Three Concerns for Structural Hylomorphism

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Abstract. Many contemporary proponents of hylomorphism, the view that at least some material objects are comprised of both matter and form, endorse a version of hylomorphism according to which the form of a material object is a certain complex relation or structure. In this paper, I introduce three sorts of concerns for this "structural" approach. First, I argue that, in countenancing an abundance of overlapping yet numerically distinct material objects, "structural hylomorphists" are committed to a certain sort of systematic causal overdetermination. Second, I argue that, because of its relatively thin conception of form, the view risks collapsing into some already well-entrenched metaphysical account of material objects. Finally, I argue that because the view emphasizes the more static structural features of composite material objects, structural hylomorphists seem unable to explain how it is that those objects might be said to persist over time through changes in such features.

I. Introduction

Hylomorphism is the view that at least some material objects are comprised of both matter and form. Hylomorphism was first introduced as a theory of material objects by Aristotle (though Plato's own view of material objects can, to some extent, be considered hylomorphic). During the medieval period, hylomorphism became the dominant view. Medieval scholastics advanced sophisticated hylomorphic theories of the natural world, and used the language of form and matter to articulate and to elucidate various theological doctrines. At the start of the early modern period, however, with the rise of modern science, notions of form and matter were rejected in favor of more "empirically adequate" mechanistic explanations. As the story goes, the early moderns liberated philosophy from the constraints of the Aristotelian worldview, and laid the groundwork for a more scientifically-informed reductionist account of material objects. For centuries afterward, the theory of hylomorphism was seen as obscure, unmotivated, and outdated.[1]

[1] For some helpful overviews of the history of hylomorphism, especially its rejection in the early modern period, see, for example: Robert Pasnau, *Metaphysical Themes 1274-1671* (Oxford: Oxford University Press, 2011), especially Chapter 24; Benjamin Hill, "Substantial Forms and the Rise of Modern Science", *Saint Anselm Journal*, Vol. 5, No. 1 (Fall 2007); David Banach, "What Killed Substantial Form?", *Saint Anselm Journal*, Vol. 5, No. 1 (Fall 2007).

Recently, however, there has been a revival of interest in Aristotelian or Neo-Aristotelian approaches to various issues in contemporary analytic metaphysics.[2] And within that revival, hylomorphism, too, has made something of a comeback. One of the central figures in this hylomorphic revival is Kathrin Koslicki. In her 2008 book, *The Structure of Objects*, for example, Koslicki defends the following, explicitly hylomorphic, thesis:

> I propose that we once more follow Plato and Aristotle in assuming that the world is best described by taking ordinary material objects to be mereologically and ontologically complex in the sense that they are composed of both material and formal components… all wholes, according to the present approach, are taken to consist of the two components of structure or form, on the one hand, and content or matter, on the other.[3]

Since its release, Koslicki's book, and the Neo-Aristotelian account of material objects outlined therein, has gathered a significant amount of attention.[4] And Koslicki is just one of several analytic philosophers who have in recent times voiced their support for a broadly hylomorphic

[2] See, for example, the essays included in: Tuomas E. Tahko (ed.), *Contemporary Aristotelian Metaphysics* (Cambridge: Cambridge University Press, 2012); John Greco and Ruth Groff (eds.), *Powers and Capacities in Philosophy: The New Aristotelianism* (New York: Routledge, 2012); Daniel D. Novotny and Lukas Novak (eds.), *Neo-Aristotelian Perspectives in Metaphysics* (New York: Routledge, 2014); Lukas Novak, Daniel D. Novotny, Prokop Sousedik, and David Svoboda (eds.), *Metaphysics: Aristotelian, Scholastic, Analytic* (Frankfurt: Ontos Verlag, 2012); Riin Sirkel and Tuomas E. Tahko (eds.), "Aristotelian Metaphysics: Essence and Ground", *Studia Philosophica Estonica*, Vol. 7, No. 2 (2014); Rafael Huntelmann and Johannes Hattler (eds.), *New Scholasticism Meets Analytic Philosophy* (Neunkirchen-Seelscheid, Germany: Editiones Scholasticae, 2015).

[3] Kathrin Koslicki, *The Structure of Objects* (Oxford: Oxford University Press, 2008)*:* pp. 172-174.

[4] Most of which can be found on her website: https://kathrin-koslicki.squarespace.com/work/.

worldview.[5] The theory of hylomorphism, then, appears to be, at least to some extent, back on the table.

Like Koslicki, many other contemporary proponents of hylomorphism have argued that the best way to understand what the formal aspect of a material object is supposed to be is to focus on the structural features of that object's material constituents. In this way, the form of a composite material object is construed as the internal "organization" or "configuration" of its

[5] In addition to the authors whose work I consider in close detail below, some other notable contemporary metaphysicians sympathetic to hylomorphism include: Simon J. Evnine ("Ready-Mades: Ontology and Aesthetics", *British Journal of Aesthetics*, Vol. 53, No. 4 (Oct., 2013): pp. 407-423; *Making Objects and Events: A Hylomorphic Theory of Artifacts, Actions, and Organisms* (Oxford: Oxford University Press, 2016)), Thomas Sattig (*The Double Lives of Objects: An Essay in the Metaphysics of the Ordinary World* (Oxford: Oxford University Press, 2015)), Brian Leftow ("Souls Dipped in Dust", in Kevin Corcoran (ed.), *Soul, Body, and Survival: Essays on the Metaphysics of Human Persons* (Ithaca, NY: Cornell University Press, 2001): pp. 120-138; "Soul, Mind and Brain", in Robert C. Koons and George Bealer (eds.), *The Waning of Materialism* (Oxford: Oxford University Press, 2010): pp. 395-416), David B. Hershenov ("A Hylomorphic Account of Personal Identity Thought Experiments", *American Catholic Philosophical Quarterly*, Vol. 82, No. 3 (Summer, 2008): pp. 481-502; "Soulless Organisms? Hylomorphism vs. Animalism", *American Catholic Philosophical Quarterly*, Vol. 85, No. 3 (Summer, 2011): pp. 465-482), Michael C. Rea ("Sameness Without Identity: An Aristotelian Solution to the Problem of Material Constitution", *Ratio*, Vol. 11, No. 3 (Dec., 1998): pp. 316-328; "Hylomorphism Reconditioned", *Philosophical Perspectives*, Vol. 25 (Dec., 2011): pp. 341-358; "Hylomorphism and the Incarnation", in Anna Marmodoro and Jonathan Hill (eds.), *The Metaphysics of the Incarnation* (Oxford: Oxford University Press, 2011): pp. 134-152), Christopher M. Brown (*Aquinas and the Ship of Theseus: Solving Puzzles about Material Objects* (New York: Continuum, 2005); "Souls, Ships, and Substances: A Response to Toner", *American Catholic Philosophical Quarterly*, Vol. 81, No. 4 (Fall, 2007): pp. 655-668), Patrick Toner ("Thomas versus Tibbles: A Critical Study of Christopher Brown's 'Aquinas and the Ship of Theseus'", *American Catholic Philosophical Quarterly*, Vol. 81, No. 4 (Fall, 2007): pp. 639-653; "Emergent Substance", *Philosophical Studies*, Vol. 141, No. 3 (Dec., 2008): pp. 281-297; "On Hylemorphism and Personal Identity", *European Journal of Philosophy*, Vol. 19, No. 3 (Sep., 2011): pp. 454-473; "Hylemorphic Animalism", *Philosophical Studies*, Vol. 155, No. 1 (Aug., 2011): pp. 65-81; "On Aristotelianism and Structures as Parts", *Ratio*, Vol. 26, No. 2 (Jun., 2013): pp. 148-161), David S. Oderberg (*Real Essentialism* (New York: Routledge, 2007); "Is Form Structure?", in Daniel D. Novotny and Lukas Novak (eds.), *Neo-Aristotelian Perspectives in Metaphysics* (New York: Routledge, 2014): pp. 164-180), Ross D. Inman ("Essential Dependence, Truthmaking, and Mereology: Then and Now", in Lukas Novak, Daniel D. Novotny, Prokop Sousedik, and David Svoboda (eds.), *Metaphysics: Aristotelian, Scholastic, Analytic* (Frankfurt: Ontos Verlag, 2012): pp. 71-88; "Neo-Aristotelian Plenitude", *Philosophical Studies*, Vol. 168, No. 3 (Apr., 2014): pp. 583-597), Timothy Pawl and Mark K. Spencer, "Christologically Inspired, Empirically Motivated Hylomorphism", *Res Philosophica,* Vol. 93, No. 1 (Jan., 2016): pp. 137-160), Anna Marmodoro ("Aristotle's Hylomorphism without Reconditioning", *Philosophical Inquiry*, Vol. 36, No. 1-2 (Winter-Spring 2013): pp. 5-22), and Eleonore Stump (*Aquinas* (New York: Routledge, 2003); "Substances and Artifacts in Aquinas's Metaphysics," in Thomas M. Crisp, Matthew Davidson and David Vander Laan (eds.), *Knowledge and Reality: Essays in Honor of Alvin Plantinga* (Dordrecht: Springer, 2006): pp. 63-80; "Resurrection, Reassembly, and Reconstitution: Aquinas on the Soul," in Bruno Niederbacher and Edmund Runggaldier (eds.), *Die menschliche Seele: Brauchen wir den Dualismus?* (Frankfurt: Ontos Verlag, 2006): pp. 151-171; "Resurrection and the Separated Soul," in Brian Davies and Eleonore Stump (eds.), *The Oxford Handbook of Aquinas* (Oxford: Oxford University Press, 2012), pp. 458-466; "Emergence, Causal Powers, and Aristotelianism in Metaphysics," in Ruth Groff and John Greco (eds.), *Powers and Capacities in Philosophy: The New Aristotelianism* (New York: Routledge, 2012): pp. 48-68. See, also, the essays found in the April 2014 issue of *Res Philosophica*.

matter, the "order" or "arrangement" of its parts. Following David Oderberg, let us refer to this popular Neo-Aristotelian version of hylomorphism as "structural hylomorphism".[6]

The goal of this paper is to offer an analysis and evaluation of structural hylomorphism.[7] Here I consider the views of four contemporary Neo-Aristotelian metaphysicians whose work I take to be representative of this sort of view. In addition to Koslicki, I also consider the work of Kit Fine, Mark Johnston, and William Jaworski.[8] The order of operations is as follows: In the next section, I outline the main claims of each of these versions of structural hylomorphism, pointing out the ways in which the four versions differ from one another. In section three, I enumerate what I take to be the main philosophical advantages of Neo-Aristotelian structural hylomorphism in general. In sections four, five, and six, I offer three objections to structural hylomorphism. First, I argue that, in countenancing an abundance of overlapping yet numerically distinct material objects, structural hylomorphists are committed to a certain sort of systematic causal overdetermination. Second, I argue that, no matter which ontological category structural hylomorphists ultimately locate the complex relations or structures on which their accounts are based, the view risks collapsing into some already well-entrenched metaphysical account of material objects. Finally, I argue that because the view emphasizes the more static structural features of composite material objects, structural hylomorphists are unable to explain how it is that certain composite material objects are able to persist over time through changes in such features.

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[6] Oderberg, "Is Form Structure?", p. 164.

[7] For other overviews and critiques of structural hylomorphism, see, for example: Rea, "Hylomorphism Reconditioned"; Marmodoro, "Aristotle's Hylomorphism without Reconditioning"; Oderberg, "Is Form Structure?"; Robert C. Koons, "Stalwart vs. Faint-Hearted Hylomorphism: Toward an Aristotelian Account of Composition", *Res Philosophica*, Vol. 91, No. 2 (Apr., 2014): pp. 151-77; William Jaworski, *Structure and the Metaphysics of Mind: How Hylomorphism Solves the Mind-Body Problem* (Oxford: Oxford University Press, 2016): pp. 327-336.

[8] Eleonore Stump could also be considered a Neo-Aristotelian structural hylomorphist, given that, on her reading of Aquinas, the form of a material substance is the "configuration" of its matter (see citations above). For reasons of space, I have limited my investigation to the four contemporary Neo-Aristotelians listed here, all of whom present the views that they consider as their own, rather than as the views of Aristotle or Aquinas.

II. Four Versions of Neo-Aristotelian Structural Hylomorphism

In his 2006 article, "Hylomorphism", Mark Johnston articulates and defends an explicitly hylomorphic account of material objects. According to Johnston, every composite material object should be understood as possessing, in addition to its various material constituents, a "principle of unity" that holds those parts together:

> A statement of the genuine parts and principle of unity of an item (at a given level of composition) takes the following canonical form: What it is for... (the item is specified here)... to be is for... (some parts are specified here) ...to have the property or stand in the relation... (the principle of unity is specified here)… The idea that each complex item will have some such canonical statement true of it might be fairly called 'Hylomorphism.' For it is the idea that each complex item admits of a real definition, or statement of its essence, in terms of its matter, understood as parts or components, and its form, understood as a principle of unity.[9]

For Johnston, then, every composite material object has a "form" and the form of that material object is the principle of unity that holds its material components, its "matter", together. As indicated in the passage above, Johnston takes the principle of unity of a material object to be a complex *relation* in which its material components stand to one another. Importantly, however, this relation is *not*, for Johnston, some further component of the object. As he explains later on in the article, if the principle of unity were itself a part of the composite material object, then there would still be a question of what holds the principle of unity together with all of the material

[9] Mark Johnston, "Hylomorphism", *The Journal of Philosophy*, Vol. 103, No. 12 (Dec., 2006): p. 658. Johnston proposes the same theory of composition, without the language of hylomorphism, at Mark Johnston, "Parts and Principles: False Axioms in Mereology", *Philosophical Topics*, Vol. 30, No. 1 (Spr., 2002): p. 133; Mark Johnston, "Constitution", in Frank Jackson and Michael Smith (eds.), *The Oxford Handbook of Contemporary Philosophy* (Oxford: Oxford University Press, 2008): p. 640.

parts. If what holds the principle of unity and all of the material parts together is some further part, then this would seem to introduce an infinite regress: each additional unifying part requiring another unifier to join it to the others. If what holds the principle of unity and all of the material parts together is not some further part, Johnston continues, then that is the real principle of unity, the form of the material object. For this reason, Johnston rejects the mereological conception of hylomorphism to which, as will be shown below, many other Neo-Aristotelian structural hylomorphists adhere.[10]

It is also worth mentioning here that, for Johnston, an object's principle of unity, the relation that holds its material constituents together, is a universal, a multiply-instantiated, repeatable entity, rather than a trope-like particular:

> perhaps the most controversial issue in the Hylomorphic tradition, namely whether the forms or principles of unity are to be thought of as 'trope-like,' as individualized characteristics or relations, or instead as universals in the sense of items potentially in common to many distinct individuals. Yet once origins and original parts are invoked as the essential differences among individual examples of any kind of complex item, it will no longer be necessary to postulate

[10] Johnston, "Hylomorphism", pp. 652-653, 659, and 672-673 (see also, Johnston, "Parts and Principles", pp. 131, 162-164; Johnston "Constitution", pp. 637-638, 663-665). Though he does not cite the argument in of any his articles, Johnston's reasoning here is reminiscent of Aristotle's famous syllable argument in his *Metaphysics*, Book VII, Chapter 17 (see: Aristotle, W. D. Ross (trans.), *Metaphysics*, in Jonathan Barnes (ed.), *The Complete Works of Aristotle*, Vol. 2 (Princeton, NJ: Princeton University Press, 1984): pp. 1643-1644). Anna Marmodoro, another contemporary hylomorphist who rejects "mereological hylomorphism" for precisely the same reason, does cite the relevant passage from Aristotle in support of her position (see: Marmodoro, "Aristotle's Hylomorphism Without Reconditioning", pp. 5-22), as does Verity Harte (see: Verity Harte, *Plato on Parts and Wholes: The Metaphysics of Structure* (Oxford: Oxford University Press, 2005): pp. 11). For an alternative, mereological reading of *Metaphysics* VII, 17, see Kathrin Koslicki, "Aristotle's Mereology and the Status of Form", *The Journal of Philosophy*, Vol. 103, No. 12 (Dec., 2006): pp. 718-728, and Kathrin Koslicki, *The Structure of* Objects (Oxford: Oxford University Press, 2008): pp. 108-111. For a response to Johnston's own version of the argument, and a defense of mereological hylomorphism, see Koslicki, *The Structure of Objects*, pp. 198.

> individualized forms as the source of the individuation of distinct individuals of a given kind.[11]

Based on these remarks, we might summarize the main features of Johnston's version of Neo-Aristotelian structural hylomorphism as follows:

> *(1) Hylomorphism: there is both a material aspect and a formal aspect to composite material objects.*
>
> *(2) Non-mereological Hylomorphism: the formal aspect of a material object, its principle of unity, is not some further part of that object.*
>
> *(3) Relationalism: the formal aspect of a material object, its principle of unity, is a relation that holds between its material components.*
>
> *(4) Universal Forms: the formal aspect of a material object, the relation that holds between its material components, is a universal, not a particular.*

Kit Fine's version of Neo-Aristotelian structural hylomorphism is similar to Johnston's in several important respects. First, it is explicitly hylomorphic: "This account takes seriously the idea that there is both a formal and material aspect to most material things. Thus it falls squarely within the hylomorphic tradition of Aristotle."[12] Second, Fine, like Johnston, also takes the formal aspect of any material object to be a certain polyadic relation:

> I should like to suggest that we take the bold step of recognizing a new kind of whole. Given objects a, b, c, . . . and given a relation R that may hold or fail to hold of those objects at any given time, we suppose that there is a new object—what one may call 'the objects a, b, c, . . . in the relation R.'[13]

[11] Johnston, "Hylomorphism", pp. 659-660.
[12] Kit Fine, "Things and Their Parts", *Midwest Studies in Philosophy*, Vol. 23, No. 1 (1999): p. 62. Though Fine has much to say about parts and wholes in other, more recent works (see, for instance, Kit Fine, "Towards a Theory of Part", *The Journal of Philosophy*, Vol. 107, No. 11 (Nov., 2010): pp. 559-589), in what follows I will focus on the account he gives in "Things and Their Parts".
[13] *Ibid.,* p. 65.

However, unlike Johnston, Fine is committed to a version of mereological hylomorphism, according to which the formal aspect of a material object is one of that object's proper parts.[14] Also unlike Johnston, Fine takes the formal component of a material object, the relation that unifies its material constituents, to be a trope-like particular, rather than a universal.[15]

To illustrate the main features of his own view, Fine gives the following example, referring to the sorts of composite material objects that he has in mind as "rigid embodiments":

> So, for example, given some flowers and given the relation of being bunched, there will be a new object—the flowers in the relation of being bunched (what might ordinarily be called a 'bunch of flowers'). Intuitively, this new object is an amalgam or composite of the component objects a, b, c, . . . and the relation R. But it is a composite of a very special sort. For the components and the relation do not come together as coequals, as in a regular mereological sum. Rather, the relation R preserves its predicative role and somehow serves to modify or qualify the components. However, the result of the modification is not a fact or state. It is a whole, whose components are linked by the relation, rather than the fact or state of the components being so linked. An object of this special sort will be called a rigid embodiment, since the 'form' R is embodied in the fixed 'matter' a, b, c, …. Let us agree to designate such an object by the term 'a, b, c, … /R.' The relation R will then be called the principle of rigid embodiment, and the operation by which a rigid embodiment is formed from the objects a, b, c, . . . and a relation R, the operation of rigid embodiment…(R1) The rigid embodiment a, b, c, . . . /R exists at a time t iff R holds of a, b, c, . . . at t.'[16]

[14] See, for example, *Ibid.,* p. 72.
[15] *Ibid.,* pp. 63-64.
[16] *Ibid.,* pp. 65-66.

Setting aside, for now, some of the particular details of his account, Fine's version of Neo-Aristotelian structural hylomorphism, then, can also be reduced to four main claims:

> *(1) Hylomorphism: there is both a material aspect and a formal aspect to composite material objects.*[17]
>
> *(2) Mereological Hylomorphism: the formal aspect of a material object is a proper part of that object (though it is a proper part of a different sort).*[18]
>
> *(3) Relationalism: the formal aspect of a material object is a relation that holds between its material components.*
>
> *(4) Particular Forms: the formal component of a material object, the relation that holds between its material constituents, is a trope-like particular, not a universal.*

Kathrin Koslicki devotes an entire chapter of her book, *The Structure of Objects,* to a critique of Fine's version of structural hylomorphism.[19] At the end of Chapter VII she also offers a rebuttal to Johnston's main argument against mereological hylomorphism.[20] In certain important respects, then, Koslicki's account is different from both of the versions of structural hylomorphism considered thus far. However, as will be shown below, her account does share some of the same general features. And, for that reason, she does fit squarely into the structural hylomorphist camp.

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[17] As some of the passages above suggest, Fine also seems willing to grant the existence of at least some sorts of "compounds" – composite material objects that are simply the sum of their material parts (see: Kit Fine, "Compounds and Aggregates", *Noûs*, Vol. 28, No. 2 (Jun., 1994): pp. 137-158). And so it might not be correct to say that for Fine *every* composite material object has both a material aspect and a formal aspect. However, I do not think that this will have much of an effect on the present discussion, and so, for the sake of parallelism, I will leave claim (1) as is.

[18] According to Fine's account there is more than one way for something to be a part of something else (see, for example, Fine, "Things and Their Parts", p. 61).

[19] Koslicki, *The Structure of Objects*, pp. 71-90. See also, Kathrin Koslicki, "Towards a Neo-Aristotelian Mereology", *Dialectica*, Vol. 61, No. 1 (Mar., 2007): pp. 127-159.

[20] *Ibid.,* p. 198.

For instance, like Fine, and unlike Johnston, Koslicki espouses a version of mereological hylomorphism, according to which material objects are literally composed of both material and formal elements. She calls this her "Neo-Aristotelian Thesis".[21] As we saw in the first quotation from my introduction, in Koslicki's case, material objects are composed of both *structure* and *content*:

> I propose that we once more follow Plato and Aristotle in assuming that the world is best described by taking ordinary material objects to be mereologically and ontologically complex in the sense that they are composed of both material and formal components… all wholes, according to the present approach, are taken to consist of the two components of structure or form, on the one hand, and content or matter, on the other.[22]

Moreover, like Johnston, and unlike Fine, Koslicki seems to prefer a conception of form according to which the structure of an object is a universal, rather than a particular.[23] Koslicki, then, is committed to four main claims, which, on the face of it, appear to be quite close to the claims that we used to characterize Johnston's and Fine's views:

> *(1) Hylomorphism: there is both a material aspect and a formal aspect to composite material objects.*[24]

[21] *Ibid.,* p. 181.
[22] *Ibid.,* pp. 172-174.
[23] See, for instance, *Ibid.,* pp. 257-258. In that same brief discussion, however, Koslicki also recognizes that a conception of structures as trope-like particulars could potentially provide a solution to a certain puzzling case for her account (see also, Trenton Merricks, "Review of Kathrin Koslicki, *The Structure of Objects*", *The Journal of Philosophy*, Vol. 106, No. 5 (May, 2009): p. 305).
[24] Note that Koslicki's hylomorphic analysis of material objects only applies to *composite* material objects, that is, material objects that have more than one material constituent. At p. 187 of her *The Structure of Objects*, Koslicki explains that if there are material simples, that is, material objects that have no material constituents, then such material objects will have no formal aspect.

(2) Mereological Hylomorphism: the formal aspect of a material object is a proper part of that object.[25]

(3) Structuralism: the formal aspect of a material object is a certain structure that is realized in the material aspect of that object, which serves as its content.

(4) Universal Forms: the formal component of a material object, its structure, is a universal, not a particular.

Koslicki's most important contribution to structural hylomorphism is her conception of form as structure (claim (3) above). But what exactly is structure? Is the structure of a composite material object a *relation* or a *set of relations* that holds between its material parts? Is it a non-relational *property* of some sort? Is the structure of a composite material object itself a certain kind of *object*? Is it something composed of relations, properties, and objects? Or is it something new, something of an altogether different category? Unfortunately, Koslicki is, for the most part, non-committal about the ontology of structure in her work.[26] However, she does offer a few helpful characterizations of the sort of ontology that she prefers. For instance, early on in Chapter VII, Koslicki describes the structure of an object as that which provides kind-specific "slots" for various material constituents to fill, much like a seating arrangement for a dinner party:

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[25] Unlike Fine, Koslicki recognizes only a single relation of parthood (see, for example, *The Structure of Objects*, pp. 167-168). However, I do not think that this difference will have any significant bearing on the present discussion.

[26] Throughout most of her book, Koslicki's remarks seem to suggest that, by the end, she will have given us her own preferred ontology of structure. For example, on page 169 she says, "Among the questions left open by RCP [Koslicki's "Restricted Composition Principle" – more on this later], for example, is the question of how exactly we ought to think about the formal components of objects. For one thing, RCP does not settle the ontological category to which the formal components of objects belong, i.e., whether they are themselves objects, whether they are properties or relations, or whether they belong to some other ontological category still. These questions will be discussed in more detail in Chapter IX below…". And, a little later, on pages 174-175, she indicates, "We have, however, up to this point left open the ontological category to which the formal components of objects are to be assigned, i.e., whether these entities belong to the category of objects, to that of properties or relations, or to some other category still. These issues will be investigated further and in more detail in Chapter IX." However, as the quotation from Koslicki on pp. 3-4 above attests, even by the end of Chapter IX she hasn't given us very much of an ontology of structure. And, to my knowledge, she has yet to address this issue in subsequent published work.

> we may think of the formal components associated with a particular kind of whole… as the sorts of entities that provide 'slots' to be filled by objects of a certain kind: thus, the formal components belonging to a particular kind of whole will generally specify not only the configuration to be exhibited by the material components in question, i.e., how these objects are to be arranged with respect to one another; they will also usually specify the variety of material components of which the whole in question may be composed, i.e., what sorts of objects can go into the various 'slots' provided by the formal components.[27]

Later on, she describes the structure of an object as a sort of recipe that calls for specific material ingredients:

> I take the primary job of an object's formal components to consist in the specification of a range of selection requirements that must be satisfied by a plurality of objects in order to compose a whole of a particular kind. We may thus think of an object's formal components as a sort of recipe for how to build wholes of that particular kind. An object's material components or matter, on the other hand, may be thought of as the ingredients that are called for in the recipe: they are the objects which, in a successful case of composition, in fact satisfy the conditions dictated by the formal components. In the preceding remarks, we have, among the requirements set by the formal components of ordinary material objects, singled out in particular those that concern the spatio-temporal proximity

[27] *Ibid.,* p. 169. The reference here is to an example first introduced by Verity Harte: "suppose that you are organizing a dinner party. There are eight guests – and you are to seat the guests so that they alternate by gender. Starting from one of eight chairs around a round table, you seat the guests clockwise in the following sequence: first a man, then a woman, then a man, then a woman, etc. The resulting configuration seats every man between two women and every woman between two men. 'Sequence' and 'configuration' are terms closely connected to structure. The seating arrangement of the dinner party here described may be taken as an example of structure" (Harte, *Plato on Parts and Wholes,* pp. 159-160).

> and, more generally, the manner of arrangement that must be exhibited by an object's material components. However, as we know from out discussion of Aristotle, formal components may also set additional constraints, for example, concerning the variety, and in some cases even the number, of material components from which a given whole may be composed.[28]

What we can gather from these passages is that, for Koslicki, the structure of an object has an important *causal* role to play. According to Koslicki, the structure of any given material object in some way *constrains* its material components, specifying those components in terms of their type, number, and configuration. This characterization of structure almost makes it sound as if the structure of an object is meant to precede, or be in some way ontologically prior to, the sorts of relations between parts that Fine and Johnston identify as the formal aspect of a composite material object. In support of this interpretation, toward the end of her book, Koslicki states that

> The evidence reviewed above suggests that structures are at least in some contexts treated as objects, rather than as properties or relations. At the same time, even when structures are so treated, they are always also closely linked with certain properties and relations which elements in the domain come to exhibit as a result of occupying the positions made available by the structure in question; but these properties and relations are nevertheless in these contexts not identified with the structures with which they are associated.[29]

Once again, however, right after making these remarks, Koslicki voices her reservations about making any firm commitments about the ontology of structure.[30] Later on, I will have more to

[28] *Ibid.,* p. 172.
[29] *Ibid*., p. 252.
[30] *Ibid.,* pp. 252-253.

say about what sort of ontology of form Koslicki may or may not actually be committed to, but at this point we can at least say that Koslicki intends her conception of form as structure to be crucially different from the relational conception espoused by Johnston and Fine.

The last Neo-Aristotelian structural hylomorphist that I would like to consider is William Jaworski. In a number of recent books and articles, Jaworski, like Johnston, Fine, and Koslicki, has argued for the thesis that, for any composite material object, that object possesses, in addition to its material components, an irreducibly formal element.[31] And, like Koslicki, Jaworski argues that this irreducibly formal element is the object's structure. In his most recent book, *Structure and the Metaphysics of Mind*, for example, Jaworski describes his view as follows:

> Hylomorphism claims that structure (or organization, form, arrangement, order, or configuration) is a basic ontological and explanatory principle. Some individuals, paradigmatically living things, consist of materials that are structured or organized in various ways. You and I are not mere quantities of physical materials; we are quantities of physical materials with a certain organization or structure.[32]

Unlike Koslicki (and Fine), and like Johnston, Jaworski rejects a mereological understanding of this key hylomorphic claim. On his view, though a composite material object in some sense "consists" of matter and form, that is, of various materials and a certain kind of structure, that

[31] Here I will focus primarily on the account that Jaworski gives in his most recent book, *Structure and the Metaphysics of Mind,* but other relevant works include: William Jaworski, *Philosophy of Mind: A Comprehensive Introduction* (Malden, MA: Wiley-Blackwell, 2011); William Jaworski, "Hylomorphism: What It Is and What It Isn't", *Proceedings of the American Catholic Philosophical* Association, Vol. 85 (2012): pp. 173-187; William Jaworski, "Powers, Structures, and Minds", in John Greco and Ruth Groff (eds.), *Powers and Capacities in Philosophy: The New Aristotelianism* (New York: Routledge, 2012): pp. 145-171; William Jaworski, "Hylomorphism and Resurrection", *European Journal for Philosophy of Religion*, Vol. 5, No. 1 (Spring, 2013): pp. 197-224; William Jaworski, "Hylomorphism and the Metaphysics of Structure", *Res Philosophica*, Vol. 91, No. 2 (Apr., 2014): pp. 179-201.

[32] Jaworski, *Structure and the Metaphysics of Mind*, pp. 1, 8.

structure is not to be included among its proper parts.[33] Moreover, according to Jaworski, the structure of any particular object is a trope-like particular, not a universal. As he explains,

> structures are particulars. To say that you and I configure materials humanwise does not imply that there is a universal, configured humanwise, that you and I have in common. If properties are tropes, then my configuring and your configuring are numerically different properties, although they resemble each other rather closely—more closely than, say, either resembles Fido's configuring the materials that compose him or the oak tree's configuring the materials that compose it. My configuring and yours are also nontransferable: my configuring cannot belong to anything other than me, nor can your configuring belong to anything other than you.[34]

In this way, Jaworski's conception of form is closer to Fine's than Johnston's or Koslicki's.

According to Jaworski's version of structural hylomorphism, then, the form of a composite material object is a certain kind of structure. But, once again, we might ask: what exactly is the structure of an object? Despite addressing this issue in several of his works, Jaworski is, like Koslicki, difficult to pin down on what precisely he takes structure to be. As we have seen, Jaworski often characterizes the structure of an object as the organization or configuration of its material parts that makes that object the kind of object that it is. In this way, Jaworski's structure sounds a bit like the unifying relation posited by Johnston and Fine. And, indeed, at certain points, Jaworski does seem to admit that a structure is a kind of relation.[35] But

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[33] Jaworski speaks of composite material objects as "consisting" of form and matter in several places, including Jaworski, *Philosophy of Mind*, p. 170. It is only in his *Structure and the Metaphysics of Mind*, pp. 327-329, that he explicitly rejects a mereological understanding of hylomorphism. It is worth noting that Jaworski rejects mereological hylomorphism for the same reason that Johnston does, even citing Johnston's argument in support of that rejection.

[34] Jaworski, "Metaphysics of Structure", p. 188. See also: Jaworski, *Structure and the Metaphysics of Mind*, p. 94.

[35] See, for example, the passage included below.

he is also keen to distance his view from the views of Johnston and Fine in several ways. For example, according to Jaworski, the structure of a composite material object is a not a relation that holds between the parts, but a relation that holds between the whole and the parts:

> The account of structures I defend nevertheless differs in significant ways from Fine's and Johnston's. One difference... is that Fine and Johnston conceive of hylomorphic structures as relations among something's parts. I conceive of them rather as relations between wholes and their parts: A whole configures or structures its parts.[36]

In other contexts, Jaworski seems to prefer a conception of structure according to which the structure of an object is a certain kind of property that it possesses, a certain type of power:

> What exactly are structures? The metaphysic developed in Chapters 2-5 implies that they must be either individuals or properties, and the theoretical roles we expect structures to play are characteristic of properties. Structures, for instance, are supposed to confer powers. The squashing example introduced in Section 1.1 suggests that Godehard's structure is what confers on him the powers to think, feel, perceive, and act. According to the metaphysic defended in Chapters 2-5, it is properties that confer powers. Consequently, if we assume that metaphysic, we appear committed to structures being properties. If structures are properties, then they have all the characteristics of properties discussed in Chapters 3 and 4. First, they must be powers – powers in particular to configure (or organize, order, or arrange) materials. Each structured individual organizes or configures the

[36] *Ibid*., p. 96fn.

> materials that compose it. I configure the materials that compose me, and you configure the materials that compose you.[37]

On this conception, the "power" that is an object's structure is such that it is necessarily and unceasingly manifested by the composite whose power it is. For the composite to cease manifesting that power, for a composite to cease configuring the materials of which it is composed, would be for that composite to cease to exist.[38]

On Jaworski's view, then, the structure of an object seems to be a certain kind of relation that holds between the whole and its parts, and a certain kind of property, a power, that that whole possesses. But there is also an important "dynamic" element to Jaworski's structures. Indeed, various remarks in his *Structure and the Metaphysics of Mind* and elsewhere seem to indicate that, on Jaworski's view, the structure of a composite material object is, in some cases, more like a "pattern of interaction" or an "activity", something that the object *does*, rather than a relation or set of relations between its parts:

> Often when people think of structure, they think of something static such as the relatively unchanging spatial relations among atoms in a crystal. But the philosophers and scientists we're considering don't view structure so narrowly. Although we can refer to the sum of spatial relations among something's parts as a structure, the structures that are likely to interest us most - the kind of structures that, say, distinguish living things from nonliving ones – are not static spatial relations, but dynamic patterns of environmental interaction.[39]

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[37] *Ibid.*, p. 94. See also: Jaworski, "Metaphysics of Structure", pp. 188-189. For a similar hylomorphic account of material objects according to which the form of an object is a certain unifying power or "nature", see Rea, "Hylomorphism Reconditioned", pp. 341-358. Unfortunately, since Rea's "reconditioned hylomorphism" does not seem to fit into the structural hylomorphist camp, an analysis of the details of his view is beyond the scope of the present discussion. But it would be interesting to see if his version of hylomorphism is susceptible to the same sorts of objections that I will raise for Neo-Aristotelian structural hylomorphism below.

[38] Jaworski, *Structure and the Metaphysics of Mind*, p. 97.

[39] *Ibid*., pp. 14-15.

> A structured individual comes into existence exactly when its activity of configuring materials commences, and the materials it configures are precisely those that compose it. Structured individuals are thus emergent individuals who are essentially engaged in the activity of configuring the materials that compose them.[40]

These last remarks make it a bit more difficult to determine what precisely Jaworski takes a structure to be. Is the structure of a composite material object (a) its power to configure the materials of which it is composed, (b) the act of configuring those materials that it performs, or (c) the actual configuration of those materials that results? Perhaps, on Jaworski's view, the answer to this question depends on what sort of composite material object we are considering. Or perhaps Jaworski means to remain neutral on this issue for the moment, and his remarks are merely intended to introduce several plausible conceptions of structure, all of which illustrate his general point: that composite material objects are more than just their materials. I will discuss Jaworski's conception of form in more detail later, but at this point it should at least be clear that, like Koslicki, Jaworski intends his account of form as structure to be importantly different from the relationalist conception offered by Johnston and Fine, and perhaps even importantly different from the alternative structuralist conception introduced by Koslicki.

Based on what was said above, let us, then, summarize the main points of Jaworski's version of structural hylomorphism as follows:

> *(1) Hylomorphism: there is both a material aspect and a formal aspect to composite material objects.*

[40] *Ibid.,* p. 104. See also: Jaworski, "Hylomorphism: What It Is and What It Isn't", p. 182; Jaworski, "Powers, Structures, and Minds", p. 157; Jaworski, "Hylomorphism and Resurrection", p. 212; Jaworski, *Philosophy of Mind*, p. 280.

(2) Non-Mereological Hylomorphism: the formal aspect of a material object is not a proper part of that object.

(3) Structuralism: the formal aspect of a material object is a certain structure that is realized or manifested in the material aspect of that object, the materials of which it is composed.

(4) Particular Forms: the formal component of a material object, its structure, is a trope, not a universal.

III. Theoretical and Explanatory Virtues of Neo-Aristotelian Structural Hylomorphism

Before moving on to my three main objections to Neo-Aristotelian structural hylomorphism, I would like to first outline what I take to be the main theoretical and explanatory virtues of the view.

The first point in favor of Neo-Aristotelian structural hylomorphism is that it offers a rather compelling anti-reductionist account of material objects. Many of the material objects with which we are familiar seem not to be mere heaps or sums of their material parts. Rather, they seem to be those same (or succeeding) material parts arranged, organized, configured or structured in some particular way. This point is nicely illustrated by an example from Jaworski:

> Suppose we put Godehard in a strong bag - a very strong bag since we want to ensure that nothing leaks out when we squash him with several tons of force. Before the squashing the contents of the bag include one human being; after they include none. In addition, before the squashing the contents of the bag can think, feel, and act, but after the squashing they can't. What explains these differences in the contents of the bag presquashing and post-squashing? The physical materials (whether particles or stuffs) remain the same - none of them leaked out.

> Intuitively we want to say that what changed was the way those materials were structured or organized. That organization or structure was responsible for there being a human before the squashing, and for that human having the capacities it had. Once that structure was destroyed, there no longer was a human with those capacities. Structure is thus a basic ontological principle; it concerns what things there are.[41]

Since the formal aspect of a material object, its structure, is meant here to be both a necessary feature of that object and something other than its material constituents, Neo-Aristotelian structural hylomorphism offers a plausible strategy for resisting the ontological reduction of a composite whole to its material parts.

In a similar way, Fine's and Koslicki's mereological versions of Neo-Aristotelian structural hylomorphism, which take an object's structure or form to be one of its proper parts, might be seen to offer a distinctive solution to what is known as the "Grounding Problem".[42] The Grounding Problem arises when we consider cases of spatio-temporally coincident, but, nevertheless, numerically distinct, material objects. Consider, for example, the standard case of the statue and the clay. A statue and the lump of clay of which it is composed or constituted share all of their material parts for at least a certain portion of their careers. But even during their period of overlap the two are typically taken to be numerically distinct material objects. This is due to the fact that they each have different modal properties: the lump of clay could survive being squashed; the statue could not. But what *grounds* these modal differences? How could the

[41] Jaworski, *Structure and the Metaphysics of Mind*, p. 9. See also: Jaworski, "Hylomorphism and Resurrection", pp. 197-198.

[42] For more on the Grounding Problem, see, for example, Karen Bennett, "Spatio-Temporal Coincidence and the Grounding Problem", *Philosophical Studies*, Vol. 118, No. 3 (Apr., 2004): pp. 339-371; Noël Saenz, "A Grounding Solution to the Grounding Problem", *Philosophical Studies*, Vol. 172, No. 8 (Aug., 2015): pp. 2193-2214; Mark Jago, "Essence and the Grounding Problem", in Mark Jago (ed.), *Reality Making* (Oxford: Oxford University Press, 2016): pp. 99-120.

statue and the clay have different modal properties when they are both made up of the very same parts? Koslicki's proposed solution to the Grounding Problem is to emphasize the fact that, on her account, the statue and the clay (or any two spatio-temporally coincident, but numerically distinct, material objects) do not in fact share all of the same parts, even during their period of overlap. The statue is composed of all of the same material parts as the lump of clay, but it also has, as an additional part not had by the lump of clay, a certain structure or form. And, according to Koslicki, the fact that the statue has, as one of its proper parts, a structure or form, which is not also possessed by the lump of clay, explains why it has a different modal profile. The reason why the statue could not survive being squashed is because squashing the statue would cause it to lose its principle formal part – its structure. As a result, Neo-Aristotelian structural hylomorphism offers a distinctive, mereological solution to the Grounding Problem.[43]

The example from Jaworski above also points to a third explanatory virtue of Neo-Aristotelian structural hylomorphism. Most Neo-Aristotelian structural hylomorphists take structure or form to be not only kind-specific, but kind-*specifying*. That is, any particular object is the kind of object that it is *because* of its structure. According to Koslicki, a material object, x, qualifies as a member of a certain kind, y, if and only if the parts of x realize some certain structure, z, that is distinctive of y.[44] Similarly, according to Jaworski, the species to which a particular organism belongs, for example, is determined by the capacities that that organism has

[43] See, for example: Koslicki, *The Structure of Objects*, pp. 181-183, 254-257, and Kit Fine, "Coincidence and Form", *Proceedings of the Aristotelian Society Supplementary Volume*, Vol. 82, No. 1 (Jun., 2008): pp. 101-118. For some doubts about the success of this proposed solution, see Alan Sidelle, "Does Hylomorphism Offer a Distinctive Solution to the Grounding Problem?", *Analysis*, Vol. 74, No. 3 (Jul., 2014): pp. 397-404. For other attempts to provide a mereological solution to the Grounding Problem, see, for example, Kris McDaniel, "Tropes and Ordinary Physical Objects", *Philosophical Studies*, Vol. 103, No. 3 (Jun., 2001): pp. 269-290; L. A. Paul, "Logical Parts", *Noûs*, Vol. 36, No. 4 (Dec., 2002): pp. 578-596; L. A. Paul, "Coincidence as Overlap", *Noûs*, Vol. 40, No. 4 (Dec., 2006): pp. 623-659; Jago, "Essence and the Grounding Problem".
[44] Koslicki, *The Structure of Objects*, pp. 173.

in virtue of its structure.[45] In other words, according to Neo-Aristotelian structural hylomorphists, it is because a certain material object has a certain structure that it has certain species-specific qualities or dispositions, and it is because that material object has those species-specific qualities or dispositions that it belongs to a certain kind. The Neo-Aristotelian conception of form as structure, then, also offers a systematic approach to natural kinds.

As Koslicki points out in Chapter VII of *The Structure of Objects*, one further advantage that Neo-Aristotelian structural hylomorphism has over "Classical Extensional Mereology", the view that Koslicki refers to as the "standard conception of composition", is that it is not committed to mereological universalism – the claim that for any arbitrary set of existing objects there also exists some object that is composed of all and only the members of that set – and so might be said to avoid the counter-intuitive implications of that view.[46] According to Koslicki, the standard conception of composition, due to its commitment to mereological universalism, is forced to admit the existence of many more (perhaps even infinitely more) composite objects than we normally take there to be. For instance, if it is in fact the case that for any arbitrary set of existing objects, there also exists some object composed of all and only the members of that set, then not only do cars, houses, tables, chairs, plants, and animals exist, but so do such "mereological monsters" as the object composed of my left thumb, my mother's knee, and the Empire State Building. The standard conception of composition, then, posits the existence of all sorts of composite objects, the existence of which we normally would not have any reason to

[45] See, for example: Jaworski, *Philosophy of Mind*, pp. 270-271; Jaworski, "Hylomorphism: What It Is and What It Isn't", p. 177.

[46] Koslicki, *The Structure of Objects*, pp. 168-170. For more on Classical Extensional Mereology, see, for example, Peter M. Simons, *Parts: A Study in Ontology* (Oxford: Oxford University Press, 2000). For a recent defense of mereological universalism, see: James van Cleve, "The Moon and Sixpence: A Defense of Mereological Universalism", in Theodore Sider, John Hawthorne, and Dean W. Zimmerman (eds.), *Contemporary Debates in Metaphysics* (Malden, MA: Blackwell Publishing, 2008): pp. 321-339. And for a list of other philosophers committed to mereological universalism, see the citations in Daniel Z. Korman, *Objects: Nothing Out of the Ordinary* (Oxford: Oxford University Press, 2015): p. 14, fn1).

grant. And this would seem to be a serious cost of the view. On Koslicki's more restricted theory of composition, however, for any set of objects, the members of that set compose some further object if and only if those objects jointly realize or instantiate certain structural features. If they are not arranged or configured in the right way, the members of that set fail to compose anything at all. Now, much more needs to be said about which arrangements or configurations are relevant for mereological composition, but in the case of my left thumb, my mother's knee, and the Empire State Building, it seems pretty clear that there are no such structural features present. In that way Neo-Aristotelian structural hylomorphism grounds a much more plausible, restricted theory of composition.[47]

One final theoretical virtue of Neo-Aristotelian structural hylomorphism is that it is able to establish the anti-reductionist, composition-restricting, kind-specifying, and capacity-grounding roles of form without having to introduce many of the more controversial aspects of Aristotle's or medieval scholastic metaphysical views.[48] All that is required in many of these versions of hylomorphism is a commitment to either universals or tropes, and a willingness to think of at least some of these universals or tropes as proper parts of the objects that are characterized by them.

In the next three sections of this paper, I argue that, despite these impressive theoretical and explanatory virtues, the conception of form to which Neo-Aristotelian structural hylomorphists are committed also introduces some serious concerns for the view.

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[47] The fact that Neo-Aristotelian structural hylomorphism can be seen to ground a restricted theory of composition is not a *unique* advantage of the view, since there are other ways of resisting mereological universalism. But it might still offer a unique way of doing so. For some alternative, similarly restricted mereologies, see, for example: Peter van Inwagen, *Material Beings* (Ithaca, NY: Cornell University Press, 1990); Trenton Merricks, *Objects and Persons* (Oxford: Oxford University Press, 2001); Ned Markosian, "Restricted Composition", Theodore Sider, John Hawthorne, and Dean W. Zimmerman (eds.), *Contemporary Debates in Metaphysics* (Malden, MA: Blackwell Publishing, 2008): pp. 341-364.

[48] Jaworski takes this to be an important advantage of his account over other contemporary hylomorphic views that are nevertheless still steeped in scholastic jargon (see, for example, Jaworski, *Structure and the Metaphysics of Mind*, pp. 330-331.

IV. Posteriority and Causal Overdetermination

According to Johnston and Fine (but not Koslicki and Jaworski), the form of a composite material object is a certain polyadic relation that unifies its material constituents. Among contemporary analytic metaphysicians, such a construal of form is not uncommon. So, for instance, in his brief critique of Aquinas's hylomorphic theory of human persons, Peter van Inwagen confesses,

> It seems evident to me that the phrase 'the form of my body' must either strictly speaking denote nothing (that is, although this phrase can appear in meaningful and true sentences, it will, ''disappear on analysis'': for example, the true sentence, 'The form of my body remains constant as long as I remain alive' expresses something that could be more perspicuously expressed by some such words as 'The formal features of my body do not change as long as I am alive') or else must denote some abstract object, some very complex property I have throughout my existence, or some very complex variably polyadic relation that at every moment of my existence then holds among the particles of matter that at that moment compose my body.[49]

Despite the ease with which form tends to be identified with a complex or polyadic relation, I think there are several reasons for resisting this conception. For one, relations are ubiquitous. As Koslicki observes in her own critique of Fine's view,[50] if all that it takes to compose some further object is for certain objects or parts of objects to be related to one another in a certain way, then there may very well be, in addition to the ordinary material objects that we typically recognize, a

[49] Peter van Inwagen, "A Materialist Ontology of the Human Person", in Peter van Inwagen and Dean Zimmerman (eds.), *Persons: Human and Divine* (Oxford: Oxford University Press, 2007): p. 205.
[50] See, for example, Koslicki, *The Structure of Objects*, pp. 83-85. The objection that follows is from Koslicki. The example is my own.

whole slew of "mereological monsters" not even recognized by those who espouse mereological universalism, such as "hand sandwiches" (mereological wholes brought into existence by placing one's hand between two slices of bread). Indeed, the very same material constituents of any mereological whole might, on this view, compose an abundance of distinct, but overlapping mereological wholes, as long as there are multiple relations that hold between them. Now, both Fine and Johnston seem willing to accept this consequence of their views.[51] But on this point I am in agreement with Koslicki: having to recognize the existence of a distinct material object for every distinct relation is much too high of a cost to pay for hylomorphism.[52]

Perhaps, then, the structuralist conception of form espoused by Koslicki and Jaworski can do better on this score. For, presumably, a structure is something a bit more robust than a mere relation that holds between two or more objects; not just any sort of relation between parts counts as a structural feature of the composite object. And perhaps, as the remarks from Koslicki and Jaworski above would suggest, the only sorts of structures that give rise to new material objects are those structures that are characteristic of natural kinds. In that case, the structuralist conception of form may not give rise to the same superabundant ontology that the relationalist conception does.

Nevertheless, as we saw earlier, the structuralist conception of form does still give rise to a certain amount of overlapping, yet numerically distinct, material objects. At the very least, Neo-Aristotelian structural hylomorphists are committed to the claim that there exist composite wholes that are numerically distinct from the material objects that serve as their material constituents. In what follows, I will argue that even if the structuralist conception of form can

[51] See, for example: Fine, "Things and Their Parts", pp. 73-74; Kit Fine, "Response to Kathrin Koslicki", *Dialectica,* Vol. 61, No. 1 (Mar., 2007): pp. 161–166; Johnston, "Hylomorphism", p. 698.
[52] It also undermines the fourth theoretical virtue outlined above: that Neo-Aristotelian structural hylomorphism's restricted theory of composition significantly pares down the number of objects that exist.

help Neo-Aristotelian structural hylomorphists successfully avoid the superabundant ontology to which the relationalist conception gives rise, its commitment to this last claim - that there exist composite wholes that are numerically distinct from the material objects that serve as their material constituents – is enough to introduce some serious concerns for the view. In particular, I will argue that this claim gives rise to a certain sort of systematic causal overdetermination. And the fact that Neo-Aristotelian structural hylomorphism has this consequence will serve as my first main objection to the view.

Let us begin with a basic formulation of structural hylomorphism's Neo-Aristotelian theory of composition:

> *Neo-Aristotelian Structural Hylomorphism's Basic Theory of Composition: when certain material objects come to be structured in a certain way, those objects give rise to a numerically distinct composite whole.*

According to Neo-Aristotelian Structural Hylomorphism's Basic Theory of Composition, when a certain kind of structure is added to a certain set of material objects, the result is that those material objects give rise to a numerically distinct, composite whole. For example, when some hydrogen atoms and an oxygen atom come to exhibit certain structural relations, the result is that those atoms give rise to a numerically distinct water molecule. And when I gather various pieces of wood and assemble them in the proper way, the result is a new table. Understood diachronically, Neo-Aristotelian Structural Hylomorphism's Basic Theory of Composition says that, in cases of mereological composition, certain structural features are added to certain already-existing material objects, which then give rise to numerically distinct, composite wholes. Of course, Neo-Aristotelian structural hylomorphists need not say that the material objects that serve as the material constituents of composite wholes *necessarily* pre-exist their composites

(since we can imagine cases in which they come into existence at the same time), but it seems plausible to suggest that the sorts of material objects that give rise to numerically distinct composite wholes can, and often do, pre-exist such wholes. For, when a new water molecule comes into existence, it would seem to come into existence *from* some pre-existing hydrogen atoms and a pre-existing oxygen atom. And when I build a table, I *first* gather the legs, the top, and all of the rest of the pieces and *then* I put them together in the appropriate way. Now, if it is indeed true that, in typical cases of mereological composition, the material objects that come to compose numerically distinct composite wholes when structured in the appropriate manner pre-exist their composites, then, with regard to these sorts of cases, we ought to ask the following question: what happens to those pre-existing material objects when they come to compose such wholes?

Here it seems that the Neo-Aristotelian structural hylomorphist has three options. First, she could say that in such cases the material objects that come to compose numerically distinct, composite wholes continue to exist upon being structured in the relevant way, and, moreover, undergo no significant change in either their intrinsic nature or their external behavior. Let us refer to this diachronic theory of composition as *preservationism*. Second, she could say that, in those cases in which the relevant material objects pre-exist the wholes of which they will later become parts, those objects continue to exist upon being structured in the relevant way, but do undergo some significant change in their intrinsic natures or their external behaviors. Let us refer to this diachronic theory of composition as *alterationism*. Third, she could say that those material objects that come to compose numerically distinct, composite wholes cease to exist upon being

structured in the relevant way and are replaced by the new object (or objects) that their union has created. Let us refer to this diachronic theory of composition as *annihilationism*.[53]

Based on my analysis of Neo-Aristotelian structural hylomorphism in sections II and III above, it should come as no surprise that Neo-Aristotelian structural hylomorphists tend to be preservationists. After all, it is an integral feature of the view that composite wholes have certain other material objects as parts. And the simplest explanation for where these material constituents came from is that they are the very same material objects to which the relevant relation or structure was first applied. Serving as confirmation of this suspicion, at various points in *The Structure of Objects*, Koslicki expresses her own commitment to something like preservationism. In the context of her treatment of Plato's structural mereology, for instance, she considers a version of annihilationism that she calls "Reverse Mereological Essentialism", only to immediately reject it.[54] On Koslicki's preferred account, "when a new whole is created, it is created out of pre-existing wholes, each of which is already structured; and it is created by structuring these pre-existing wholes in some new way."[55] As she explains later on, using the example of a table and its various material components:

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[53] There are, in turn, at least two versions of annihilationism that one could hold. First, one could hold that when pre-existing material objects give rise to a "composite" whole they are annihilated and replaced by a single, non-composite entity, which has no other material objects as parts. We might call this view *simple annihilationism*. Alternatively, one could hold that when pre-existing material objects give rise to a composite whole they are replaced by a numerically distinct, complex material object, which has various new material objects as its parts. We might call this view *complex annihilationism*. (Presumably, for complex annihilationism, the new material objects that serve as parts of the new mereologically complex whole would be of a different sort than those that preceded it. Otherwise, it is not clear to me what the motivation for saying that the preceding ones ceased to exist would be.) Importantly, there is nothing about these diachronic theories of composition that necessitates their universality. One could, for instance, hold that preservationism applies to certain kinds of wholes, and alterationism to others. Or one could hold a different diachronic theory of composition for different levels of composition. Perhaps preservationism is true at the atomic level, while annihilationism is true at some higher level.

[54] Koslicki, *The Structure of Objects*, pp. 112-117. Koslicki's reasons for rejecting Reverse Mereological Essentialism (or lack thereof) are discussed in Ross D. Inman, "Review of Kathrin Koslicki, *The Structure of Objects*", *Philosophia Christi*, Vol. 13, No. 1, (2011): pp. 219-223.

[55] *Ibid*., p. 118.

> Since the process of assembling the table in the normal case only changes the ingredients' non-essential relational characteristics, there is no reason to think, given the persistence conditions we ordinarily ascribe to these objects, that they cease to exist merely as a result of being rearranged. For example, it seems plainly compatible with the persistence conditions of the two pieces of wood, which we describe (looking towards the future) as a table-leg and a table-top, that the two may come into closer proximity to one another. Thus, unless there is additional evidence to the effect that the pre-existing ingredients are somehow destroyed during the process of assembling the table, it is thus natural to view them as still maintaining a 'presence' of some sort within the resulting table; the most obvious way in which their continued 'presence' within the resulting table may be understood us by appeal to the notion of parthood.[56]

Koslicki, then, is clearly committed to preservationism. Moreover, Johnston, too, seems to hold that the sorts of material objects that serve as the proper parts of composite wholes are only contingently related by their principle of unity:

> In each instance a hylomorphic complex may seem to be ontologically dependent on its genuine parts, the parts related by its principle of unity. Those parts figure in the real definition of the whole, and *since they could be around anyway without making up the whole, the whole will not figure in the real definition of the parts*. Hence Hylomorphism seems to sit well with the thought that the whole is always ontologically dependent on its parts.[57]

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[56] *Ibid.*, p. 177.

[57] Johnston, "Hylomorphism", p. 676, emphasis added. As I will discuss in more detail below, however, Johnston also thinks that his version of hylomorphism is compatible with the claim that some wholes are "ontologically prior" to their parts, that is to say, some parts might depend for their existence and their identity on the wholes that they compose, rather than the other way around. And this claim would constitute a denial of preservationism.

And the second quotation from Fine above suggests that he also thinks that the sorts of relations between objects that give rise to numerically distinct wholes "may hold or fail to hold of those objects at any given time".[58]

Taking these remarks as representative of the view, then, we might say that, according to Neo-Aristotelian structural hylomorphism, when certain material objects come to be structured such that those objects come to compose some numerically distinct composite whole, those same material objects continue to exist upon being structured in the relevant way. And, moreover, they do so without changing any of their essential characteristics. As a result, in such cases those material objects now partially overlap the composite wholes of which they have become parts, while also maintaining their own characteristic attributes, causal powers, and behaviors. So as to capture these important diachronic elements of the account, we might, then, reformulate structural hylomorphism's Neo-Aristotelian theory of composition as follows:

> *Neo-Aristotelian Structural Hylomorphism's Diachronic Theory of Composition*: *when certain material objects come to be structured in a certain way, those objects, without undergoing any significant change in either their intrinsic*

[58] Fine, "Things and Their Parts", p. 65. However, Fine, too, think that his version of hylomorphism is compatible with the claim that some wholes are "ontologically prior" to their parts in the way specified in the previous footnote. With regard to Jaworski, Jaworski recognizes two kinds of parts that composite wholes can be said to have: dependent parts and independent parts. Dependent parts are such that they depend for their existence on the composite whole of which they are parts, and so do not exist before that whole comes to be. Examples of dependent parts are the functional parts of an organism, such as the organism's hands, head, and heart. Independent parts, on the other hand, are such that they can exist independent from the composite whole of which they are parts, and so might have existed before that whole came to be. Examples of independent parts are the elemental parts of a composite substance, such as its electrons. For Jaworski, then, some of the objects that give rise to composite wholes continue to exist upon the introduction of those wholes (the electrons involved, for example), while others do not. Even those electrons, however, undergo various changes in their intrinsic nature and external behavior upon the introduction of the relevant wholes, according to Jaworski. For more on this, see: Jaworski, *Structure and the Metaphysics of Mind*, pp. 116-117. For an earlier suggestion along these lines, see, for example: Jaworski, "Metaphysics of Structure", pp. 193-194, 196. It is also worth noting that immediately after the relevant section from his *Structure and the Metaphysics of Mind*, Jaworski goes on to reject a full-blown version of annihilationism that he calls "The Thomistic Theory of Parts".

natures or external behaviors, come to compose, along with that structure, some numerically distinct, composite whole.

As it is formulated here, Neo-Aristotelian Structural Hylomorphism's Diachronic Theory of Composition does indeed commit the structural hylomorphist to a certain amount of overlapping, yet numerically distinct, material objects: namely, composite wholes and their parts. But why should this be seen as a problematic feature of the view? Why think that this claim would commit Neo-Aristotelian structural hylomorphism to any sort of systematic causal overdetermination? With structural hylomorphism's diachronic theory of composition in place, I will now proceed to my argument for that conclusion.

To begin, consider once again the statue and the clay.[59] Imagine that I am carrying a certain heavy, unformed lump of clay across the room when I drop it on my toe. What should we say has crushed my toe? It seems that we should say that it was the lump of clay. Now imagine that at some time later a sculptor takes that same lump of clay and molds it into a statue. According to structural hylomorphism's diachronic theory of composition, we now have two overlapping, yet numerically distinct, material objects: the lump of clay and the statue, which is composed of the lump of clay and a certain form or structure.[60] Now imagine that I am carrying

[59] This example, the next example, and the discussion that follows are all adapted from an argument first introduced by Trenton Merricks in his *Objects and Persons*, pp. 47-84. For other, similar formulations of the argument, see, for example: Toner, "Emergent Substance", pp. 281-297; Ross D. Inman, "Substantial Priority: An Essay in Fundamental Mereology", Ph.D. Dissertation, Trinity College, Dublin, 2013: pp. 191-198; Daniel Z. Korman, "Ordinary Objects", in Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy,* Spring 2014 Edition, available at: http://plato.stanford.edu/archives/spr2014/entries/ordinary-objects/; Korman, *Objects*, Ch. 10. The observation that such cases, given certain other assumptions, seem to result in systematic causal overdetermination, then, is not new. What is new is my application of this sort of argument to Neo-Aristotelian structural hylomorphism. As will be argued below, I think that these sorts of cases are especially troublesome for this sort of view. Given certain assumptions to which Neo-Aristotelian structural hylomorphists are otherwise committed, it is not at all clear to me that *any* of the standard replies to Merricks's argument are available to them. That is, at least, what I will try to argue below. For Jaworski, since there are no lumps of clay, statues, or tables (see, for example, his *Structure and the Metaphysics of Mind*, p. 106), this particular puzzle and the next would not apply to his version of structural hylomorphism, but there are still organisms and electrons on his view, and so the puzzles could simply be shifted to cases of coincidence with respect to an organism and the electrons of which it is composed, with the same result (or so I would argue).

[60] For Johnston, since he does not take the relevant unifying relation to be a proper part of the statue, this would be a case of two material objects that overlap with respect to every one of their parts, not just their material parts. For

that same lump of clay, which now spatially coincides with the statue, across the room when I, once again, drop it on my toe. What should we say has crushed my toe in this case? It seems that in the second case we have two candidates for the material object that crushed my toe, both of which were there at the time and had the requisite mass to do the job. Did *both* the lump of clay and the statue crush my toe at the same time? If so, then it looks as if the crushing of my toe is causally overdetermined: there are two, numerically distinct causes of the crushing of my toe, either of which would have been sufficient by itself to bring about the effect.

Consider also the table and the material objects of which it is made. Imagine that while gathering various pieces of wood in preparation for putting together a table, I decide to throw all of those pieces through the nearest window, breaking it. What should we say has broken the window here? It seems that we should say that it was the pieces of wood, acting in concert, that did it (assuming that there are such things as pieces of wood, that such things can be causally efficacious and, in the present case, that no one of the pieces was sufficient to break the window by itself). Now imagine that, at some time later, I gather those same pieces of wood together again and assemble them in the appropriate way, thus giving rise to a new table. According to structural hylomorphism's diachronic theory of composition, we now have at least a few partially overlapping material objects: we have each of the material components of the table (various pieces of wood) and we have the table itself, which is composed of all of those same parts, along with a certain form or structure, but is not identical to them.[61] Now imagine that after having assembled the table I proceed to throw that table through a different window, breaking that one as well. What should we say has broken the window in this case? It seems that, once again, we

evidence that Johnston does in fact think that there would be two entirely overlapping material objects in such cases, see Johnston, "Hylomorphism", 664-672; Johnston, "Constitution", pp. 653-663.

[61] Once again, for Johnston the relevant unifying relation would not be a proper part of the table, but it should be clear that the same puzzle would arise all the same.

have at least a few candidates for the cause of the window's breaking. Did the parts of the table collectively break the window? Did the table, which is numerically distinct from those parts, do it? Or, did *both* the parts of the table collectively and the table itself break the window? Once again, it seems hard to say that it was caused by one of these candidates *rather than* the other. Both the parts of the table collectively and the table itself were there at the time, and they each had the requisite mass and velocity to do the job. But if it was caused by both, this would seem to causally overdetermine the effect, just like in the case of the statue and the clay. What this second scenario shows us is that there was nothing special about the statue and the clay in the first scenario. The fact that in both scenarios there are multiple, at least partially overlapping, material objects is what produces the puzzle. And so by committing themselves to that claim, Neo-Aristotelian structural hylomorphists would also seem to be committed to a certain sort of systematic, and, indeed, ubiquitous, causal overdetermination.

As I see it, there are only five ways to respond to these sorts of causal overdetermination cases: (1) deny the existence of the whole, (2) deny the existence of the parts, (3) deny that the whole causes the relevant effect, (4) deny that the parts cause the relevant effect, or (5) admit the existence of systematic causal overdetermination, and give an explanation for why this result is unproblematic. Strategies (1) and (2) are versions of eliminativism; they resolve the threat of overdetermination by eliminating one or more of the candidates altogether. (2) makes macrophysical wholes into extended simples: things that take up a certain amount of space but have no parts.[62] (1) makes it so there are no macrophysical wholes at all: only simples acting in concert.[63] It should be clear by now that neither of these strategies is open to the Neo-Aristotelian

[62] For more on extended simples, see, for example: Kris Mcdaniel, "Extended Simples", *Philosophical Studies*, Vol. 133, No. 1 (Mar., 2007): pp. 131-141; Peter M. Simons, "Extended Simples: A Third Way Between Atoms and Gunk", *The Monist,* Vol. 87, No. 3 (Jul., 2004): pp. 371-384.

[63] For views according to which there are no macrophysical wholes, see, for example: Theodore Sider, "Against Parthood", in Karen Bennett and Dean W. Zimmerman (eds.), *Oxford Studies in Metaphysics*, Vol. 8 (Oxford: Oxford University Press, 2013): pp. 237-293; Ross P. Cameron, "How to Have a Radically Minimal Ontology",

structural hylomorphist, since according to that view there exist both composite wholes and various material objects that serve as their proper parts.

Can the Neo-Aristotelian structural hylomorphist pursue the third strategy and deny that the whole causes the relevant effect? There are at least a few reasons to think that this strategy will not work. First, one might wonder how the whole could possibly fail to cause the relevant effect. As I pointed out in the example, the statue was in the right place, at the right time, and had the requisite mass to crush my toe. In fact, because it has the clay as a proper part, any feature of the clay that makes it a suitable candidate for the material object that crushed my toe would also seem to be a feature of the statue. Depending on how far we want to pursue (3), there is also the risk that this strategy will result in epiphenomenalizing composite wholes. For if we are forced to deny the causal efficacy of the statue in the scenario above, it seems that we should also be forced to deny its causal efficacy elsewhere, lest we overdetermine its effects there. As a result, (3) might lead us to the conclusion that the statue never causes anything; it is entirely epiphenomenal. Neo-Aristotelian structural hylomorphists should be concerned about this result. It would entail that composite wholes, the existence of which they have worked so hard to motivate, end up making no causal difference in the world whatsoever.

In his *Objects and Persons,* Merricks takes the argument further and suggests that if wholes never cause anything, and so are necessarily epiphenomenal, we ought to seriously doubt whether such things exist at all.[64] In this way, Merricks argues that strategy (3) collapses into strategy (1). Merricks's argument here is based on the controversial claim that any existing macrophysical object would have to be non-redundantly causally efficacious in some way. There

Philosophical Studies, Vol. 151, No. 2 (Nov., 2010): pp. 249-264. For a view according to which the only macrophysical wholes that exist are organisms, see, for example: van Inwagen, *Material Beings*, pp. 81-97. For a view according to which the only macrophysical wholes that exist are persons, see, for example: Merricks, *Objects and Persons*, pp. 85-117. While each of these authors provides reasons for denying the existence of certain macrophysical wholes, only Merricks is explicitly motivated by the threat of systematic causal overdetermination.

[64] *Ibid.*, pp. 79-83.

might be reasons to reject that claim.[65] But even if the Neo-Aristotelian structural hylomorphist is able to preserve the existence of their composite wholes in some other way, he or she would still have to contend with the threat of epiphenomenalism.

Can the Neo-Aristotelian structural hylomorphist pursue the fourth strategy, then, and deny that the parts cause the relevant effect? The main reason for thinking that this strategy will not work either is based on Neo-Aristotelian structural hylomorphism's commitment to preservationism, as reflected in its diachronic theory of composition. In the first example above, before enlisting the sculptor to create the statue, it was clearly the lump of clay that crushed my toe. In the second example above, before assembling the table, it was clearly the pre-existing parts of that table that collectively broke the window. Now, according to preservationism, when the lump of clay comes to compose, along with a certain relation or structure, the statue, the lump of clay remains in existence upon being structured in the relevant way, and, moreover, undergoes no significant change in either its intrinsic nature or its external behavior. And the same is true of the parts of the table when they come to compose the table. When we focus on this fact, it is hard to see how the lump of clay or the parts of the table could fail to crush my toe or break the window after they have become parts of a larger whole. They are exactly the same material objects that were there before, and they have maintained all of the same qualities that are relevant for producing the effect. It seems, then, that, precisely because structural hylomorphists are committed to preservationism, they cannot pursue (4).

Perhaps the best way for Neo-Aristotelian structural hylomorphists to respond to my version of Merrick's Overdetermination Argument is to pursue strategy (5): admit the existence of systematic causal overdetermination, and explain why the sort of causal overdetermination

[65] See, for example, Patrick Toner, "On Merricks's Dictum", *Journal of Philosophical Research*, Vol. 33 (2008): pp. 293-297.

involved in these sorts of cases is of an unobjectionable sort – even if it is systematic.[66] Here the Neo-Aristotelian structural hylomorphist would have to give some reason to think that, on her account, the sort of causal overdetermination that results from the joint causal efficacy of a whole and its parts is less problematic than it appears. One way of deproblematizing causal overdetermination is to identify composite wholes with their parts. For, if a composite whole is identical to its parts, then for the whole to cause some effect *just is* for the parts to cause that effect.[67] But this way of pursuing strategy (5) is not available to the Neo-Aristotelian structural hylomorphist, precisely because she denies that a composite whole is identical to the material objects of which it is composed.[68] What reason, then, can the Neo-Aristotelian structural hylomorphist give for thinking that the sort of causal overdetermination illustrated above is of an unobjectionable sort?

When describing a similar worry for her view, one pertaining to the properties of a composite whole and the properties of its parts, Koslicki asserts that, if there is some sort of overdetermination here, it is of a "benign" sort.[69] But in order to make this reply work, Koslicki needs to offer an account of why this sort of overdetermination is merely benign. Koslicki suggests that the best explanation for what goes on in these cases is that the whole causes the

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[66] This tends to be the most popular way of responding to Merricks's own overdetermination argument. For some examples of this sort of reply, see: Korman, *Objects*, pp. 194-202; Steinvör Thöll Árnadóttir, "Overdetermination and Elimination", *International Journal of Philosophical Studies*, Vol. 23, No. 4 (2015): pp. 479-503; Eric Yang, "Eliminativism, Interventionism, and the Overdetermination Argument", *Philosophical Studies*, Vol. 164, No. 2 (Jun., 2013): pp. 321-340; Amie L. Thomasson, "Metaphysical Arguments Against Ordinary Objects", *The Philosophical Quarterly*, Vol. 56, No. 224 (Jul., 2006): pp. 340-350; John W. Carroll and William R. Carter, "An Unstable Eliminativism", *Pacific Philosophical Quarterly*, Vol. 86, No. 1 (Mar., 2005): pp. 13-15; Theodore Sider, "What's So Bad About Overdetermination?", *Philosophy and Phenomenological Research*, Vol. 67, No. 3 (Nov., 2003): pp. 719-726; Eric T. Olson, "The Ontology of Material Objects: Critical Notice of *Objects and Persons*", *Philosophical Books*, Vol. 43, No. 4 (Oct., 2002): pp. 292-299. Merricks himself considers this strategy in more detail in his *Objects and Persons*, pp. 66-79.

[67] This strategy was suggested to me by Megan Wallace (see her "The Many Advantages of Composition as Identity", Unpublished Manuscript, for more on this solution).

[68] This is part of Neo-Aristotelian structural hylomorphism's rejection of Classical Extensional Mereology. See, for example: Koslicki, *Structure of Objects*, Chapter Three.

[69] *Ibid.*, pp. 177-179.

effect *because* the parts cause the effect: the whole "inherits" certain causal powers and properties from its parts.[70] But here it sounds as if the whole is not actually doing any of the causal work. All of the causal work is being done by the parts, and we are able to say that whole causes the effect, in some sense, only because it is intimately related to something that is, strictly speaking, the cause of that effect. This, then, is not a defense of (5), but of (3), and so Koslicki is left without a principled reason for asserting that the sort of causal overdetermination outlined in the scenarios above is of a benign sort. To my knowledge, no other Neo-Aristotelian structural hylomorphist has offered any sustained reply to this sort of objection. This is not to say that there is no possible way for the Neo-Aristotelian structural hylomorphist to pursue the fifth strategy for responding to my formulation of the causal overdetermination argument. Perhaps there is. But I hope to have shown that it is not an easy route for the Neo-Aristotelian structural hylomorphist to take. And unless he or she can make this solution work, the threat of overdetermination looms large.

In concluding this section, I would like to briefly say a bit about what I take to be the source of the problem for Neo-Aristotelian structural hylomorphism. I have argued that the Neo-Aristotelian structural hylomorphist's commitment to the diachronic theory of composition formulated above introduces a certain sort of systematic causal overdetermination. I have also shown that the Neo-Aristotelian structural hylomorphist's commitment to that diachronic theory of composition is based on its commitment to preservationism, and that at least some Neo-Aristotelian structural hylomorphists explicitly assent to that view. Notice that if Neo-Aristotelian structural hylomorphists were to forego their commitment to preservationism,

[70] *Ibid.,* p. 177-178, 185-186. See also, Kathrin Koslicki, "Constitution and Similarity", *Philosophical Studies*, Vol. 117, No. 3 (Feb., 2004): pp. 327-363. Based on what she says there, I think that Koslicki's preferred solution to something like Merrick's Overdetermination Argument might be very close to the one Catherine Sutton proposes in her "The Supervenience Solution to the Too-Many-Thinkers Problem", *Philosophical Quarterly*, Vol. 64, No. 257 (Oct., 2014): pp. 619-639. But to my knowledge, neither Koslicki, nor any of the other Neo-Aristotelian structural hylomorphists featured above, have explicitly addressed the sorts of worries that I have raised here.

and, instead pair their hylomorphic account of material objects with either alterationism or annihilationism, then there would be a least a few more ways for them to avoid systematic causal overdetermination. For instance, if a structural hylomorphist were to espouse annihilationism, then the fact that the pre-existent parts of the table are able to break the window before the construction of the table itself does not entail that they can do so afterwards. For according to annihilationism, those parts have ceased to exist by the time the table is thrown through the window. And it would be at least open to the structural hylomorphist to say that the new parts that replace them behave much differently.[71] Alternatively, if the structural hylomorphist were to espouse alterationism, then perhaps the significant change that material objects undergo when they become parts of larger composites includes a sort of "surrendering of agency" to the whole, such that the whole itself becomes the only thing that can properly be said to break windows and the like.[72]

Why not, then, abandon preservationism in favor of one of the other diachronic theories of composition? One reason for being wary of alterationism and annihilationism is that they are both pretty radical theories of composition. It would certainly be a very bold claim to say that the pieces of wood that are used to construct a table undergo significant changes in their behavior or even cease to exist upon that table's creation! Perhaps, then, a proponent of either view would have to say that the sort of mereological composition that gives rise to numerically distinct,

[71] Patrick Toner pursues this sort of strategy in his "Emergent Substance". For other hylomorphists who defend an annihilationist reading of hylomorphic composition, see Theodore Scaltsas, *Substances and Universals in Aristotle's Metaphysics* (Ithaca, NY: Cornell University Press, 1994); Marmodoro, "Aristotle's Hylomorphism without Reconditioning"; Alexander Pruss, "Parts and Ownership", available at http://alexanderpruss.blogspot.com/2007/11/parts-and-ownership.html (Nov., 2007).

[72] Robert Koons defends an alterationist reading of hylomorphic composition at least in part as a means of avoiding overdetermination in his "Stalwart vs. Faint-Hearted Hylomorphism".

composite wholes is rare. For instance, he or she might have to deny the existence of things such as tables.[73]

However, I would like to suggest that Neo-Aristotelian structural hylomorphists tend to be preservationists for another reason. I think that once one is committed to a conception of form as a polyadic relation or a structure, then a commitment to preservationism follows as a natural consequence of one's view.[74] For, on the face of it, a relation or a structure would seem to be the sort of thing that is added to or applied to already existing things, depending on them for its continued existence, rather than having its own independent existence and identity that it might be said to bestow on that which it relates or structures. Now, perhaps I am wrong about that. Perhaps a relation could be ontologically prior to its relata in the relevant way.[75] And perhaps a structure could be ontologically prior to those objects of which it is the structure. But on the sort of broadly Aristotelian picture that Johnston, Fine, Koslicki, and Jaworski seem to want to preserve, this is not how relations and structures are construed. On any broadly Aristotelian

[73] Which would not be unprecedented, since, as I mentioned earlier, both van Inwagen and Merricks deny the existence of such things while also accepting the existence of other composite wholes.

[74] It should be noted that at least two of the Neo-Aristotelian structural hylomorphists discussed above are willing to grant the possibility that a composite whole might be ontologically prior to at least some its parts, rather than the other way around. So, for instance, later on in his article, Johnston states that "Hylomorphism does not itself entail that the hylomorphic whole is ontologically dependent on its parts. There can be genuine parts that are not independent of the whole" (Johnston, "Hylomorphism", p. 678; see, also: Johnston, "Parts and Principles", pp. 133, 139). And in a more recent article on the topic, Fine remarks, "[I]t seems to me that some basic generative operations are in fact *de*compositional. Far from serving to account for the identity of a whole in terms of its parts, they serve to account for the parts in terms of the whole" (Fine, "Towards a Theory of Part", p. 585). If Johnston and Fine are right to suggest that Neo-Aristotelian structural hylomorphism is compatible with the claim that some wholes are ontologically prior to their parts, then, while this is not exactly the same as saying that the relation or structure of a composite whole is ontologically prior to that whole's material constituents, the end result would still be a rejection of preservationism. Perhaps, then, an advocate of the view can reject preservationism after all. In response, I would first point out that both of these Neo-Aristotelian structural hylomorphists espouse a relationalist conception of form rather than a structuralist one. And it is hard for me to see how any material object could be annihilated merely by coming to be related to some other material object (see, also, the quotation from Koslicki above). But perhaps there are such object-destroying relations. My larger concern is that such a view of relations would mark a significant departure from the Aristotelian program that Johnston and Fine seem to want to defend. I say more about this in what follows.

[75] I take it that this is the view of "Ontic Structural Realists" (see, for example, James Ladyman, Don Ross, David Spurrett, and John Collier, *Everything Must Go: Metaphysics Naturalized* (Oxford: Oxford University Press, 2007).

picture of the world, relations are ontologically posterior to their relata.[76] And if structures are at all like relations, then they too would be ontologically posterior to the objects that are structured.[77] I submit, then, that it is their conception of form as something like a polyadic relation or a certain type of structure, which, given an Aristotelian conception of relations, would be ontologically posterior to a certain set of material objects, that ultimately gives rise to systematic causal overdetermination for Neo-Aristotelian structural hylomorphism. And so I would like to call the sort of objection that I have outlined here my *Posteriority Objection* to Neo-Aristotelian structural hylomorphism. If we are at all concerned about the threat of systematic causal overdetermination, then I think that this Posteriority Objection is sufficient motivation for hylomorphists to search for an alternative conception of form - one that might be seen to avoid these sorts of implications.[78]

V. Reducibility and Redundancy

According to Koslicki and Jaworski (but not Johnston and Fine) the form of a composite material object, understood as the structure that is realized or instantiated in its material constituents, is something more than just a relation or set of relations. But if a structure is supposed to be something more than a relation or a set of relations, we ought to wonder just what

[76] Based on what he says in his *Categories*, it is clear that, on Aristotle's view, *relations* are, as members of a certain category of accidents, ontologically posterior to members of the substance category (see: Aristotle, J. L. Akrill (trans.), *Categories*, in Jonathan Barnes (ed.), *The Complete Works of Aristotle*, Vol. 1 (Princeton, NJ: Princeton University Press, 1984): pp. 10-14). As a result, I think that any view that takes relations or structures to be ontologically prior to substances is a view that significantly departs from this basic Aristotelian schema.

[77] Verity Harte attributes to Plato the view that structures are ontologically prior to the entities that are structured (see, for, example, Harte, *Plato on Parts and Wholes*, ch. 4). I take it that such a view of structures is only possible if we accept a Platonic theory of universals.

[78] While I have focused on issues related to causal overdetermination here, I think that the fact that forms are ontologically posterior to the material component(s) of their composite wholes according to Neo-Aristotelian structural hylomorphism also introduces some other significant concerns for the view. For example, I think the ontological posteriority of structure is what gives rise to David Oderberg's "Content-Fixing Problem" (see: Oderberg, "Is Form Structure?", p. 170). I also think that granting the existence of partially overlapping, numerically distinct material objects makes Neo-Aristotelian structural hylomorphism susceptible to Peter Unger's "Problem of the Many" (see, for example: Peter Unger, "The Problem of the Many", *Midwest Studies in Philosophy*, Vol. 5, No. 1 (Sep., 1980): pp. 411-467; Inman, "Substantial Priority", pp. 182-186; Korman, "Ordinary Objects"; Toner, "Emergent Substance", p. 292; Korman, *Objects*, Ch. 12). Unfortunately, I do not have room to go into these concerns here.

that something more is. Given that there *are* spatial and causal relations between a composite whole's material constituents, what is that object's structure if not just those relations? If a structure is *not* a set of spatial and causal relations, how is it related to these entities, and to what ontological category does *it* belong? The worry here is that talk of "the structure of the whole" might, in the end, just be a figurative way of referring to a shifting set of lower-level relations between micro-physical parts. Call this the *Reducibility Objection* to Neo-Aristotelian structural hylomorphism. In a recent article criticizing contemporary Neo-Aristotelian structural hylomorphism, Howard Robinson nicely describes this sort of worry:

> It is sufficient for the concept of structure to be applicable that elements be appropriately related in the world, and these relations can be characterized without using the notion of structure. This could be done by specifying the spatio-temporal location of the elements and their causal influence on each other. If [this] is correct, it looks as if, though our structural concepts are well grounded in reality, structures are not part of the basic furniture of the world; by the causal criterion of concrete reality, they contribute nothing over and above the 'forces' of physics, and, as entities, they are nothing above their constituents and their spatiotemporal and causal relations.[79]

As I see it, the most pressing concern for Neo-Aristotelian structural hylomorphism here is that it might, upon further scrutiny, end up collapsing into some other already well-entrenched metaphysical view. If a structure *just is* the spatial and causal relations that hold between a composite whole's material constituents, and these relations are, as Johnston and Koslicki

[79] Howard Robinson, "Modern Hylomorphism and the Reality and Causal Power of Structure: A Skeptical Investigation", *Res Philosophica*, Vol. 91, No. 2 (Apr., 2014): p. 210. See also: Donald C. Williams, "Form and Matter, I", *The Philosophical Review*, Vol. 67, No. 3 (Jul., 1958): pp. 292, 294 and 295; Katherine Hawley, "Review of Kathrin Koslicki, *The Structure of Objects*", *International Studies in the Philosophy of Science*, Vol. 24, No. 3 (Jan., 2011): p. 338.

suggest, universals rather than particulars, then perhaps Neo-Aristotelian structural hylomorphism is just an elaboration and defense of David Armstrong's account of structural properties or structural universals.[80] On the other hand, if the relevant spatial and causal relations are, as Fine and Jaworski suggest, trope-like particulars, then perhaps Neo-Aristotelian structural hylomorphism is just a more sophisticated version of the bundle theory of material objects.[81] Either way, Neo-Aristotelian structural hylomorphism risks losing its novelty; it has nothing significant to add to contemporary discussions.

Consider, first, Armstrong's account of structural properties or structural universals. In *A World of States of Affairs*, Armstrong explains that the most basic entities that exist are states of affairs,[82] and the most basic states of affairs are those that involve a single particular instantiating a single property.[83] Here properties are understood as immanent universals,[84] and the state of affairs involving some particular, x, and some universal, F, *just is* x's being or instantiating F.[85]

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[80] For David Armstrong's account of structural universals, see, for example: D. M. Armstrong, *Universals and Scientific Realism, Vol. II: A Theory of Universals* (Cambridge: Cambridge University Press, 1978): pp. 68-71; D. M. Armstrong, *A World of States of Affairs* (Cambridge: Cambridge University Press, 1997): pp. 32-37; D. M. Armstrong, *Sketch for a Systematic Metaphysics* (Oxford: Oxford University Press, 2010): pp. 29-31.

[81] By bundle theory here I mean the view that material objects are composed of nothing but property-tropes. For versions of this sort of bundle theory, see, for example: Donald C. Williams, "On the Elements of Being: I", *The Review of Metaphysics*, Vol. 7, No. 1 (Sep., 1953): pp. 3-18; Donald C. Williams, "On the Elements of Being: II", *The Review of Metaphysics*, Vol. 7, No. 2 (Dec., 1953): pp. 171-192; Keith Campbell, *Abstract Particulars* (Oxford: Blackwell, 1990); Peter M. Simons, "Particulars in Particular Clothing: Three Trope Theories of Substance", *Philosophy and Phenomenological Research*, Vol. 54, No. 3 (Sep., 1994): pp. 553-575; Arda Denkel, *Object and Property* (Cambridge: Cambridge University Press, 1996); Arda Denkel, "On the Compresence of Tropes", *Philosophy and Phenomenological* Research, Vol. 57, No. 3 (Sep., 1997): pp. 599-606; Peter M. Simons, "Farewell to Substance: A Differentiated Leave-Taking", *Ratio*, Vol. 11, No. 3 (Dec., 1998): pp. 235-252, Peter M. Simons, "Identity Through Time and Trope Bundles", *Topoi*, Vol. 19, No. 2 (Dec., 2000): pp. 147-155; Jonathan Schaffer, "The Individuation of Tropes", *Australasian Journal of Philosophy*, Vol. 79, No. 2 (Jun., 2001): pp. 247-257; L.A. Paul, "Logical Parts", *Noûs*, Vol. 36, No. 4 (Dec., 2002): pp. 578-596; Anna-Sofia Maurin, *If Tropes* (Dordrecht: Kluwer Academic Publishers, 2002); Douglas Ehring, *Tropes: Properties, Objects, and Mental Causation* (Oxford: Oxford University Press, 2011); Markku Keinanen, "Tropes—The Basic Constituents of Powerful Particulars?", *Dialectica*, Vol. 65, No. 3 (Sep., 2011): pp. 419-450. For discussion, see, for example: Robert K. Garcia, "Bundle Theory's Black Box: Gap Challenges for the Bundle Theory of Substance", *Philosophia*, Vol. 42, No. 1 (Mar., 2014): pp. 115-126; Robert K. Garcia, "Tropes and Dependency Profiles: Problems for the Nuclear Theory of Substance", *American Philosophical Quarterly*, Vol. 51, No. 2 (Apr., 2014): pp. 167-176.

[82] Armstrong, *A World of States of Affairs*, p. 1.

[83] *Ibid.*

[84] *Ibid*., p. 22.

[85] *Ibid.*, pp. 1, 28-29.

According to Armstrong, there are, in addition to these atomic states of affairs, certain molecular or complex states of affairs.[86] States of affairs are complex when they include more than one particular (for example, the state of affairs involving two particulars joined by some relation) or more than one property (for example, the state of affairs involving one particular instantiating two or more properties at the same time[87]), or both. States of affairs that involve both a multitude of particulars and a multitude of properties or relations are what we might call structural states of affairs, and the properties that give rise to such states of affairs, structural properties. In an earlier work, Armstrong defines 'structural property' as follows: "A property , S, is structural if and only if proper parts of particulars having S have some property or properties, T… not identical with S, and this state of affairs is, in part at least, constitutive of S. It will be seen that a structural property must be complex."[88] Importantly, some structural properties include among their constituents, in addition to various properties or monadic universals, certain relations between the particulars that comprise the structural state of affairs. As Armstong explains,

> Structural properties may or may not involve certain relations among the parts of the particulars having the properties. Consider the putative property, being one kilogram in mass exactly. This is a structural property. The proper parts of one-kilogram particulars are not one-kilogram particulars. These parts, individually weighing less than one kilogram, together make up an object of mass one kilogram. But no particular relations between these parts seem involved in the object having this property. For instance, the parts may be scattered parts. Compare this with being a hydrogen atom or being a certain tartan pattern. Not every particular which contains the essential constituents of a hydrogen atom is,

[86] *Ibid.*, pp. 1, 19, 122.
[87] Armstrong calls these states of affairs "thick particulars" (see, for example: *Ibid*., pp. 124-125).
[88] Armstrong, *Universals and Scientific Realism*, p. 69.

> or even contains, a hydrogen atom. To be a hydrogen atom, a particular must include an electron and a proton. But, more than this, the electron and proton must stand in certain relations. The particular made up of an electron in atom A and a proton in atom B is not a hydrogen atom. To be a token of a certain tartan pattern, it is not necessary that a particular include certain sorts of constituents (yellow stripes, etc.). But it is further necessary that the constituents be arranged in a certain way. We will say of the latter type of structural property that it is a relationally structural property. It includes relations among its parts. Properties like being one kilogram in mass will be said to be non-relationally structural properties.[89]

What is especially significant about this passage in particular is how strikingly close its characterization of "relationally structural properties" comes to Koslicki's own characterization of structures. Consider once again the following passage from *The Structure of Objects*:

> we may think of the formal components associated with a particular kind of whole… as the sorts of entities that provide 'slots' to be filled by objects of a certain kind: thus, the formal components belonging to a particular kind of whole will generally specify not only the configuration to be exhibited by the material components in question, i.e., how these objects are to be arranged with respect to one another; they will also usually specify the variety of material components of which the whole in question may be composed, i.e., what sorts of objects can go into the various 'slots' provided by the formal components[90]

[89] *Ibid.,* pp. 70-71.
[90] Koslicki, *Structure of Objects*, p. 169.

Now, there are some significant differences between Armstrong's and Koslicki's views. One noteworthy difference is that Armstrong recognizes two forms of composition, mereological and non-mereological, whereas Koslicki recognizes only mereological.[91] But they both seem to have very similar views about what a structure is, and they both consider such structures to be proper parts of composite wholes. And so it is unclear to me whether Neo-Aristotelian structural hylomorphism does in fact offer a novel or unique account of material objects. Two of the principal features of that account – that there is a structural aspect to material objects, and that that structural aspect is to be construed as a proper part of such objects – were already principle features of Armstrong's own account when he started articulating his views more than thirty years ago.[92]

Consider, also, the bundle theory of material objects. The sort of bundle theory that I have in mind here is built on three fundamental claims: (1) all of the properties of a material object are particulars, rather than universals,[93] (2) material objects are collections of particular property-instances; that is, each of a material object's particularized properties, or "tropes", is one of its proper parts or constituents, and (3) material objects have no other proper parts or constituents (i.e., there are no bare particulars or substrata of any sort that might be said to

[91] See, for example: Armstrong, *A World of States of Affairs*, pp. 122, 126; Koslicki, *The Structure of Objects*, pp. 167-168.

[92] That Koslicki's view, or something very much like it, can be seen as an extension of Armstrong's for precisely this reason is briefly suggested by Harte in her *Plato On Parts and Wholes*, p. 161. It is puzzling to me that Koslicki herself never makes this connection between her view and Armstrong's, even though she cites his work frequently throughout her book.

[93] There are versions of bundle theory according to which objects are composed of nothing but property-*universals* (see, for example: Bertrand Russell, *An Inquiry into Meaning and Truth* (New York: W. W. Norton & Co, Inc., 1940); James van Cleve, "Three Versions of the Bundle Theory", *Philosophical Studies*, Vol. 47, No. 1 (Jan., 1985): pp. 95-107; Albert Casullo, "A Fourth Version of the Bundle Theory", *Philosophical Studies*, Vol. 54, No. 1 (Jul., 1988): pp. 125-139; John O'Leary-Hawthorne and J.A. Cover, "A World of Universals", *Philosophical Studies*, Vol. 91, No. 3 (Sep., 1998): pp. 205-219; L. A. Paul, "Logical Parts", *Noûs*, Vol. 36, No. 4 (Dec., 2002): pp. 578-596; L. A. Paul, "Coincidence as Overlap", *Noûs*, Vol. 40, No. 4 (Dec., 2006): pp. 623-659; L. A. Paul, "Building the World From its Fundamental Constituents", *Philosophical Studies*, Vol. 158, No. 2 (Mar., 2012): pp. 250-255; L. A. Paul, "A One Category Ontology", in John A. Keller (ed.), *Being, Freedom, and Method: Themes from van Inwagen* (Oxford: Oxford University Press, forthcoming)), but in order to fill out both horns of my dilemma for Neo-Aristotelian structural hylomorphism, here I will focus on the property-*trope* versions of the view.

underlie the properties of those objects[94]). On this sort of view, my coffee cup, for example, can be exhaustively decomposed into its color, its shape, its mass, its spatiotemporal location, and any other properties that characterize it at any particular time. All of these properties jointly compose or constitute my coffee cup and there is nothing more to the cup than these properties.

Given this characterization of the bundle theory of material objects, it should now be clear that if the structure of an object is a certain sort of property of that object, and if that property is a trope-like particular, then Neo-Aristotelian structural hylomorphism's claim that that structure is itself a part of the object is a claim that bundle theorists already accept. Neo-Aristotelian structural hylomorphism's purportedly novel thesis would really just be a way of specifying claim (2). As Merricks puts it, discussing Koslicki's view in particular,

> trope theorists say that all of an object's properties are parts of that object. So they say that an object's structure – assume its structure is a property – it itself a part of that object… So they agree with Koslicki's claim that an object's structure is a part of that object. Thus her claim turns out to be just one predictable upshot of trope theory, as opposed to a new account of the nature of objects, or a bold hypothesis about how an object's structure differs from its other properties. In this way, I think that trope theory makes Koslicki's claim less exciting than it originally seemed to be.[95]

Moreover, even if structure turns out to be more like a relation or a set of relations, these too are already taken to be parts of material objects according to bundle theory. For example, consider the following description of Peter Simons's bundle theory of material objects:

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[94] For some helpful overviews of the different versions of substratum theory, see, for example: Jeffrey E. Brower, *Aquinas's Ontology of the Material World: Change, Hylomorphism, and Material Objects* (Oxford: Oxford University Press, 2014): pp. 35-41, 130-151; Michael J. Loux, *Metaphysics: A Contemporary Introduction*, Third Edition (New York: Routledge, 2006): pp. 84-120; Michael J. Loux, *Substance and Attribute: A Study in Ontology* (Dordrecht, Holland: D. Reidel Publishing, 1978): pp. 107-112, 112-115, 140-152.

[95] Merricks, "Review of *The Structure of Objects*", p. 305.

> Everyday substances will however be more than just a single trope bundle. Everyday material objects have smaller material objects as their material parts: a human being has limbs, organs, tissues, cells, etc. as parts, and all of these interacting parts are themselves substances and there are tropes, unary *and relational*, linking and characterising them. A human being is at any one time a hugely complex whole of interrelated parts *in static and dynamic relations to one another*… Only objects without parts in the common or garden sense are pure bundles of tropes and nothing else. Everything else is a whole of parts which are wholes of parts which are… etc. until we come to the parts which are as they are not because they have parts but because they are bundles of tropes.[96]

What this passage shows us is that even Neo-Aristotelian structural hylomorphism's "hierarchical" view of material objects, according to which the complement of a material object's structure is a certain set of material constituents, which are themselves structured wholes, can be re-described in bundle-theoretic terms.

Now, perhaps what distinguishes Neo-Aristotelian structural hylomorphism from the bundle theory of material objects is that the former claims that the only properties of material objects that are included among the proper parts of those objects are the spatial and causal relations that hold between their material constituents. We might also say that what distinguishes Neo-Aristotelian structural hylomorphism from the bundle theory of material objects is that it is not committed to the claim that all of the parts of a material object are ultimately decomposable into property-tropes. However, despite these important differences, it is clear from the aforementioned that if an object's structure turns out to be nothing more than a certain sort of property, or the spatial and causal relations that hold between that object's material constituents,

[96] Simons, "Farewell to Substance", p. 244.

and if that property or those spatial and causal relations turn out to be trope-like particulars, then two of the principle features of Neo-Aristotelian structural hylomorphism – that there is a structural aspect to material objects, and that that structural aspect is to be construed as a proper part of such objects – are already principle features of the bundle theory of material objects, and were principle features of that view when D.C. Williams first began formulating it over fifty years ago. As a result, unless Neo-Aristotelian structural hylomorphists can somehow distinguish the sorts of structures that they have in mind from the sorts of properties or spatial and causal relations between parts already recognized as constituents of material objects by Armstrong and bundle theorists, the view risks collapsing into one or the other of these already well-entrenched metaphysical views. In other words, instead of offering a new and exciting view of material objects, Neo-Aristotelian structural hylomorphism might end up being simply redundant.

I think that there are at least two strategies available to the Neo-Aristotelian structural hylomorphist for resisting the reducibility of his or her view to one of the aforementioned, well-entrenched metaphysical views. Unfortunately, neither one of these strategies is without significant costs. First, the structural hylomorphist could say that, while a given structure is not identical to any particular set of relations, it is, at any time that it exists, *composed* of various relations. Structure might, then, be some sort of *sui generis,* higher-order property that has lower-level relations as parts. We have already seen that Neo-Aristotelian structural hylomorphists reject the composition as identity thesis for composite wholes and their constituents.[97] And there are a handful of other contemporary metaphysicians who have rejected it (for various reasons) as well.[98] So it is at least open to the Neo-Aristotelian structural

[97] I emphasized this fact in my discussion of overdetermination cases, on p. 25 above.

[98] For other accounts of material objects that reject the composition as identity thesis, see, for example: Peter van Inwagen, "Composition as Identity", *Philosophical Perspectives*, Vol. 8 (1994): pp. 207-220; Merricks, *Objects and Persons,* pp. 20-28; Kris McDaniel, "Against Composition as Identity", *Analysis*, Vol. 68, No. 2 (Apr., 2008): pp. 128-133. For more on composition as identity, see the essays in Aaron J. Cotnoir and Donald L. M. Baxter (eds.), *Composition as Identity* (Oxford: Oxford University Press, 2014).

hylomorphist to say that any particular structure is a sort of complex, *sui generis* property composed of various relations without being identical or reducible to any one of them or even any set of them.

I have two concerns for this sort of approach. First, inasmuch as the structural hylomorphist makes structure out to be a complex, higher-order property, it would seem thereby to make that structure dependent for its existence on the sorts of lower-level relations of which it is composed. Keeping in mind that each of the particular lower-level relations of which the structure is composed is itself an accidental property (a property that the object could lose while remaining the same object), this approach would entail that a form, the essential component of any material object, necessarily depends for its existence (and perhaps even for its identity) on accidental properties, various non-essential features of the object. But this schema would seem to have things precisely backwards. If the form of an object is its most essential component, that which makes it what it is and to be of a certain kind, should not the various accidental features of that object stem from or be grounded in its existence, rather than the other way around? Should not the fact that I have two legs be explained by the fact that I have a certain essential form, and not vice versa?

One way to get around the previous implication would be to combine a mereological conception of structure, a rejection of the thesis that composition is identity, and the claim, which was mentioned briefly in the previous section, that some wholes might be ontologically prior to their parts.[99] According to this suggestion, a form, as structure, would be a whole, composed of, but not identical to, various spatial and causal relations, but it would also be ontologically prior

[99] For views according to which at least some composite wholes are ontologically prior to their parts, see, for example: Harte, *Plato on Parts and Wholes*, pp. 158-167, 273-281; Jonathan Schaffer, "Monism: The Priority of the Whole", *The Philosophical Review*, Vol. 119, No. 1 (Jan., 2010): pp. 31-76; Inman, "Substantial Priority". As I pointed out earlier, both Mark Johnston and Kit Fine consider this possibility as well (see footnote 62 above).

to those relations, in that each of those spatial and causal relations would depend for its existence on the whole of which it is a part. I actually think this is a promising route for the structural hylomorphist to take. It is not a route that any of the Neo-Aristotelian structural hylomorphists considered above do take, and it might require them to abandon certain features of their views, but it could be done. The only concern I have for this suggestion is that it ends up making forms mereologically complex. Even if we reverse the priority relations between structures and their parts, it is still the case, on this model, that forms have parts. And this complexity within a form might be seen to undermine its ability to unify the material constituents and the species-specific capacities of the larger substance of which it is part.[100]

A second strategy for resisting the Reducibility Objection would be to say that structure is both distinct from, and ontologically prior to, any spatial or causal relations that hold between the material constituents of a composite object. The structural hylomorphist pursuing this strategy would, then, deny all of the following: (1) that a structure is a relation, (2) that a structure is a set of relations, and (3) that a structure is composed of, but not identical to, a set of relations. Instead, he or she would espouse something like: (4) that a structure underlies or explains the existence of certain relations, but is itself a member of some non-relational ontological category. At least one of the quotations from Koslicki featured above would seem to advocate such a view (I include it here again for emphasis):

> The evidence reviewed above suggests that structures are at least in some contexts treated as objects, rather than as properties or relations. At the same time, even when structures are so treated, they are always also closely linked with certain

[100] In a famous passage from Book I, Chapter 5 of his *De anima*, Aristotle argues that in order to unify the material parts of a substance, a form must be itself maximally unified – that is, without parts (see: Aristotle, J. A. Smith (trans.), *On the Soul*, in Jonathan Barnes (ed.), *The Complete Works of Aristotle*, Vol. 1 (Princeton, NJ: Princeton University Press, 1984): p. 655). For a critique of Aristotle's argument here, as well as a list of the relevant texts, see Koslicki, *The Structure of Objects*, pp. 195-196.

> properties and relations which elements in the domain come to exhibit as a result of occupying the positions made available by the structure in question; but these properties and relations are nevertheless in these contexts not identified with the structures with which they are associated.[101]

The downside to such a "solution" to the problem is that it leaves the ontological status of structure, the centerpiece of the Neo-Aristotelian structural hylomorphic account of material objects, a complete mystery. If a material object's structure is not one of its properties, or any of the spatial or causal relations that hold between its material constituents, then what is it? The quotation from Koslicki featured above seems to suggest that she might prefer a conception of structure according to which a material object's structure is itself an object, albeit one that is different in kind from the other objects that serve as the material constituents of the whole. If structures are indeed objects, then this might explain why Koslicki is so adamant in her claim that they ought to be construed as proper parts of composite material objects. It might also explain why she does not feel the need to introduce a distinctive non-mereological form of composition in order to include them in her account of material objects, as Armstrong does for his structural universals. But in order for this strategy to work, Koslicki or other Neo-Aristotelian structural hylomorphists will need to say more about what sort of object they take structures to be and why it is that they must be construed as objects rather than as properties or relations. Until we are given such an ontology of structure, we are left wondering how an object's structure could be anything but one of its properties or one or more of the causal or spatial relations that hold between its material constituents. And so, until then, the threat of redundancy remains for Neo-Aristotelian structural hylomorphism.

VI. Fragility and Identity over Time

[101] *Ibid.,* p. 252.

One of the most salient, and yet one of the most philosophically troublesome, features of the natural world that form has traditionally been posited to explain is identity over time.[102] Most medieval scholastic proponents of hylomorphism, for instance, held that form is both the ground and explanation for the continued existence of material substances through various sorts of changes in their other constituents. Consider, for example, my cat, Nico. Nico was once a small, frail kitten that we found underneath the hood of a truck. Later on, Nico got bigger and stronger, faster and smarter. He ate, drank, shed his fur, and, in an unfortunate accident, lost most of his tail. Nico still has black fur, but most of his other features have changed over time. In addition, Nico has, by now, shuffled through various material constituents at a rapid rate, such that none that he once had now remain a part of him. According to many medieval proponents of hylomorphism, what makes it the case that Nico is the very same cat now as that kitten we once found underneath the hood of a truck is the fact that Nico's various material constituents are actualized by the very same form (which, in Nico's case, is a particular feline soul). And a similar story can be told for other material substances. What makes a particular substance the very same particular substance at some later time is the continued existence of a particular form. This is typically seen as one of the principal explanatory advantages of hylomorphism.[103]

Now, it is not clear to me that contemporary hylomorphists *must* preserve tradition here. It is not obviously an essential feature of a hylomorphic account of material objects that it be able to provide a formal explanation for identity over time. However, there are good reasons to think that a hylomorphic account of material objects *would* be able to provide such an explanation. For, if the form of a composite material object is that which brings it into existence, makes it what it is, places it in its natural kind, and grounds its kind-specific capacities, then it

[102] For an excellent overview of the role of form in medieval accounts of the identity over time of composite material substances, see: Pasnau, *Metaphysical Themes,* Ch. 29.
[103] *Ibid.*

would also seem to follow that if that composite material object is to maintain its identity over time, it ought to at least have the same form throughout.

As I will investigate in more detail below, each of the four Neo-Aristotelian structural hylomorphists considered above has something to say about identity over time. Each of them seems to want to offer *some* sort of formal explanation for the persistence of composite material objects. But is a conception of form as a relation or as a structure capable of preserving this explanatory virtue of hylomorphism? Can Neo-Aristotelian structural hylomorphists maintain both that form is best understood as a material object's structure or the unifying relation that holds between its material parts and that the form of that material object is what grounds and explains its continued existence over time?

Initially, in the example above, it seems clear that Nico has survived a change in not only his material constituents, but also in some of the structural features that his material constituents have exhibited throughout his life. Nico got taller and fatter, recovered from various maladies, picked up new behavioral tendencies, and, later on, sadly, lost his tail. And so, if it is true that Nico's persistence over time is grounded in the persistence over time of his form, then that form cannot be identified with *those* structural features. Which structural features, then, could be said to stay the same? When we look at the particular structural features of any material object, the particular causal and spatial relations that hold between its parts, it is hard to see how any one of them, let alone any subset of them, could remain for very long. Though my cat Nico exhibits a very similar structure to that which his material parts exhibited earlier on, it seems that, strictly speaking, it is not the very same structure.

My third worry for the Neo-Aristotelian structural hylomorphist conception of form, then, is that any particular structure that is realized in the matter of a material substance at any

time seems too fragile to ground the persistence of that substance over time. It, too, seems to change, one particular structure succeeding that which came before, no one structure surviving for very long. And without itself remaining the same, there is a real concern here about whether structure can ground the persistence of the substance of which it is part. Thus, the structural hylomorphist's conception of form would appear not to be able to preserve the traditional persistence-grounding role of form, despite the remarks (to be considered in more detail below) of contemporary Neo-Aristotelians to the contrary. Call this the *Fragility Objection* to Neo-Aristotelian structural hylomorphism.

Each of the four versions of Neo-Aristotelian structural hylomorphism that I considered above feature some sort of solution to something like my Fragility Objection. First, Johnston makes a distinction between two sorts of principles of unity:

> A form or principle of unity may be static, in that its holding of certain parts requires that the parts it holds of remain as they are, and remain ordered as they are… form or principle of unity may be instead be dynamic, in that its holding of certain parts may allow or require that the parts it holds of vary over time; either by those very parts undergoing intrinsic change, or by their being replaced with parts of the same kind, or by their being shed without replacement.[104]

Here Johnston introduces the notion of a "dynamic" principle of unity or a "dynamic" structure. However, it is not clear that this by itself solves the problem. For, as Johnston understands the notion, a dynamic principle of unity appears to be one in which the relations stay the same, but the material *relata* of those relations change over time. And the observation with which I began my formulation of the problem was that in the case of my cat, Nico, the relations that hold

[104] Johnston, "Hylomorphism", p. 663; Johnston, "Constitution", pp. 648-649; Johnston, "Parts and Principles", p. 143.

between his parts do not stay the same; they themselves change, sometimes dramatically, over time.

Fine's solution to the Fragility Objection involves the postulation of a whole new sort of material object: a "variable embodiment".[105] Earlier I gave a characterization of Fine's view according to which a material object is composed of a set of material constituents and a relation that unifies them. Fine calls these sorts of material objects "rigid embodiments". As is clear from the descriptions above, rigid embodiments are fragile; no rigid embodiment can survive the loss of any of its material constituents or any change in its "principle of rigid embodiment" - the relation that holds those material constituents together. Variable embodiments, on the other hand, are not as fragile; a variable embodiment can survive some changes in its material constituents and some degree of change in its principle of rigid embodiment. This is because a variable embodiment has an additional part, a "principle of variable embodiment", which guarantees the continued existence of that variable embodiment through changes in its material constituents and various principles of rigid embodiment.[106]

As an illustration of what he has in mind here, Fine offers the following example:

> Here is one way of getting an intuitive grip on the notion of a variable embodiment. Imagine a container into and out of which water flows. We may then distinguish between three things: (a) the container itself, (b) the water that is in it at any given time, and (c) the container with the water in it. We may think of (c) as a single object that has different water as a part at different times. Let us now make two modifications to our conception of the container. First, we suppose that it not merely a passive recipient of the water but somehow determines which

[105] Fine, "Things and Their Parts", p. 68.
[106] *Ibid.,* pp. 68-69.

> water is to be in it at any one time. It plays an active role, as it were, in determining what its content is to be over time. Second, we suppose that the container is not another physical object but something of a more abstract or conceptual nature. Thus the varying contents of the container will be determined by conceptual rather than by physical means.[107]

As Fine explains right before this example, a principle of variable embodiment is more like a quasi-mathematical "function" than a single relation, a set of relations, or a particular structure.[108] (His description of the causal role that this principle of variable embodiment plays in the material object of which it is part, however, sounds very similar to the sort of role that Koslicki envisions for structure.[109])

In response to Fine's proposed solution to the Fragility Objection, I will say just two things. First, there is a worry here that in describing the principle of variable embodiment as having a "conceptual nature" (later on in the article he refers to it as the "intensional element" of a variable embodiment[110]), Fine seems to suggest that the identity of a variable embodiment depends on certain human conventions or features of human reason rather than having the sort of independent existence characteristic of substances.[111] Second, it is worth noting that in his attempt to capture the dynamic character of certain material objects, Fine is forced to supplement, if not altogether replace, his relationalist conception of form with a "functionalist" conception. The form for variable embodiments, then, turns out to be neither a relation nor a structure, but a function. This is an important point. For, as Koslicki remarks, "from the point of view of those not yet in the grip of the mereological rigidity of traditional sums, it would seem

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[107] *Ibid.*
[108] *Ibid.*
[109] See pp. 6-7, above.
[110] *Ibid.,* p. 73.
[111] See Koslicki, *The Structure of Objects*, p. 86 for more on this.

that the material world in general is composed, in the terminology of Fine's theory, of variable embodiments."[112] In other words, it is Fine's account of variable embodiments, not his account of rigid embodiments that really describes the sorts of objects with which we are familiar. And so if the conception of form present in that account says that form is neither a relation nor a structure, it may very well be that Fine is not a structural hylomorphist after all.

Like Johnston and Fine, Koslicki, too, recognizes that material objects persist through various changes in their material constituents:

> One of the ways in which a structured whole may change over time is by tolerating the addition, alteration or loss of some of its material components. The table, for example, given the persistence conditions ordinarily ascribed to objects of this kind, need not be constituted of the same legs, the same top or the same hardware throughout its career; the legs, top and hardware in turn need not be constituted of exactly the same wood and metal throughout their career; and so forth…[113]

And, like Fine, and unlike Johnston, she also recognizes that material objects seem to persist through various changes in their structural features:

> Similarly there is of course an endless variety of ways in which the general formal requirements that come with wholes of a specific kind may be manifested in particular objects at particular times; and, depending on the persistence conditions which characterize the objects in question, one and the same mereologically complex object may well tolerate a fair share of structural change in this regard.[114]

[112] *Ibid.,* p. 90.
[113] *Ibid.,* p. 189.
[114] *Ibid.*

As this passage indicates, Koslicki's preferred solution to something like my Fragility Objection relies on a distinction between "general formal requirements" and "particular manifestations" of those formal requirements. According to Koslicki, it is the continuity of these general formal requirements that grounds the persistence of substances over time, not the obviously more fragile particular manifestations of those requirements:

> Thus, the material components of which an H_2O molecule consists, viz., the two hydrogen atoms and the single oxygen atom, must always exhibit the relation of chemical bonding, for as long as they compose an H_2O molecule; but the specific way in which they exhibit this configuration of chemical bonding may vary over time, without affecting the existence or identity of the whole in question. In light of these considerations, then, we ought to think of the formal components, as they have been described up to this point, as something closer to determinables, of which particular determinates are represented in a mereologically complex object at each time at which it exists. To what extent structural change is permitted either with respect to the determinable or the determinate manifestation of an object's formal components depends on the persistence conditions that are operative in the particular case at hand.[115]

Koslicki's distinction between general formal requirements and particular manifestations of those requirements does seem like an important and plausible distinction to make. On the face of it, it does seem that Nico has maintained something like a general feline structure throughout his life, even if the particular way in which he has realized that structure has changed over time.

[115] *Ibid.,* pp. 189-190.

With that said, I do have some concerns for Koslicki's proposed solution. First, as Koslicki herself admits,[116] even if the persistence of certain general formal requirements is a *necessary* condition for the continued existence of any material substance, the persistence of those features cannot also be a *sufficient* condition for the continued existence of any *particular* substance. This is because, for Koslicki, forms are universals, not particulars. And so any particular cat will have, as its "general formal part" (i.e., its form) the very same feline structure as any other cat. Koslicki's account might, then, explain why it is that there is the same *type* of substance in existence at two different times, but general formal requirements alone cannot explain why it is the very same *particular* substance that exists at both of those times.[117]

My main objection to Koslicki's proposed solution, however, comes in the form of a trilemma. Suppose, first, that it is indeed the case that the various material constituents of my cat Nico continue to meet some general formal requirements throughout Nico's life. The question we must ask, then, is this: is there, in the case of my cat, Nico, some single structure, some single formal part, that persists throughout the whole of his life or not? If, strictly speaking, there is no single structure, no single formal part that persists throughout the whole of his life, only a continuous chain of relevantly similar structures or formal parts, then it is not the case that the persistence of my cat Nico is grounded in the persistence of any particular structure or formal part. If, however, there is some structure that persists throughout the whole of his life, then we must ask one further question: what is the relationship between this structure and the structural features of his various material constituents that have changed over time? If the structure that remains the same over time is identical to, or in any way composed of, these more fragile

[116] See: *Ibid.,* p. 191.

[117] At page 191 of *The Structure of Objects*, Koslicki seems to admit as much, granting that "[s]ince the current approach is not addressed directly to the question of how to account for the identity of an object with itself over time, the resources provided by it by themselves do not yield an account of diachronic identity." In what follows I attempt to show that Koslicki's conception of form not only *does* not provide an account of diachronic identity, but that it *can*not provide such an account.

structural features, then that structure itself changes. If, however, the structure that remains the same over time is not in any way composed of these more fragile structural features, it must instead underlie or stand beside them as a member of some other ontological category. The problem with the former suggestion is that it just pushes the demand for an explanation for the persistence of composite material objects back a step. If the structure of a material object itself changes, what grounds or explains *its* persistence over time? The problem with the latter suggestion is that we have no reason to believe that what underlies or stands beside a material object's more fragile structural features is itself a structure of any kind. This brings us back to the impasse to which we arrived at the end of my discussion of the Reducibility Objection above. As a result, I conclude that Koslicki's conception of form as structure cannot preserve the role of form as the ground and explanation for the continued existence of composite material objects over time.

Of the Neo-Aristotelian structural hylomorphists that I have considered in this chapter, Jaworski is the only one who explicitly claims that his account of form as structure preserves its traditional role as the ground and explanation for the continued existence of material substances through various sorts of changes. In the case of living things, for instance, Jaworski explains,

> The dynamic structure that qualifies something as a living thing is also what enables that thing to persist through time. It is one and the same organism that persists through the constant influx and efflux of matter and energy because of its structure and its dynamic ability to impose that structure on incoming matter and energy.[118]

Here Jaworski, like Johnston, invokes the concept of a "dynamic structure" to try to explain identity over time. But what is a "dynamic structure"? Is it, like Johnston's dynamic principle of

[118] Jaworski, *Structure and the Metaphysics of Mind*, p. 16; Jaworski, "Metaphysics of Structure", p. 181.

unity, a complex relation, the *relata* of which change over time? Is it, like Koslicki's general formal requirements seem to be, a complex universal, the constituent universals of which change over time? Or is it, like Fine's principle of variable embodiment, a function, which is in some way prior to any particular relations or structures that hold between an object's material constituents? As I interpret him, Jaworski intends for his structures to be dynamic in a way that goes beyond the dynamicity of Johnston's principles of unity, Koslicki's general formal requirements, or Fine's functions. For Jaworski, it seems that certain structures are considered dynamic not because they themselves *change* over time, but because they are a *changing* in something else. Earlier we saw that, in various places Jaworski seems to suggest that his structures are not relations or configurations, but *activities*. In his most recent article on the subject, Jaworski pursues this idea in more detail:

> Once a structured individual comes into existence it is essentially and continuously engaged in configuring materials. The materials it configures are precisely those that compose it. When it comes to characterizing the configuring activity of structured individuals, hylomorphists can adopt most of what van Inwagen says about lives, at least when it comes to the configuring activities of living things, the paradigmatic structured individuals. My life is identical to my configuring various fundamental physical materials at various times—an event that has the characteristics van Inwagen attributes to lives, and that has many other characteristics it is business of the biological sciences to describe. *An individual living thing does not configure exactly the same materials for very long since those materials are in constant flux; despite this, the individual maintains itself one and the same through all the changes on account of its ongoing*

> *configuring activity. That activity is what unifies various materials into a single individual, both synchronically and diachronically*, just as lives do on van Inwagen's account.[119]

It seems clear from these remarks that Jaworski's solution to something like my Fragility Objection involves a significant departure from the structuralist views of his contemporary Neo-Aristotelian counterparts. Jaworski refers to that which grounds and explains the identity of a material substance over time as structure, but in this context, it seems that Jaworski's conception of form is not structuralist after all. In order to capture the inherent dynamism of material objects, Jaworski seems to have moved away from structural hylomorphism, and toward a more dynamic, activity-based conception of material objects.

All four of the Neo-Aristotelian structural hylomorphists considered in this chapter, then, fail to provide an adequate solution to what I am calling the "Fragility Objection" to the structuralist conception of form. Johnston underestimates the degree to which composite material objects are able to undergo various changes in their structural features. Koslicki offers a partial explanation of the identity of composite material objects over time in terms of general formal requirements, but fails to explain how any particular composite material object can remain the same over time, given that it undergoes various changes in its structural features. Fine and Jaworski do offer their own analyses of identity over time, but in order to capture the degree to which composite material objects undergo changes in their structural features, they are forced to adapt their hylomorphic accounts of material objects in such a way that their accounts are no longer clearly versions of structural hylomorphism.

VII. Conclusion

[119] *Ibid.,* p. 193, emphasis added.

In this paper I have presented three concerns for Neo-Aristotelian structural hylomorphism. First, I argued that Neo-Aristotelian structural hylomorphism's conception of form as a polyadic relation or structure commits it to a preservationist diachronic theory of composition, and that a preservationist diachronic theory of composition, when paired with Neo-Aristotelian structural hylomorphism's anti-reductionist account of composite material objects, gives rise to a certain sort of systematic causal overdetermination. In this way, structural hylomorphism fails to preserve the economy of a hylomorphic account of material objects. Second, I argued that, due to its relatively thin conception of form as a polyadic relation or structure, Neo-Aristotelian structural hylomorphism risks collapsing into some other already well-entrenched metaphysical view, such as David Armstrong's theory of states of affairs, or the bundle theory of material objects. In this way, structural hylomorphism fails to preserve the uniqueness of a hylomorphic account of material objects. Third, I argued that, due to its emphasis on the mostly static structural features of composite material objects, Neo-Aristotelian structural hylomorphism is unable to provide a formal explanation for the identity over time of those objects that exhibit a greater degree of dynamic complexity, such as living organisms. In this way, structural hylomorphism fails to preserve one of the principal explanatory virtues of a hylomorphic account of material objects: that material objects persist over time by virtue of their forms.

For these three reasons, I think that Neo-Aristotelian structural hylomorphism, the most popular contemporary hylomorphic approach to understanding material objects, fails. I do not, however, think that this is reason enough to abandon the project of hylomorphism altogether. As I argued above, there are significant theoretical and explanatory virtues of a hylomorphic account of material objects. What I take these concerns to have shown is that those who are sympathetic

to something like a hylomorphic account of material objects might have to look elsewhere for an alternative approach to understanding the nature of form.[120]

[120] *[acknowledgements redacted for purposes of blind review]*