, specifically, the asymmetry of what in classical extensional mereology is called the proper parthood relation. Classical extensional mereology distinguishes ‘parthood’ proper from ‘proper parthood,’ and it is between these two relations, as between the Scylla and Charybdis of causal interpretations of material part-whole relations, that teleological realism gets caught and—forced to opt for the latter—devoured.

The classical mereological relation of ‘parthood’ is characterized by transitivity but, more importantly for present purposes, by relexivity (Leonhard & Goodman, 1940, p. 49). This relexivity has the following consequence for the constitution of wholes by their parts. If x is a part of y, then y can be a part of x provided x = y. In other words, in the limiting case of identity between a whole and itself as a mono-part, the whole in fact ‘composes’ that part (and vice versa). While this does not make ‘parthood’ a symmetrical relation tout court (it is symmetrical only in the limiting case mentioned), it does mean that parthood is not asymmetrical tout court either. Neither fully symmetrical nor fully asymmetrical, classical mereological parthood is variously characterized as “non-symmetrical” (ibid.) or “antisymmetric” (Varzi, 2008). This non- or anti-symmetry, entailed by the reflexivity of ‘parthood’ is, however, of no use for the would-be proponent of synchronic, intra-substantial whole-to-part causality. The whole here ‘composes’ the part only in the limiting case of the identity between whole and part and to interpret that causally promotes self-causation and, hence, causally backward ‘backward causality.’ Besides, the classical mereological conception of ‘parthood’ fails to capture both the physical notion of ‘material part’ and the biological notion of ‘functional part’ (after all, alongside toes, kidneys, and mitochondriae, we do not count the whole organism in its entirety as a sort of super-organ of itself). So much for Scylla.

The mereological Charybdis that does capture our intuitive idea that a part is a constituent of a whole is the relation of ‘proper parthood.’ Proper parthood captures the idea of mereological constituency because it is an inherently asymmetrical relation (Leonhard & Goodman, 1940, p. 49). Now, if, in our causal interpretation of material composition we are compelled to avoid mono-parts and interpret the parts of a whole as proper parts (thus foregoing Scylla), we can no longer interpret the envisioned intra-substantial whole-to-part causality synchronically. Any synchronic causal relations we detect between the parts and the whole can now only go in the direction from the parts to the whole.

The reason for this is not that a putative synchronic, intra-substantial form of whole-to-(proper) part causality would be a causally backward form of ‘backward causality.’ As we saw, there is no good causal reason that part-to-whole causality should take precedence over whole-to-part causality—hence, that the downward mereological direction of the latter (as opposed to the upward mereological direction of the former) should lead to ‘backward causality’—in a causal analysis of part-whole relations. Rather, a putative synchronic version of intra-substantial whole-to-part causality is ruled out on strictly mereological grounds. The patent mereological direction of the asymmetric ‘proper parthood’ relation quite simply dictates the causal direction any causal interpretation of that relation must take. A causal interpretation of mereological relations indexed to proper parthood just is a causal interpretation of asymmetric composition. A whole cannot cause its proper parts because it cannot contain them. Synchronic, intra-substantial whole-to-part causality is a causal impossibility only because it is a mereological impossibility.

Accordingly, it is for mereological reasons, that teleological realism’s envisioned intra-substantial whole-to-part causality must be interpreted as diachronic causality. Since teleological realism’s interpretation of organic self-reproduction stands or falls with the reflexivity (hence, with the holistic character) of this form of causality (see 3.3, above), the pertinent question to ask at this juncture is: can a mereologically acceptable form of intra-substantial whole-to-part causality (i.e., a diachronic, intra-substantial form of whole-to-part causality) still be reflexive? Can changed parts, whose change causally depends on the whole they formed prior to the change, still be parts of that same whole? Can such a whole

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22 This line of thought strongly suggests, although it falls short of proof, that it was this mereological consideration that led Kant to resist—as an implication of his causal interpretation of material composition—the possibility of whole-to-part causality. That Kant would not have considered a diachronic version of whole-to-part causality (which remains causally and, indeed, mechanistically possible) is also not surprising. First, material composition is a synchronic relation and Kant was interested in giving a causal interpretation of that relation. Second, Kant had no interest in establishing the empirical reality of teleological processes. As he put the (perfectly general) point in the context of aesthetic judgments, “the purposiveness of a thing, insofar as it is represented in perception is also not a property of the object itself (for such a thing cannot be observed)” (Kant, 1910—, vol. 5, p. 189). Kant, that is to say, simply had no philosophical reason to consider what other inflections of the part-whole relation might yield a metaphysically feasible form of downward causality.
be said to cause changes in its parts or can it only cause changes in the parts of what must now be considered an ontologically distinct descendant whole?

And here, finally, teleological realism’s luck runs out. For, the answer is that intra-substantial whole-to-part causality cannot be mereologically acceptable (hence, diachronic), causally acceptable (hence, free from causally backward ‘backward causality’), and teleologically acceptable (hence, reflexive) all at once.

Ex hypothesi, ex-changed parts of a self-reproducing whole—qua material parts—stand in their own synchronic, upward, causally interpreted composition-relation to a whole. If this whole were (still) the same old whole that (diachronically) caused these parts, then its (diachronic) causation of those parts would be reflexive, as the teleological realist requires (see 3.3, above). But it would then also be an instance of causally backward ‘backward causality,’ triggered, here, by the typically causally innocuous upward mereological direction of part-to-whole causality (in the non-standard way discussed above). It follows that a form of whole-to-part causality that is both mereologically and teleologically acceptable (namely, diachronic, reflexive, intra-substantial whole-to-part causality) must be causally unacceptable.

Since teleological realists (sensibly) seek to avoid causally backward ‘backward causality,’ the only mereologically acceptable (diachronic) option left is that the whole the parts now form is a descendant whole and, hence, no longer the same (now ancestral) whole that caused them. But the form of whole-to-part causality that is thus both mereologically and causally acceptable (namely, diachronic, non-reflexive, intra-substantial whole-to-part causality; or ‘downstream’ causality), is now teleologically unacceptable (see 3.3, above).

Forced to interpret parts as proper parts, and thus to interpret intra-substantial whole-to-part causality as diachronic, the proponent of teleological realism must then either give up the reflexivity of intra-substantial whole-to-part causality—and hence the project of “conceptu[alizing] self-organization as actual in the world” (Zammito, 2006, p. 766, my emphases) rather than deflating it—or be mired for good in causally backward ‘backward causality.’

There are several ways out for the teleological realist. One of these would be to try to make sense of self-reproduction non-mereologically, i.e., without appeal to persisting wholes and changing parts. Another would be to devise a more organism-friendly mereology: one that somehow keeps the benefits of asymmetric composition without forestalling the possibility of causality that cuts against the compositional grain—thereby, as it were, allowing a teleological dumb-waiter to do its dirty inter-ontological-level business out of sight. My sense is that these are non-starters. I recommend to inject a dose of realism into teleological realism. The empirical reality of ‘intrinsic[ly] purposive’ entities or processes in nature is a myth. Let’s get over that hang-up and make peace with a teleologically deflated natural world, it can be an ontologically rich and fulfilling place to be (see, e.g., Winsatt, 1994).

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