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Forms as Simple and Individual Grounds of Things' Natures

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To understand Aristotle's conception of *form*, we have to see clearly the relationship between his account and Plato's Theory of Forms. I offer a novel interpretation of Aristotle's Moderate Realism, in which forms are simple particulars that ground the character and mutual similarity of the entities they inform. Such an account has advantages in three areas: explaining (1) the similarity of particulars, (2) the synchronic unity of composite particulars, and (3) the diachronic unity or persistence of intrinsically changing particulars.

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I. Introduction

As Elizabeth Anscombe and Peter Geach observed (in their *Three Philosophers*, Anscombe and Geach 1961), Aristotle's notions of matter (*hule*) and form (*eidos* or *morphe*) are quite elusive, especially to the modern mind. They have been interpreted in many different ways over the centuries. In this paper I offer a new account of the two notions, drawing on some recent work on *metaphysical grounding* by Kit Fine (2012), Jonathan Schaffer (2016), Gideon Rosen (2010), and others and recent work on tropes (individualized properties, accidents, or modes) by Michael Loux (2006) and Robert Garcia (2015). I am primarily interested in metaphysics, and I offer an account of form and matter that is defensible in its own terms. I believe that something in the neighborhood of what I am proposing here makes the best sense of Aristotle's system as a whole, but I will not offer here a point-by-point defense of the theory as an interpretation of specific texts in Aristotle's corpus. I hope to offer such a defense in subsequent work.

In section II, I will briefly discuss and defend an Aristotelian solution to the problem of universals. It's critically important to discuss the concept of form within the context of Aristotle's answer to Plato's problem of the one over the many. Then (in section III) I will present three arguments for the thesis that forms ground internal structure.

II. Moderate Realism and Constituent Ontology

It's important to remember where the idea of *form* (*eidos*, *morphe*) came from. For Aristotle, form was not originally conceived as a solution to the mind/body problem, or to the problem of material composition. Aristotle's notion of form is a direct descendant of Plato's Forms, introduced as a solution to the problem of universals, the problem of explaining the existence of samenesses through plurality (the One over the Many).

Aristotle immanentizes Plato's other-worldly Forms as individual essences, thereby creating a genuine alternative to both Nominalism (the rejection of any explanation of non-numerical sameness) and Realism (Plato's postulation of non-individual Forms as the grounds of sameness). Aristotle's alternative is attractive because of the serious problems that attend the two alternatives.

What's wrong with standard versions of Nominalism?

There are two versions of Nominalism that are worthy of consideration: Ostrich Nominalism and Resemblance Nominalism.¹ Ostrich Nominalists refuse to offer any general account of non-numerical sameness. To say that two things are similar or *the same* in some non-numerical sense is simply to say that they are

¹ As David Lewis (1983) recognized, natural-class Nominalism is nothing but a notational variant of Resemblance Nominalism.

both *red* or both *kangaroos* or whatever. Each form of similarity is metaphysically *sui generis*. This is a viable position, but as Bryan Pickel and Nicholas Mantegani (2012) have recently argued (see also our discussion of this in Koons and Pickavance 2017, 139–42), Ostrich Nominalism comes at a very high cost in terms of qualitative economy or parsimony, since it treats every natural kind as a metaphysical primitive.

Resemblance Nominalism avoids this cost by offering a single, general account of sameness in terms of a metaphysically primitive comparative resemblance relation. Of course, such an account is not an explanation of similarity, but simply a matter of recognizing similarity as a general phenomenon, while treating it as metaphysically primitive (i.e., inexplicable). There are at least three serious problems with Resemblance Nominalism (see Koons and Pickavance 2017, 152–63, for a detailed account):

- (i) Resemblance Nominalism reverses the proper order of explanation. Things are similar because they are in some way intrinsically the same; they are not the same because they resemble each other. Resemblance Nominalism has to treat similarity as though it were an external and not internal relation.
- (ii) The problem of imperfect community (first identified by Nelson Goodman 1951/1977) requires for its solution both possibilism (the postulation of possible but not actual entities) and either tropes (including generic or determinable tropes) or fantastic complexity in the structure of the resemblance relation (along the lines of Lewis 1983 or Rodriguez-Pereyra 2002),
- (iii) Resemblance Nominalism cannot explain the structural facts about the resemblance relation, namely, that it is necessarily symmetric and transitive (in the limit of perfect resemblance). Gonzalo Rodriguez-Pereyra (2002, 69–79) demonstrated that we can demonstrate that the resemblance relation is symmetric and transitive, but only on the assumption that the relation has those formal features that are needed for a resemblance-nominalist account of the existence of properties to work. That is, Rodriguez-Pereyra shows that Nominalists must assume (if their account is to have any hope of success) that the resemblance relation is symmetric and transitive. In other words, they must assume that the relation has those formal features needed to make a Nominalist definition of properties possible. However, Realists need make no comparable assumption: when exact resemblance is defined in terms of instantiating the same universals, the symmetry and transitivity of the relation follows by logic alone.

What's wrong with Platonic Realism?

There are also good reasons for being dissatisfied with the postulation of universals² as grounds of similarity (the Platonist or realist strategy). Realism comes in two varieties: relational and constituent Platonism, depending on whether instantiation or participation is understood as a relation between two disjoint entities (relational realism) or a particular is supposed to instantiate a universal by literally containing it as a part (constituent realism). Some constituent realists have labeled their account 'Aristotelian' (David Armstrong) or have offered such an account as an interpretation of Aristotle's theory (Loux 2006). On my view, constituent realism is really a variety of Platonism, and I will offer quite a different interpretation of Aristotle's solution to the problem of the One and the Many in his *Metaphysics*.

The principal problem with relational realism is the objection from intrinsicity (discussed in Oliver 1996). Relational realists must deny that any particular has any intrinsic properties. What we take to be paradigms of intrinsic properties, like shape, volume, mass, or charge, are really extrinsic properties that depend on the thing's relation to the relevant universal (a disjoint entity). How can such an extrinsic relation to a disjoint entity make a thing what it most fundamentally is?

There are three difficulties with constituent realism. First, there is the oddity of having universals wholly located in many different places in the same time. As Plato noted in *Parmenides* (131b1–2), this means that each universal is somehow 'separated from itself,' which seems impossible. Second, it is difficult to explain how a mere bundle of universals could constitute a particular, or how the mere combination of some universals with a bare particular (like some prime or signate matter) could constitute a single, unified particular

² I am defining 'universal', for the purposes of this paper, as an entity that grounds the character of multiple entities (its *instances*) and thereby grounds the relations of similarity (or resemblance) among those instances. Thus, universals must be *ante rem* or *in re*, as opposed to *post rem*, since *post rem* universals do not ground the character or similarity of the things that instantiate them. I am not assuming that *universals* and *particulars* comprise two mutually exclusive and jointly exhaustive categories. We could define a 'particular' as anything whose intrinsic character is grounded by some universal.

(as Aristotle points out in *Metaphysics* Zeta 12, 1037b22–24 and Zeta 13, 1039a3–10). Third, as Aristotle argues in *Metaphysics* Zeta 12–14 and Eta 6, the Platonist cannot explain the relation of genus and species without destroying the unity of the definition. In the end, Platonists cannot explain how species and genera can be predicated essentially of the same thing, if belonging to both consists merely in 'participating' in two separate universals.

Two versions of Aristotelian Moderate Realism

Consequently, there is some reason to look for an alternative to these familiar solutions to the problem of universals. Aristotle is usually classified as a Moderate Realist, but his view is actually a version of *Nominalism*, in the sense that Aristotle's account denies the existence of *ante rem* (or *in re*) universals (universals that ground the character of their instances). For Aristotle, universals exist only as intentional objects of the intellect (post rem). For Aristotle, everything real is particular.³ I see two distinct but similar ways of developing Aristotle's moderate realism: one relies on the relation of *being a potential formal cause*, and the other relies on *potential identity* between distinct forms.

Unlike Ostrich Nominalism, Aristotle does offer a general account of generic sameness. Unlike Resemblance Nominalism, Aristotle's theory does not rely on a primitive relation of similarity or comparative resemblance. Instead, his account (on my interpretation) reduces similarity to one of two possible foundations.

Version 1: Specific identity as equipollent formal causes

Each particular (whether a substance or an accident) has its own individual form. Two particulars are the same in species just in case they have forms that are equipollent, that is, forms that are potential formal causes (PFCs) for exactly the same particulars:

(D1) x and y are *conspecific* if and only if they have equipollent formal causes.

(D2) x and y are *equipollent* formal causes if and only if, for all z , x is (at least) potentially a formal cause of z if and only if y is (at least) potentially a formal cause of z .

For the sake of brevity, I will hereafter drop the qualification 'at least' and I will refer simply to *potential formal causes*, with the understanding that a thing's actual formal cause also counts (for my purposes) as one of its potential formal causes. This version of Aristotelianism reduces specific similarity to two more fundamental relations: formal causation and potentiality. Both of these more fundamental relations do real theoretical work, as we shall see.

In addition, Aristotle's theory is not just a theory of when two particulars belong to the same *infima species*. His theory gives rise in a very simple and natural way to a Porphyrean tree of genera, with the categories (substance, quality, quantity, and so on) as the most general or broadest genera. As I understand Aristotle's account, he introduces a second kind of entity, in addition to forms, namely, *differentiae*. Each particular P has a single, simple form F , but F 's power to act as P 's formal cause has to be explained in terms of the prior action of a series of *differentiae*, which have progressively transformed F from a merely categorical form into a specific one. The *differentiae* have acted on the form in a specific order, corresponding to a path through the Porphyrean tree (from categorical root to specific leaf). This order doesn't correspond to a temporal order, but rather to a purely metaphysical or causal ordering, in the sense that some *differentiae* depend for their action upon the ontologically prior action of other *differentiae*.

Where do *differentiae* themselves fit in an Aristotelian ontology? Aristotle isn't explicit on this point, but I would identify a *differentia* with a certain causal power (a differential power) of the efficient cause of the substance (or accident). For example, the efficient cause of the generation of a horse would have to both introduce a new substantial form and exercise a series of differential powers upon that form, moving down the Porphyrean tree until it reaches an *infima species*. Only at that point (i.e., once fully actualized) is the substantial form enabled to ground the character of the individual substance of the species. A similar account can be given for the generation of an accidental form, like a particular shade of color.

Two forms F_1 and F_2 belong to a common genus that is n levels above the level of species just in case there is a series of *differentiae* of length n that could transform F_1 into a state of equipollence with F_2 (or *would have transformed* an early version of one into a state of equipollence with the other):

³ This is, of course, a controversial interpretation. Those who (like me) take Aristotelian forms (both substantial and accidental) to be particulars include Witt (1989), Frede (1987, 72–80), and Irwin (1988, 248–276, 569n1). Defending the Realist interpretation of Aristotle are Michael Loux (1991) and Frank Lewis (2013, 264–7).

(D3) x and y are *congeneric at level n* if and only if they have formal causes that are n levels removed from equipollence.

(D4) x and y are *n levels removed from equipollence* if and only if, for all z , there is a sequence S of n differentiae with the potential of transforming x into a potential cause of z if and only if there is a sequence $S\epsilon$ of n differentiae with the potential of transforming y into a potential formal cause of z .

Each substance contains a single, individual substantial form, which has been enabled to do its formal-causal work by a series of individual substantial differentiae. Similarly, each individual accident is an accidental form that has also been generated from a bare form of the appropriate category (quantity, quality, and so on) into an accident of an infima species within the category.

Each of these entities (forms and differentiae) has a real metaphysical role to play. Each differentia actualizes the potential of a form at level $n+1$ to be a form of level n , and the final differentia for each substance actualizes the potential of a form at level 1 to be *the* formal cause of that substance.

Version 2: Specific identity as potential numerical identity

On the second version of Aristotle's moderate realism, the conspecific forms of two substances are individuated by the distinct parcels of matter of those two substances, and two conspecific accidents are individuated by the distinct substances in which they inhere. That is, in these cases the numerical distinctness of form F_1 in substance S_1 from form F_2 in substance S_2 is not a metaphysically fundamental fact. The distinctness of F_1 from F_2 is grounded in the numerical distinctness of S_1 's matter from the matter of S_2 . Since the numerical distinctness of F_1 from F_2 is grounded in such cases by some distinct fact, we can consider what would happen if, *per impossibile*, that second fact did not exist. In other words, if the matter of S_1 were *not* distinct from the matter of S_2 , form F_1 would be identical to F_2 . Therefore, conspecific forms F_1 and F_2 are potentially identical to one another, even though they are actually distinct. In contrast, if F_1 and F_3 belong to distinct species, then their numerical distinctness is fundamental and ungrounded, and they are not potentially identical. We can use this difference as a metaphysical account of the conspecificity of substantial forms (which can be adapted, *mutatis mutandis*, into an account of the conspecificity of accidents):

(D4) Forms x and y are **conspecific** if and only if there are substances z and w such that: if the matter of z were identical to the matter of w , x and y would be identical.

This version requires only the logical relation of identity (Leibnizian identity) and the counterfactual conditional. The counterfactual conditional is grounded in a form of potentiality: in this case, potential identity. Hence, the reduction basis of Version 2 is even leaner than Version 1. If we adopt Version 2, we can use it to explain the material adequacy of Version 1: two forms are equipollent if and only if they are counterfactually identical, since a difference in potentiality for formal causation would (if it existed) provide independent grounds for individuation.

Besides its commitment to counter-possible conditionals, Version 2 also requires something like prime matter as the ultimate ground of numerical distinctness, since the 'matter' upon which the distinctness of two conspecific forms depends must be separate from any substantial form or accident. We could think of the prime matter of a given material substance as constituted by an infinite number of point-like bare particulars, each primitively distinct from all other such bare particulars. Alternatively, we could suppose that matter is constituted by a *gunky* mass of bare particulars, each containing smaller bare particulars as proper parts, with no atomic or partless particulars. Any two disjoint bare particulars would then be fundamentally distinct.

We can also extend this account (as we did Version 1) up the Porphyrean tree by introducing differentiae as a new category of entity. Suppose that two individual forms are congeneric but not conspecific. For example, suppose that x is a form of humanity and y a form of equinity. Since these are both forms of animality, the distinctness between x and y is not a metaphysically fundamental fact. Instead, the distinctness of the two forms depends on the prior distinctness of the two associated differentiae (one of rationality and the other, let us say, of swift-footedness). If, *per impossibile*, rationality and swift-footedness were not distinct, humanity and equinity would be identical. Each form contains a series of differentiae d_1, \dots, d_n , each belonging to a different level in the Porphyrean tree. If two substances are distinct and belong together to a genus of level n (but no lower), then the distinctness of the substances is grounded in the distinctness of their n -level differentiae. In addition, we may assume that the distinctness of any two differentiae of these two substances at levels above n is also grounded in the distinctness of the n -level differentiae. We can now turn this into a metaphysical account of congenericity.

(D5) Forms x and y are **congeneric at level n** if and only if there are differentiae z and w of level n such that: if z and w were identical, x and y would be identical.

(D6) A differentia z is of level 1 if and only if, for any differentia w and substances x and y , if the distinctness of x and y is grounded in the distinctness of z and w , then there is no other pair of differentiae u and v such that the distinctness of z and w is grounded in the distinctness of u and v .

(D7) A differentia z is of level $n + 1$ if and only if, for any differentia w and substances x and y , if the distinctness of x and y is grounded in the distinctness of z and w , then there is no other pair of differentiae u and v of level n or lower such that the distinctness of z and w is grounded in the distinctness of u and v .

The sort of potential identity involved in D4 and D5 does not imply that there is a possible world in which the forms x and y are identical. There will be no such possible world if there is no possible world in which the matter of x 's substance is identical to the matter of y 's substance. However, for Aristotelians, the possibility of a world is grounded in certain facts about potentiality, not vice versa. Therefore, potentiality *per impossibile*, that is, potentiality without a corresponding possible world, is quite intelligible. A form of potentiality is necessary but not sufficient for possibility. In order for possibility to obtain, the relevant potentiality must have manifestation conditions that are themselves possible.

The virtues of Moderate Realism

How is this Aristotelian theory superior to standard resemblance nominalism (with or without tropes)? Most importantly, there is on Aristotle's account no primitive external relation corresponding to *similarity*.

Instead, Aristotle's explanation of similarity parallels that of Platonism: instead of sharing a *single* universal, two similar particulars share a *family* of equipollent formal causes or a *family* of potentially identical of forms. In this picture, forms are modifying tropes, not modular tropes (to use Robert Garcia's distinction—Garcia 2015): that is, a form *makes* its particular belong to that particular's species. The form is not *itself* a member of the species. Thus, two forms do not resemble each other; rather, they are the ground for the resemblance of the particulars of which they are the formal causes.

Therefore, the Aristotelian account is a kind of *reduplicative* version of relational Platonism: the sameness of two particulars is grounded in their being formed (either actually or potentially) by the very same forms.

Why then isn't this just a profligate version of Platonism? Wouldn't Platonism be preferable on grounds of parsimony or economy? Why posit many individual forms when a single universal will do?

Admittedly, the Aristotelian theory is less parsimonious than Platonism, although this is only true with respect to *quantitative* economy (the sheer number of entities), which is must less important than *qualitative* economy (as measured by the number of fundamental kinds of entities). In addition, Aristotelianism brings with it several compensating advantages. It doesn't require any kind of action at a distance or multi-located universals, and it doesn't require universals as necessary, eternal existents with some odd, extra-spatial and extra-mental mode of existence. Most importantly, it posits only a single substantial form for each substance, and it provides a clear explanation of the relationship between genera and species (in terms of the progressive actualization of a form's potentialities).

Is there a problem for the Aristotelian in accounting for the symmetry and transitivity of the potential formal-causal relation, similar to the problem resemblance nominalists have in accounting for the symmetry and transitivity of perfect resemblance? Here we must distinguish the two versions of Aristotelian moderate realism. Version 2 has a clear advantage here, given the symmetry and transitivity of identity. If x is potentially identical to y , then y is potentially identical to x . This is an immediate consequence of the logic of identity. In the case of transitivity, we must make use of some facts about subjunctive conditionals, namely, the fact that we may conjoin and weaken the consequents of two conditionals with the same antecedents. Then, if x and y would be identical under condition C , and y and z would be identical under those same condition C , it will immediately follow that x and z would also be identical under condition C .

In order to exploit this logical fact, we should modify somewhat our definitions of conspecificity and congenericity. Let's say that forms x and y are conspecific if they would be identical if all pairs of material substrates were identical. Similarly, forms x and y are congeneric at level n if they would be identical were all differentiae of level n or lower identical to each other.

The situation is a bit more complicated in the case of Version 1, with conspecificity defined in terms of equipollent formal causes. If the form of x is a potential formal cause of y , why is the form of y also a potential formal cause of x ? And, if the form of x is a PFC of y , and the form of y a PFC of z , why is the form of x also a PFC of z ?

These facts can be explained in terms of the fact that what each form does in the actual world to its actual patient is exactly what it would do potentially to any potential patient. There are no accidents that can affect the core formal operation of a form. So, if x is actually and y potentially the formal cause of some z , they must be (at least) potentially the formal causes of exactly the same particulars.

III. Forms as the Grounds of Structure

In Section II, I developed in some detail my own account of Aristotelian form. In this section, I would like both to locate my account in the space of alternative versions of hylomorphism and to defend it against those same alternatives. All hylomorphists agree that forms are clearly related in some intimate way to the nature or kind of an entity and so are properties or property-like entities. In thinking about such property-like entities, there are a number of basic categorial questions that must be answered:

- (1) Are forms *universal* or *particular*? Do individuals of the same species share numerically the same form, or are there numerically distinct forms corresponding to distinct substances?
- (2) Are forms logically *simple* or *complex*? Are they something like conjunctions or disjunctions (or both) of logically simpler properties, or are they logically atomic?
- (3) Are forms *ontologically prior* to the substances of which they are the form? The priority relation I have in mind is one of grounding or metaphysical explanation: does the existence of the form explain the existence and nature of its substance? Or does the substance explain its form? Or are the form and substance really the very same entity, considered under different guises or aspects?

On the view I developed in section II, forms are *logically simple particulars* that are *ontologically prior* to the substances that they inform.

In recent years, several philosophers have proposed that an Aristotelian form is the *structure* of a substance. This structural hylomorphism comes in a variety of versions, depending on how we understand *structure*. In fact, we can ask the same three questions of structures: are they universal or particular, simple or complex, prior or non-prior? The view that structures are logically complex universals has been defended Mark Johnston (2006). Kit Fine (1999) and Eleonore Stump (1995) think of forms as logically complex particulars that are clearly posterior to the existence of their associated substances. For William Jaworski (2011, 2012, 2016), structures are simple particulars that are *ontologically non-prior* to their associated substances, although *causally* explanatory of those substances' persistence through time.

From forms as solutions to the problem of the One over the Many

If forms are formal causes, as explained in section II, then they must be the ultimate grounds of similarity. This means that forms cannot be logically complex, since the similarity between two things that instantiate the same logically complex property is to be explained ultimately in terms of those kinds of similarity that correspond to the simple, atomic properties of which the properties are composed. Hence, forms must be logically simple.

In addition, if forms are universals, then we face the inconveniences associated with Platonism. We would need an explanation of how causally inert entities outside space and time can be related to or unified with spatiotemporal particulars.

Finally, forms must be ontologically prior to the things they inform. Otherwise, they could not ground the similarity between the fundamental natures of those things.

Forms as grounds for the per se synchronic unity of composite substances

For Aristotelians, a composite substance is one thing *per se*. It is not in reality a plurality of things that we think of or treat as one, as in the case of artifacts or conventionally delimited regions of nature (like Mt. Blanc or the Mississippi River). A substance has real unity in itself. Since it is the form that makes the substance to be a substance, it is reasonable to infer that the form must be an ultimate source of unity. In general, only simple things can be ultimate sources of unity. A composite thing could be a source of unity only if something else is the ground of its unity.

Mark Johnston (2006) has proposed that structures (forms) are logically complex universals. If forms are complex universals, then they cannot explain the unity of composite substances. If the universal is logically complex, then the universal cannot by itself explain the unity of the substance, since we would still require some explanation of the unity of the universal. The structural universal can only convey to the composite substance a unity that it has already acquired from some other source: it cannot be the ultimate source of unity.

I am assuming that a logically complex universal must be mereologically complex: it must have proper parts corresponding to its logical components. The cost of denying this assumption would be pretty high: we would have to have metaphysically primitive logical relations (such as *is a conjunct of*) among mereologically simple universals. In addition, we would have to posit a large number of distinct and metaphysically primitive forms of instantiation between particulars and the various *logical parts* of a mereologically simple structural universal (such as the *instantiates the first conjunct of* relation). These objections are very similar to those made by David Lewis against what he calls the 'Magical Abstractionism' of Roderick Chisholm and Alvin Plantinga, who posited abstract states of affairs that were logically complex, but who did not insist that these states of affairs be mereologically complex as well (Lewis 1986, 174–190).

Could Aristotle's conception of homonymy (*Metaphysics* Zeta 10, 1035b20–25), which has the consequence that wholes can be ontologically prior to their parts, be of help here?⁴ I think not, since the thesis is only plausible in case of the integral parts of a substance, like the hand or eye as part of an organism. Aristotle never suggests that the logical parts of a proposition might be logically posterior to the whole. It is true that a specific form is ontologically prior to its associated generic forms, but that is precisely why the notions of *potentiality* and *actuality*, rather than logical composition, must be applied in those cases. The generic form is potentially a specific form; it is not actually a part of that form.

Kathrin Koslicki, in her 2008 account, proposes that a form unifies by imposing certain *structural constraints* on a plurality of material components. Let's consider an account according to which these multiple constraints are encoded in a single, logically simple universal. For a whole substance to be unified is for its material components to *satisfy* the structural constraints imposed by the formal components associated with the universal of the natural kind to which it belongs. But how do these components *satisfy* the universal? Is the realism involved constituent or relational? That is, are universals elemental parts of the substances they unify? If they were, then we would have to explain what unifies the universal with the other components of the substance, and so the universal itself cannot be the ultimate explanation of that unity (as Aristotle points out in *Metaphysics* Zeta 17). If they were not, we would have to accept the implausible thesis of relational realism, with a thing's fundamental nature being extrinsic to it. On relational realism, the essence of a thing cannot be wholly intrinsic to it, because the existence of the essence (a universal) is in principle separable from the participation of a thing's parts in that universal. The universal can exist even if the particular substance does not.

On my alternative account of hylomorphism, no such problem arises. Each substantial form is not a complex structure but a simple metaphysical cause of the character of the substance, a formal cause that grounds that very substance's complex structure. Both the structure and the materials so structured are unified by their having a common, simple formal cause. Is the formal cause intrinsic to the substance it informs? We can introduce here a nominalist distinction analogous to Armstrong's distinction between the *thin* and the *thick* particular (Armstrong 1989, p. 95). The individual form is extrinsic to the thin particular and its matter, but it is (by virtue of informing the thin particular and its proper parts) a constituent of the thick particular. This differs from constituent realism in that this form cannot exist except insofar as it unifies some materials into this particular substance: there is no universal form that exists in isolation from all particulars. Thus, the form is separated neither from itself (as in constituent realism) nor from its particular (as in relational realism).

If a form is itself a logically complex particular, as has been suggested by Eleonore Stump (1995) and Kit Fine (1999), then it obviously cannot be part of the ultimate explanation of the unity of a composite substance, since its own unity would have to be explained by some further source.

Therefore, if the form is to be the ultimate explanation for the unity of a composite material substance, it must be both particular and logically simple. Furthermore, since a composite substance cannot exist except as a unity, if a form explains the unity of a composite substance, it also explains the existence of that substance. Hence, a form must be ontologically prior to the substance it informs. This rules out the view of William Jaworski, who hypothesizes that forms are powers possessed by substance or activities carried out by those substances. The power of a substance cannot be ontologically prior to the existence or nature of that very substance, and neither can an activity.

The theory of forms as simple, particular grounds of nature is an attractive and simple account of *per se* unity. There are, however, two clear alternatives to the theory of simple forms that I haven't yet considered:

⁴ Suggested by an anonymous referee.

1. The so-called 'composite substance' isn't really composite: the material parts of a material substance are annihilated in the process of generation—an account defended by Theodore Scaltsas (1994), Alexander Pruss (2007), and Anna Marmodoro (2013). I'll call this the SPM account.
2. Substantial unity emerges through the cooperation of many simple proper parts.

The SPM account

The SPM account violates the substrate constraint of *Physics*, Book I (191a13). All change requires a persisting substrate, something that exists both before and after the change. In Koons and Pickavance (2017, 533–7), Tim Pickavance and I defend this substrate principle using David Lewis's Patchwork Principle: if any local change could occur without substrate, there could be a world and a time, and even a dense interval of time, involving nothing but constant change everywhere without any substrate. We call such a supposedly possible interval containing dense and global discontinuities *the Interregnum*. But the Interregnum is impossible: in such a world, there would be nothing throughout the interval to tie together enduring places or successive moments, and so no real passage of time at all.

Suppose, however, that the substrate principle is wrong, and that we do not need for anything particular to remain numerically one through substantial change. The *matter* of a substance could simply be that substance's potentiality to produce various other substances as mortal remains or expelled waste. In this case, we could simply deny that substances have proper parts or components at all (as Pruss does explicitly). This would apparently dissolve the problem of explaining a substance's synchronic unity, since there would be literally no parts to unify.

I think that such a theory represents the most viable competitor to the one I defend here. Scaltsas's account of the substance comes quite close to my own account of the substantial form: both are mereologically simple, both are *wholly located* (in a sense) at every sub-region occupied by the substance, both ground the unity of the various spatially-localized accidents and powers of the whole. There are three differences, however. First, as I have argued, the absence of prime matter as an individual particular (or a plurality of such particulars) on the SPM account requires a violation of the substrate constraint. Nothing particular and numerically one can survive cases of substantial change, since the matter of a substance is merely an aspect of it, not a part. Second, the SPM account cannot endorse anything like Version 2 of Aristotelian nominalism, since the distinctness of two substances is fundamental and not dependent on the distinctness of two *parcels* or *gobs* of matter. (A defender of SPM could, however, accept a version of Version 1, by referring to the equipollence of the differential powers exercised by efficient causes of entities.) Third, the SPM account cannot provide as neat an account of diachronic persistence of substances, since the whole substance does change intrinsically over time (in contrast to the internal stability of the substantial form). See section C below for details.

Unity through cooperation

But what is wrong with the second alternative? Why can't unity come about or emerge as a result of the unified *cooperation* of the many parts? To take a simple example, why couldn't there be two simple things *A* and *B*, such that *A* has the natural power to unify under certain circumstances with *B*, and *B* has the complementary natural power to unify in those same circumstances with *A*? In this picture, there doesn't have to be a single unifier: instead, the many unified things are themselves mutual unifiers.

However, this would require a very improbable and ad hoc pre-established harmony among the powers of the many mutually unifying parts—a coordinated distribution of mutually exercisable powers. This problem ramifies as the number of components to be unified increases. It becomes quite untenable when billions of components must unite with each other.

The simple form theory offers a much simpler account: it locates the source of the persistent unity of each substance in a single agent, the substantial form. The presence of the many material parts serves merely as the patient of the formal action, as enabling conditions for the exercise of the form's formal powers. These enabling conditions are built into the form itself, requiring no prior mutual agreement.

Forms as grounds for diachronic unity or persistence of changeable substances

There are two kinds of unity that an Aristotelian theory of compound substances must account for: the synchronic unity of the material components at each moment in time, and the diachronic persistence of the substance through time.

If a structure is to explain diachronic unity or persistence, it must be (as William Jaworski has argued) a *dynamic* structure. A dynamic structure cannot be just a set of four-dimensional relations among the

substances's actual states and activities. We must also give an account of the substance's *counterfactual* potentialities for persistence (as Howard Robinson 2014 points out).

In recognition of this point, Kit Fine (1999) identified substances with a triple consisting of a set of material components, an original static structure, and a *principle*, which is a function from times and worlds to static structures. A substance persists just in case its set of material components realizes the appropriate static structure at each time and world, as dictated by its principle. There are at least two problems with such an account. First, it makes it impossible to account for substances that are mereologically inconstant, that is, ones that gain or lose material components over time.

More importantly, as Fine recognized, this introduces a purely conceptual component to the existence and persistence of substances. Principles are not metaphysical simples: if they are simple at all, it is as a purely mathematical entity (a function). There are infinitely many such functions, connecting arbitrary structures with any world or time. The resulting persisting substances have no *per se* unity. They are simply things that we can count as unified across time by reference to an arbitrary mathematical function.

In a similar way, a Platonist could appeal to Koslicki's constraints as a ground for persistence. Constraints can be both synchronic and diachronic. Let's consider the two relevant versions of Platonic realism: constituent and relational. First, constituent realism. Clearly, a universal cannot ground the persistence of a substance simply by being a continuing constituent of that substance. Either the whole continues to exist as one and the same independently of the presence of the universal, or not. If independently, then the presence of the universal is not the explanation for its persistence. If the persistence of the whole as one consists simply in its containing the universal, then there could be at most one persisting instance of that universal at any point in time, since any two collections that both contain it would thereby be one substance.

In the case of relational realism, we must ask: How can several distinct substances share the very same extrinsic ground for the individual facts of their diachronic persistence? Even if the substances were synchronically simple, an external relation to a single universal could ground the persistence of at most one substance at a time. To solve this problem, we would have to have two separate universals: one responsible for the synchronic nature of each substance at each moment, and a second, relational universal responsible for unifying the separate instantaneous states of a substance into a single life. However, this would mean that the substance no longer enjoyed *per se* diachronic unity. Instead, the diachronic unity of the substance would have to be something over and above its instantaneous nature.

Therefore, the ultimate metaphysical ground of the diachronic persistence of a substance must be something particular, something that cannot be shared with other substances of the same kind. This form must simultaneously ground both the synchronic nature and the diachronic persistence of the substance.

Just as it is plausible to suppose that the ultimate ground of synchronic unity must be mereologically simple, so it is plausible to suppose that the ultimate ground of diachronic unity must be intrinsically and categorically *unchangeable*. The internal structures of substances undergo intrinsic change—they can even undergo mereological change, gaining or losing components. Therefore, structures cannot be ultimate ground of persistence of substances. The ground (the substantial form) must be ontologically prior to changeable structures and activities.

IV. Conclusion

Substantial forms must be the ultimate grounds of the natures of the substances they inform. They thereby ground natural similarities between things. In addition, forms must be particular, if we are to avoid the inconveniences of both constituent and relational realism, and, if we are to ground the *per se* unity (both synchronic and diachronic) of substances, forms must be both mereologically simple and categorically unchangeable. Finally, forms could perform none of these functions unless they be ontologically prior to the substances they inform.

Competing Interests

[[COMPETING INTEREST STATEMENT TO BE PROVIDED]]

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