MARY LOUISE GILL

ARISTOTLE'S DISTINCTION BETWEEN CHANGE AND ACTIVITY

ABSTRACT. Aristotle's conception of being is dynamic. He believes that a thing is most itself when engaged in its proper activities, governed by its nature. This paper explores this idea by focusing on *Metaphysics* Θ, a text that continues the investigation of substantial being initiated in *Metaphysics* Z. Q.1 claims that there are two potentiality-actuality distinctions, one concerned with potentiality in the strict sense, which is involved in change, the other concerned with potentiality in another sense, which he says is more useful for the present project. His present project is the investigation of substantial being, and the relevant potentiality is the potentiality for activity, the full manifestation of what a thing is. I explore Aristotle's two potentiality-actuality distinctions AND argue that the second distinction is modeled on the first, with one crucial modification. Whereas a change is brought about by something other than the object or by the object itself considered as other (as when a doctor cures himself), an activity is brought about by the object itself considered as itself. This single modification yields an important difference: whereas a change leads to a state other than the one an object was previously in, an activity maintains or develops what an object already is.

1. THE PROBLEM OF SUBSTANCE

Why is primary substance problematic? Against Plato Aristotle insists that being is not a genus.[1] On Aristotle's view there are various sorts of beings, and substance (οὐσία) is the primary sort. Other beings, such as qualities and quantities, are determined as what they are in some relation to it.[2] To understand those other entities, then, one must first understand the being of substance. To judge from Aristotle's *Categories*, this project seems relatively straightforward. Substances are autonomous individuals, such as a particular man or a particular horse, and they are the subjects for various properties, including qualities and quantities, which are located in one or another of the nonsubstance categories. Nonsubstances depend for their existence on the substance to which they belong. The primary substances are themselves individuated by the so-called secondary substances, the species and higher kinds that classify the individuals. Although species and genera determine the primary substances as what they are, the secondary substances, like the nonsubstances, depend for their existence on the primary substances. Remove the primary substances and everything else is

J. Seibt (ed.), Process theories: Crossdisciplinary studies in dynamic categories, 3–22.

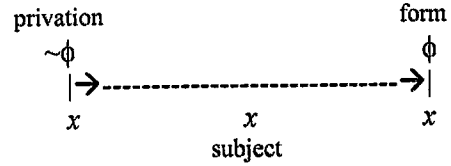

Figure 1. The replacement model of change (*Physics* I.7).

removed as well.[3] Physical objects are primary substances because they are the ultimate subjects. All other things depend on them for their existence.

The problem with this picture is that it fails to accommodate substantial change. The Presocratic philosopher Parmenides had denied the possibility of all change, arguing that change would require the emergence of something from nothing. Aristotle agreed with his predecessor that there is no absolute becoming. But he regarded the existence of change as empirically evident. His task was to account for change without admitting sheer emergence. In *Physics* I.7 he proposed that every change involves three principles: a form (ϕ), an opposed privation ($\sim\phi$), and an underlying subject (x). This account of change is known as the Replacement Model. (See Figure 1).

A change is the emergence of something new, because the form (ϕ) replaces the privation ($\sim\phi$). The change is not a sheer emergence, because some part (x) of the product (ϕx) was there all along, characterized first by the privation and then by the form. For example, when Socrates comes to be musical from being unmusical, Socrates himself survives the change and is characterized first as unmusical and later as musical. The *Categories* accommodates nonsubstantial changes, changes of quality, quantity, or place. In that work Aristotle claims that a distinctive feature of a primary substance is that one and the same individual can survive the replacement of opposed nonsubstantial properties.[4]

But substantial generation and destruction cannot be so easily reconciled with the *Categories*' scheme. In a substantial generation, a substance is the *product* of a change and so cannot be what persists through it. Aristotle's Replacement Model is supposed to provide for this case too, though that provision will entail an ontological scheme more complicated than that envisaged in the *Categories*. A new substance emerges from something else without sheer emergence, because a part of the preexisting item survives in the product. Aristotle calls the continuant *matter*. Matter provides continuity between the preexisting object and the product, and guarantees that the emergence is not from nothing. When a new substance comes into being, the form, which replaces a privation, determines what the emergent substance is. Whereas substances in the *Categories* were treated as simple

entities, the analysis of change in the *Physics* reveals them as complex, as *composites* of matter and form.

Now that physical objects are regarded as hylomorphic complexes, what counts as primary substance and on what grounds? These questions are explored in the central books of the *Metaphysics* (ZHΘ). Is the whole complex primary? The complex consists of more basic components, the form and the matter, and so is arguably posterior to them (Z.3, 1029a30–32). Is primary substance the matter (Z.3, 1029a10–27)? Consider a bronze statue, whose matter is bronze. The shape of the statue informs the bronze, and the bronze can survive its removal. The constituent matter seems to satisfy the subject-criterion for substantiality in the *Categories*. If we accept the substantiality of the bronze on grounds of its subjecthood, however, why stop here? The bronze is itself a composite of more basic material ingredients, copper and tin. And these metals are themselves composites of the Aristotelian elements earth and water combined in certain ratios. Why not suppose that the elements are substances, or perhaps some yet more ultimate matter that underlies them? Tradition attributes to Aristotle a belief in prime matter, an ultimate stuff that is nothing in its own right but underlies all material bodies in the sublunary realm. Is some such ultimate matter substance? In *Metaphysics* Z.3 Aristotle excludes such an entity as substance, saying that a substance must be some definite thing in its own right (a τόδε τι) and be separate (χωριστόν) from other things (1029a26–30). An ultimate bare matter satisfies neither of these two conditions. Z.3 shows that if we press the subject criterion for primary substance, we end up with an unknowable object. Such an object is disqualified as substance because it fails to meet the constraints of thisness and separation.[5]

Is primary substance, then, the form of the composite (Z.4–12)? Whereas matter appears to claim existential priority because the form depends for its existence on it, the form appears to claim logical and epistemic priority because it determines the composite as the thing that it is and thus accounts for its knowability. Many scholars think that in the *Metaphysics* Aristotle awards the title 'primary substance' to form, revising the position he advocated in the *Categories*.[6] This solution too is problematic. First, if form is primary substance, what becomes of the subject criterion and the demand that substance be capable of separate existence? Form is predicated of matter and depends on matter for its existence. Second, what becomes of the demand that substance be an individual? Form is something predicable, definable, and knowable, and therefore seems to be a universal.[7] It can also be shared by more than one individual (Z.8, 1034a5–8). In *Metaphysics* Z.13 Aristotle notoriously argues that no universal is a substance. Some advocates of form argue on the basis of Z.13

that form is a particular.[8] Others offer sophisticated readings of the chapter to show that form escapes the objections to the universal, even though it is predicated of matter. They argue that the chapter merely shows that nothing is the substance of that of which it is universally predicated.[9] Form is the substance of one thing (the composite) and predicated of something else (the matter).

In my view both sides of the debate about form are on the wrong track. I have elsewhere argued that the objections to the universal in Z.13 tell against Aristotelian form, whether it is construed as a universal or as a particular.[10] According to Z.13, one criterion of substantiality is being a subject – something of which other things are predicated but not itself predicated of anything else (1038b15–16).[11] If form is predicated of matter, and the nature of the matter is distinct from the form, form is disqualified as substance by that criterion alone.

If I am right about Z.13, form as well as matter faces serious objections in *Metaphysics* Z. These difficulties invite us to reconsider the claims of the composite to be primary substance. My own view is that the *Metaphysics* reconfirms Aristotle's commitment to the primacy of a subset of individual physical objects – living organisms like Socrates and Bucephalus, which he defended as substances in the *Categories*.[12] To preserve their substantiality once they are analyzed into matter and form, however, he must show that living organisms are genuine unities and not accidental compounds. The relationship between form and matter within a substance should not be an accidental relation comparable to that between whiteness and a man who happens to be white. As we shall see, Aristotle believes that the relation between form and matter in those composites that succeed as substances is an *essential* relation.

Aristotle's solution to the problem of the unity of composites depends on his doctrine of potentiality and actuality. The last chapter of *Metaphysics* H takes various people to task for distinguishing between subject and predicate and then introducing a relation, such as participation, to unify them. His own treatment of change in the *Physics*, as well as his treatment of matter and form in *Metaphysics* Z, suggests that he would include himself in this critique.[13] If the relation between matter and form is analogous to that between a physical object and its accidental properties, then composite objects like Socrates and Bucephalus fail to be proper unities and so fail to be primary substances. H.6 proposes a new solution to the problem of unity for forms and composites, and ends with the following celebrated claim:

> But, as we have said, the proximate (ἐσχάτη) matter and the form are the same and one, the one in potentiality (δυνάμει), the other in actuality (ἐνεργείᾳ), so that it is like seeking what is the cause of oneness and of being one; for each thing is some one thing, and the thing in potentiality and the thing in actuality are somehow one, so that the cause is nothing else unless there is something that caused the movement from potentiality to actuality. And all those things that have no matter are simply just some one thing. (1045b17–23)

What precisely does Aristotle mean when he says that the proximate matter and the form are the same and one, the one in potentiality, the other in actuality? One main task of *Metaphysics* Θ is to flesh out this statement through its analysis of potentiality and actuality.

2. POTENTIALITY AND ACTUALITY

Aristotle initiates his discussion of potentiality and actuality with a strategic proposal:

> Let us distinguish potentiality and actuality, and first let us discuss potentiality which is talked about in the strictest sense, which is not, however, the most useful for our present purpose. For potentiality and actuality extend beyond the cases spoken of only in connection with change. But when we have talked about this, we shall in our distinctions of actuality clarify the other potentialities as well. (1045b34–1046a4)

Aristotle distinguishes two potentiality-actuality models.[14] The first model concerns change, the context in which potentiality applies most strictly. Although he denies that this model is central to the current project, he devotes the first five chapters of *Metaphysics* Θ to it. He states the reason for this attention at the beginning of Θ.6 (1048a28–30): the first model will help to clarify the model that is more useful for the current project.

What is Aristotle's current project? He says quite plainly at the beginning of Θ.1 that his project is the investigation of being, and in the first place being in its primary sense, the being of substance. The beginning of Θ thus reminds us of the investigation in Z-H. The second potentiality-actuality model is designed to solve the problems that emerged in that investigation, and in particular, the unity of composite substances.

Before we turn to the second model, we shall follow Aristotle's lead and consider potentiality in the strict sense, the potentiality concerned with change. The first model provides the tools to understand the second. Let us start by considering the levels of potentiality and actuality distinguished in *De Anima* II.5. The first part of the model (see Figure 2) can be mapped onto the Replacement Model in Figure 1.

In the first place, a child (x) has knowledge of French (ϕ) potentially, because her matter and kind are of an appropriate sort to be in the positive state (417a27). A child is a human being, and some human beings have that knowledge.[15] The child's potentiality is first level, because she actually

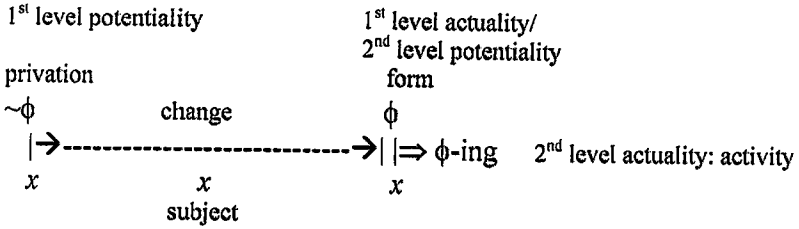

Figure 2. Levels of potentiality and actuality (*De Anima* II.5).

lacks knowledge of French (she is in the privative state ~ϕ). So an object (x) has a first-level potentiality for ϕ on two conditions: (1) x is the right sort of thing to have ϕ, and (2) x actually lacks ϕ (x is in the privative state ~ϕ). An object x has a first-level actuality for ϕ, if (1) x is the right sort of thing to have ϕ, and (2) x has ϕ. Thus the person who has learned French and now knows French has a first-level actuality for knowledge of French. The state ϕ is itself a potentiality for something further – speaking and understanding the French language (ϕ-ing). So a first-level actuality is also a second-level potentiality. This second-level potentiality can be realized in an activity when the agent wishes, if nothing external interferes.[16] The activity (ϕ-ing) is a second-level actuality. The transition from a first-level potentiality to a first-level actuality is a change. It takes place across a continuum that can be divided into distinct moments, and it terminates in a state other than the one in which the subject began. The transition from a second-level potentiality to a second-level actuality is not a change. This transition is simply a switch from inactivity to activity, just as the beginning of a change is a switch from rest to motion.

The levels of potentiality and actuality in *De Anima* II.5 apply to what we may call the *patient*, an entity that undergoes a change or exercises its character. Aristotle's account of these motions also includes an *agent*, something that brings about the change or the activity. Let us first consider change.

3. THE FIRST POTENTIALITY-ACTUALITY MODEL: CHANGE

Change involves a mover ($\phi^a y$) and a moved ($\sim\phi x$), each characterized by a special sort of δύναμις, or potency.[17] In *Metaphysics* Θ.1 Aristotle defines the δύναμις that causes change (designated in Figure 3 as ϕ^a) as "the source of change in another thing or [in the thing itself] as other".[18] *Metaphysics* Δ.12 specifies the δύναμις more precisely as a source of active change (ἀρχὴ μεταβλητική).[19] The potency responsible for a change typically belongs to an entity other than the object changed or, in the

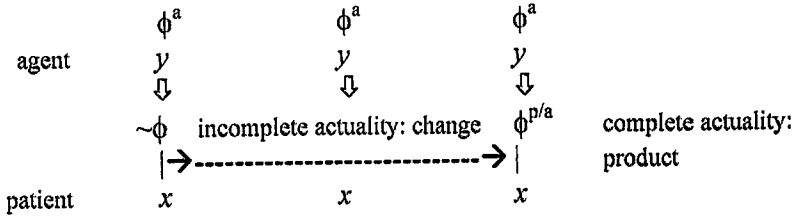

Figure 3. The first potentiality-actuality model: change (*Metaphysics* Θ.1-5).

special case of self-change, as when a doctor cures himself, to the mover itself considered as other.[20] The doctor acts in virtue of his knowledge of health; he undergoes a change in virtue of his privation of health. Aristotle characterizes the potency of the moved (designated in Figure 3 as the privation ~ϕ) as a source of passive change (ἀρχὴ μεταβολῆς παθητικῆς) by another thing or by the thing itself as other. How should we understand these two principles?

First, a potency, whether active or passive, is always directed toward a definite end or *actuality*. When the potency is such that its realization requires a change, the actuality is a certain state of the patient. For instance, a doctor has an active, an invalid a passive potency for health. These potencies differ from those of a teacher and student, which are directed toward a certain sort of knowledge, say knowledge of French. Second, as the examples suggest, pairs of active and passive potencies correspond in their goal: both members are directed toward the same state to be realized in the patient. A doctor's active potency for health enables him to bring about health in a suitable patient; a person's passive potency for the same state enables him, when properly affected, to become healthy.

In those changes that are not spontaneous or due to chance, the agent somehow has the character that it induces in the patient. In *Physics* III.2 Aristotle says:

> The mover will always bring a particular form, either substantial, qualitative, or quantitative, which will be the source and cause (ἀρχὴ καὶ αἴτιον) of the change, when it produces change; for instance, a man in actuality produces a man from what is a man potentially. (202a9–12)

At *Physics* VIII.5 he says: "The mover is already in actuality (ἐνεργείᾳ), for example, the hot thing heats and generally *that which has the form* generates" (257b9–10). Whereas in natural contexts the mover's own form is the form it induces in suitable materials, in artificial contexts the form is present in the agent's soul. For instance, a builder who constructs a house has in mind the form of a house: this form is his knowledge of building. The doctor has in mind the state of health: this form is his knowledge of medicine.[21] Aristotle calls the active form 'the maker' (τὸ ποιοῦν) and the

source of motion (ὅθεν ἄρχεται ἡ κίνησις) (*Met.* Z.7, 1032b21–23). This active source does not itself bring about the outcome,[22] but its presence in the agent enables the agent to do so.

Aristotle defines *change* in *Physics* III.1 as "the actuality (ἐντελέχεια) of that which is in potentiality, as such (or as potential)" (201a10–11).[23] In *Physics* III.2 he says that the actuality in question is incomplete, since the potentiality of which it is the actuality is incomplete (201b31–33). Take an object (x) with a first-level potentiality for ϕ. Such an object is the right sort of thing to be in the end-state, but it is currently in the privative state ($\sim\phi$). The complete actuality of this object's potentiality is the product ϕx.[24] In his definition of change, Aristotle wants to define not the product of the change but the process that yields the product. The point of the phrase 'as such' or 'as potential' is to specify how the patient is to be regarded. If we aim to specify the change that yields a house, we are not interested in the actuality that the patient is in its own right (say bricks and stones [i.e., x itself]).[25] Nor are we interested in the actuality of the patient's potentially to be a house: the house (ϕx) is that actuality.[26] Rather, we are interested in the actuality of the patient, *as potential*, that is, as potentially a house and not actually a house (i.e., as $\sim\phi x$). The relevant actuality captures the object at all and only moments when it is *potentially* ϕ *but actually* $\sim\phi$. So construed, the definition of change captures the object at all moments up to but excluding the moment at which it is actually ϕ.

Although the definition excludes the final position, it captures more than the change, since the object in its initial state, before the change begins, has not been excluded. Indeed, the definition also fails to capture the change in its dynamic continuity: instead it picks out the object in its initial state and at any stage of its journey. How can Aristotle capture the change as a dynamic whole, excluding the initial as well as the final position? He answers this question in *Physics* III.3. Here Aristotle argues that the change, which the patient undergoes, is the actuality of the agent as well as the patient, though it takes place in the patient. At the end of III.3 he states the definition of change more precisely as "the actuality of that which is potentially productive and of that which can be affected, as such" (202b26–27). By arguing that change is the joint actuality of the agent and the patient, Aristotle can define change as a continuous process toward a goal. The actuality starts to exist at the moment the patient leaves its initial position prompted by the agent, and continues to exist until the last moment before it arrives at the goal.

In contexts of change an agent conveys to a patient a form that the patient is suited to have but actually lacks. Initially the agent and the patient are unlike because the agent's active potency (ϕ^a) is opposed to the patient's lack ($\sim\phi$).[27] By means of the change the agent 'assimilates' the patient to itself; the agent imposes on the patient the form that is the goal of its own active potency.[28] So, once the change has been completed, the agent and the patient are like. Often the resulting likeness is limited to the form that is the góal of an active and passive potency pair, and does not extend to the type of potency the agent has. For instance, if a doctor cures a patient, he conveys to the patient the form for which he has the active potency: health. The patient does not thereby gain an active potency for health (i.e., medical knowledge) but only a second-level passive potency, a potency that enables its possessor to respond to its environment in certain characteristic ways but not to reproduce that form in other things.[29] In some cases, however, an agent conveys to a patient not only the content of its own form, but also a like potency, as when a man generates a man, or when a French teacher conveys to her student the ability not only to use but also to teach French.[30]

4. THE SECOND POTENTIALITY-ACTUALITY MODEL: ACTIVITY

Aristotle has said in *Metaphysics* Θ.1 that potentiality extends beyond situations concerned with change, and that although change is the situation in which potentiality applies most strictly, the potentiality involved in change is not the most useful for the present project, the investigation of being. He discussed potentiality and actuality in connection with change, because that discussion will help to clarify the second model. I believe that the second model resembles the first in all of its basic components.[31] Like the first model, the second employs an active potency and a passive potency; and like the first, the second concerns two main actualities – a motion and a product. But unlike the first, the second model involves an agent and a patient that act and suffer in respect of the same form (ϕ), and unlike the first, the second concerns a motion that is not a change (κίνησις) in the strict sense, but an activity (ἐνέργεια).[32]

Metaphysics Θ.8 specifies a potency, which Aristotle calls a *nature* and contrasts with the active potency familiar from Θ.1. He says:

> I mean by 'potency' not only the one that has been defined, which is called an active source of change in another thing or as other, but generally every source of motion and rest. For *nature* (φύσις) is also in the same genus as potency; for it is a source of active motion, but not in another thing but in the thing itself as itself (ᾗ αὐτό). (1049b5–10)

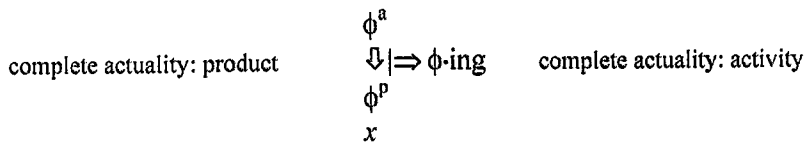

Figure 4. The second potentiality-actuality model: activity (*Metaphysics* Θ.6–9).

The single modification, that the source of active motion is in the thing itself *as itself*, yields a scheme quite different from the previous one. In contexts of change the agent acts on a subject deprived of a certain positive character (∼ϕ). By means of a change the patient comes to be other than it previously was and is assimilated to the positive state of the agent. On the second potentiality-actuality model the agent and the patient act and suffer in virtue of the same positive character (ϕ), and in natural cases active and passive potencies are located in the same individual.[33] For instance, a living organism has a nutritive soul, which is an active potency (ϕ^a), and its body includes a digestive system, which has a corresponding passive potency (ϕ^p).[34] When the organism nourishes itself using food, nutrition is a joint operation of its active and passive potencies. Nutrition is not a change, because the motion does not lead the organism into a state other than the one it was previously in. Nutrition and the organism's other natural functions, such as perception, are *activities* (ϕ-ing) which express the organism's nature. By means of activity, the organism preserves and enhances what it already is.[35]

Aristotle does not offer a definition of activity as he does for change. Instead he says that we should be content to grasp the distinction between actuality and potentiality in the second context by observing a series of examples and noting the analogies (*Met.* Θ.6, 1048a35–37). Here are two examples of the relation between actuality and potentiality: that which is awake to that which is asleep, and that which is seeing to that which has its eyes shut but has sight. Being awake and seeing are motions proper to the second model. They are activities. The fundamental difference between change and activity is that, whereas a change is a process from one state to another, an activity is the dynamic expression of a state the subject is already in. *De Anima* III.7 distinguishes the actuality that is an activity from the actuality that is a change in the following way: "Change is the actuality (ἐνέργεια) of something incomplete, but actuality (ἐνέργεια) in the unqualified sense is different, the [actuality] of that which has been completed" (431a6–7). An object that undergoes a change lacks the positive state the change will yield (the object is incomplete in that respect). An object that engages in an activity is already in the positive state (the object has been completed in that respect); its motion is a dynamic expression

of that state. Applied to Aristotle's examples of potentiality and actuality on the second model: an animal asleep has various potencies that will be actively expressed when it awakes; the person with sight but eyes shut will see when her eyes open.

Metaphysics Θ.6 lists some differences between the two sorts of motions (*Met.* Θ.6, 1048b18–36). Whereas a change is directed toward an end but is not itself an end, an activity is an end in itself. In cases of change, one cannot say of the same object at the same time that it 'is ϕ-ing' and 'has ϕ-ed', for instance, 'is building a certain house' and 'has built the house'. Since the goal of a change is distinct from the change, the present and perfect verb-forms apply at different times. But an activity, by contrast, is an end in itself, and so one can use the present and perfect verbs-forms of the same object at the same time. For instance, one can say of Socrates at the same time that he 'is seeing' and 'has seen', 'is thinking' and 'has thought', and 'is living' and 'has lived'. An activity is complete as soon as it starts and for as long as it lasts.[36]

5. THE UNITY OF COMPOSITES

As we saw, Aristotle's account of change in the *Physics* threatens the unity of physical objects. In response to Parmenides he argued that all changes involve a continuant, something that remains the same through a replacement of properties. The continuant undermines the unity of the generated object. Since the continuant pre-exists the acquisition of form and can survive its removal, the composite itself is an accidental compound analogous to a white man. Aristotle's doctrine of potentiality and actuality aims to overcome this problem. But the account we have given so far does not overcome it. Take an artificial example (and consider it in terms of Figure 2). A builder builds a house out of bricks, stones, and wood. Before the building takes place these materials have a first-level potentiality to be a house: they are the right sorts of materials (suitable x) to be a house, but while lying in a heap they are deprived of the form of a house (∼ϕ). Once the house has been completed, the same materials are organized into a house (ϕx). The materials now have a first-level actuality: they are informed by the form of a house (ϕ). The first-level actuality is also a second-level potentiality for being a house (ϕ-ing). When the house performs its function of protecting goods and bodies, the composite house has a second-level actuality: it is actively being what it is.

Is a house a genuine unity? The bricks, stones, and wood organized in a particular way have a second-level potentiality to be a house. At the same time, those materials are still *actually* bricks, stones, and wood, and can

remain what they are when the house is torn down. Let's call these materials the *remnant matter*.[37] If the materials can remain what they are when the organization is removed, the organization that makes the materials be a house is *accidental* to what they are in themselves – namely, bricks, stones, and wood. The house is therefore an accidental unity.

This artificial example is intended to show that the problem for substantial unity is the item designated as 'x' in the four Figures we have discussed – the item that underlies a change and persists as a component of the generated product. In substantial generations this item is matter. If x is something in its own right and can survive a substantial generation and destruction – if, that is, it is remnant matter – then the composite it constitutes is an accidental compound, not a genuine unity. Aristotle's doctrine of potentiality and actuality as so far described does not address this difficulty. The problem is that the remnant matter is *distinct* from the form of the object composed out of the matter, as bricks are distinct from the form of a house. The distinctness of matter and form in artifacts is one reason why artifacts ultimately fail to be Aristotelian substances.

Living organisms are different, but as we shall see, their difference is not enough to overcome the problem. On numerous occasions Aristotle insists that the material parts of living organisms, if separated from the whole, are what they are in name only – homonymously.[38] Call this the *homonymy principle*.[39] For instance, a severed arm is an arm in name only and no better than a sculpted or painted arm. What is true for each bodily part is true for the whole body (*De An.* II.1, 412b17–25). A human corpse is not a human body with the soul removed. It is a human body in name only (*Meteor.* IV.12, 389b31). When an organism dies, what is left is not the organic matter. The matter, as well as the composite, is destroyed when the organism dies. Aristotle's homonymy principle expresses his conviction that the relation between form and matter in living organisms is not an accidental relation. On the contrary, the form determines the matter as the matter that it is. Since the form determines the matter as what it is, the relation between the form and the matter in living organisms is *essential*.[40] Let us call this matter the *functional matter*.

The problem of unity persists, however. Even if the functional matter is determined as what it is by the form of the whole object whose matter it is, the functions belong to some lower level subject, the remnant matter, which survives the destruction of the whole. The functional matter of an animal is destroyed when the animal dies, but some remnant matter is left behind. In *Metaphysics* Z.11, Aristotle says that Callias is destroyed into flesh and bones (1035a18–19, a33). If flesh and bones survive the destruction of a living organism, they undermine the unity of the whole, even if they are functionally organized into an organic body within the animal.

In *Generation of Animals* II.1, Aristotle confronts this difficulty. Flesh, he says, is like a face. After the organism dies, flesh is called flesh only homonymously (734b24–31). Thus he includes the uniform parts, like flesh and bone, with the nonuniform parts, like a face and an arm, as constituents of the functional matter. Still the problem does not go away. What about the matter of flesh – the earth and water of which it is composed? If there is some material continuant that underlies the functional organization and can survive its removal, this is the x-factor, the remnant matter, that undermines the unity of the whole. The remnant matter is ontologically prior to both the composite and the form, since the form depends on it for its existence, and the composite consists of the form and the remnant matter as two more basic components.

Aristotle deals with the problem of lower level matter in his account of mixture in *On Generation and Corruption* I.10. He argues that the ingredients of a mixture exist actually before they enter into a combination but are only potentially present in the compound (μίξις).[41] Think of the spongy stuff called 'cake'. The ingredients of cake are eggs, flour, sugar, butter, water, and so on. These exist separately and actually before they are mixed, but once they are combined and the batter is baked, the product is a spongy stuff in which the ingredients are no longer actually present. Aristotle was not an atomist: an analysis of compounds does not yield elemental particles. He proposes that the ingredients are only potentially present in the compound. They are potentially present, because components of that sort are left behind when the compound is destroyed.[42] The original ingredients do make a contribution to the compound: various of its properties are due to the ingredients. For example, the original ingredients of cake account for it flavor, moisture, weight, consistency, and color. The important point is that those properties characterize the higher level compound; there is no remnant matter to which the form of that higher compound belongs.

Aristotle's treatment of *mixis* suggests that he has a new conception of the relation between matter and form which replaces the old predication model. I think that this new model is introduced in *Metaphysics* H.6. Recall that the chapter addresses two outstanding problems, the unity of form and the unity of material composites. Aristotle first asks: Why is form one, even though we specify two items in its definition, a genus and a differentia? For instance, we define man as 'biped animal'. Why is man not two things, animal and biped? The problem goes away, says Aristotle, if we conceive of the one as matter and potential, the other as form and actuality. He says:

But if, as we say, the one is matter and the other form, and the one is in potentiality, the other in actuality, the thing being sought would no longer seem to be a difficulty. (1045a23–25)

The form man is one thing and not two, because animal is something indefinite and potential: it is not some *distinct* thing in addition to biped. Animal is simply an indefinite determinable, which biped determines as man. Since a mention of animal adds no information that is not already contained in biped, and biped exhausts what man is, 'biped animal' specifies just one thing: man. The form man is simply one thing, even though we specify its essence in terms of a genus and a last differentia.[43]

Metaphysics H.6 then extends this solution to the more difficult case of material composites.[44] Take a bronze sphere. Why is a bronze sphere not two things, bronze and sphere? On the old predication model, a bronze sphere is two things specified as 'this in that',[45] form predicated accidentally of remnant matter. But now, he says, the problem of unity disappears. There is matter, and there is form, the one in potentiality, the other in actuality. I have elsewhere argued that in claiming that the problem is the same as the earlier one about form, Aristotle is proposing that we think of the relation between matter and form as comparable to that between genus and differentia.[46] The matter is not an independent subject to which the formal properties belong. Instead, the matter is an indefinite determinable, like a genus, which the form differentiates into a particular object. Instead of remnant matter, Aristotle introduces what I call *generic matter*. There are not two objects in the same place at the same time, the remnant matter and the object it constitutes. There is just one object, which is determined as what it is by its form. To be sure, that object is also characterized by material properties that connect it to its material origins, but those properties do not contribute to the nature of the object. This new relation is what Aristotle describes in his famous statement at the end of H.6:

But, as we have said, the proximate (ἐσχάτη) matter and the form are the same and one, the one in potentiality (δυνάμει), the other in actuality (ἐνεργείᾳ). (1045b17–19)

The new treatment of the bronze sphere reveals that there are not two objects, the bronze and the sphere, each with its own persistence conditions. There is only one object, the sphere, which has been differentiated out of the bronze.

Aristotle explores the new relation between matter and form in greater detail in *Metaphysics* Θ.7, and he contrasts it with the old predication model. The old predicative relation holds as before between nonsubstantial properties (πάθη) and the physical object they characterize. The dependence of the properties on the underlying subject is indicated by the fact that we use adjectives in preference to nouns when we speak of the object's

properties (we call the object 'that-en' [ἐκεῖνινον] with reference to its πάθη). For instance, we call a man 'musical', not 'musicality'. But in the case of matter and form, we no longer have the old predicative relation, but something new. We indicate the dependence of the matter on the object by using adjectives in preference to nouns when we speak of the object's matter (we call the object 'that-en' with reference to its matter). For instance, we call a sphere 'bronz-en' not 'bronze'. This usage indicates that the form is not a property of the matter (if it were, it should be perfectly correct to call the sphere 'bronze', just as we call a musical man 'man'). Instead, the matter is something indefinite and determinable, which the form differentiates into the object. The matter is a property (or collection of properties) of that higher object. Aristotle says:

In the case of things that are not so [i.e., not related as a physical object to its nonsubstantial properties], but the thing predicated is some form and 'this', the final thing is matter and material substance. And calling [a thing] 'that-en' with reference to its matter and its affections turns out to be quite correct. For both are indefinite (ἀόριστα). (1049a34–b2)

By conceiving of the *x*-factor in this new way, as an indefinite determinable rather than as a definite subject to which properties belong, Aristotle solves the problem of the unity of material compounds like flesh and bronze(n) spheres. More importantly, living organisms like Socrates and Bucephalus turn out to be unified objects after all. For now the nature of the functional matter is exhausted by the form of the organism. Predicating the form of the functional matter is not a case of predicating one thing of another, since the nature of the matter is exhausted by the form. Indeed, the form just is the organism's active potency (ϕ^a) and its matter is its functional body, which is essentially (and exhaustively) determined by the corresponding passive potency (ϕ^p). An organism acts on itself as itself and the motion is its characteristic activity, its mode of living.

The residual material properties (with reference to which parts of the organic body are called *x*-en) remain independent of the form. These properties still have a crucial role to play. Recall that in the key passage in H.6 Aristotle said: "For each thing is some one thing, and the thing in potentiality and the thing in actuality are *somehow* one" (ἕν πώς ἐστιν) (1045b20–21). Why merely 'somehow' one? I have argued that the form and the matter of living organisms are characterized by active and passive versions of the same functional properties. But because organisms are generated out of simpler matter and will be destroyed into simpler matter, they also possess various dispositional properties inherited from the lower level ingredients. For this reason complex organisms easily degenerate into simpler stuff. The residual material properties tend to undermine the unity of the whole, with the result that the unity is unstable and must be con-

stantly maintained.[47] The residual material properties are responsible for the fact that material substances grow tired, weaken, and finally collapse.[48] Because an organism tends to degenerate, staying the same is considerable work. An organism's characteristic activity is consequently more than an expression of what it is. Such activity is also its means of self-preservation and renewal. This dynamic preservation is the joint manifestation of its active and passive potencies, and that activity preserves the organism as the thing that it is.

6. THE PRIORITY OF ACTIVITY

Activity claims a special priority in Aristotle's ontological scheme. A thing's function (ἔργον, what it does) is its final cause. The function determines what the object is and many other things about it. Consider once more an artificial example, an ax. The function of an ax is to chop things. This function determines which potentialities of an ax are essential to it. An ax has many potentialities that are not essential to it – the potentiality to fall downward when dropped, the potentiality of some of its parts to burn and of others to melt when subjected to intense heat, the potentiality to be painted yellow, and so on. It displays these behaviors and undergoes these changes under certain conditions. But these potentialities do not make the object an ax. The object is an ax because it has the potentiality to chop, and the content of that potentiality is determined by the activity (function) for which it is the potentiality. The function not only determines what the thing is. It also determines those features of the object needed to carry out the function, including its material constitution and the way the material components are organized. For instance, the blade of an ax must be sharp and rigid if it is to chop things, the handle must be solid, convenient to grasp, and sufficiently light for a person to use.

What distinguishes living organisms from artifacts is that artifacts depend for the performance of their function on an external user – the ax depends on the person who wields the ax, the violin on the violinist. An organism is itself both the user and the instrument, and so has an autonomy that artifacts lack.[49] An organism is most itself and most unified when it is engaged in those activities in which its matched active and passive potencies cooperate. These activities constitute its particular life and preserve it as the substance that it is. In this way an organism's proper activity accounts both for its peculiar composition and for its enduring unity.[50]

NOTES

[1] *Met.* B.3, 998b22–27.

[2] This is Aristotle's doctrine known as focal meaning (πρὸς ἓν λέγεται), which is spelled out in *Met.* Γ.2.

[3] *Cat.* 5, 2a34–b6.

[4] *Cat.* 4a10–21.

[5] I have oversimplified. I think that thisness and separation are introduced as constraints on the subject-criterion. So a bare matter cannot succeed even as a proper subject, let alone as a substance. See Gill (1989), ch. 1. I also argue that Aristotle was not committed to the entity the tradition calls 'prime matter'. See Gill (1989), ch. 2 and Appendix.

[6] But see Wedin (2000), who argues that the *Categories* and *Metaphysics* are compatible. The two works, he thinks, are engaged in different but complementary projects. The project in the *Categories* is ontological, whereas the project in *Metaphysics* Z is explanatory. The *Categories* asks what is ontologically primary and opts for individual physical objects; *Metaphysics* Z asks what is explanatorily primary and opts for substantial form. Wedin could answer the questions I pose in this paragraph, because on his interpretation form need not be ontologically basic.

[7] For form as definable, see esp. *Met.* Z.11, 1036a28–29; cf. Z.15, where Aristotle argues that individuals cannot be defined or known as individuals: definitions are general. For form as predicable, see esp. *Met.* H.2, 1043a5–7. Form is also said to be predicated of matter at Θ.7, 1049a34–36, but I argue below (sec. 5) that Aristotle is talking about a different relation between form and matter.

[8] E.g., Frede and Patzig (1988), I.36–57, II.241–63; Irwin (1988), sec. 140; and Witt (1989), 155–62.

[9] There are many varieties of this basic idea. See, e.g., Woods (1967), Driscoll (1981); Loux (1991) ch. 6; Lewis (1991), ch. 11; Wedin (2000), ch. 9.

[10] Gill (2001).

[11] Cf. the more precise formulation of the subject criterion in Z.3: "that of which other things are predicated but which is not itself predicated of anything other (μηκέτι κατ' ἄλλου)" (1028b36–37). On the more precise formulation, cf. Irwin (1988), sec. 115.

[12] See Gill (1989).

[13] But see Loux (1995) and Lewis (1995), who argue that Aristotle's predication model (form accidentally predicated of matter) is not in fact subject to the critique in H.6. This is not the occasion to discuss their defense.

[14] See the classic paper by Kosman (1984); I discuss the topic in Gill (1989), chs. 6 and 7.

[15] Cf. *Met.* H.4, 1044a27–30: The matter for a particular product must have suitable dispositional properties – one cannot make a saw out of wood or wool. Cf. *Met.* Θ.7, 1048b37–1049a12.

[16] *De An.* II.5, 417a27–28. In this passage Aristotle focuses on what he elsewhere calls a rational potency (such as knowledge of French). Desire is a necessary condition for actualizing a second-level rational potency. If an object has a second-level nonrational potency (say it is inflammable), and it comes into contact with an appropriate causal agent (say fire), the potency will be actualized barring external interference. Obviously desire is not an issue in the nonrational cases. See *Met.* Θ.2 and Θ.5.

[17] I translate the same Greek word δύναμις sometimes as 'potentiality' and sometimes as 'potency.' I use 'potentiality' in discussing Aristotle's distinctions between δύναμις and

ἐνέργεια or ἐντελέχεια ('actuality'). I prefer 'potency' in discussing an object's source of active or passive change, because it lends itself more naturally than 'potentiality' to active and passive construal.

[18] 1046a10–11: ἡ ἀρχὴ μεταβολῆς ἐν ἄλλῳ ἢ ᾗ ἄλλο.

[19] *Met.* Δ.12, 1019b35–1020a6.

[20] *Met.* Θ.1, 1046a11–26; cf. Δ.12, 1019a20–23.

[21] *Met.* Z.7, 1032a32–b6, 1032b11–14.

[22] The active potency is an unmoved mover. See *GC* I.7.

[23] Cf. 201b4–5. On Aristotle's definition of change, see Kosman (1969); and Gill (1989), 183–94.

[24] Note that Aristotle sometimes speaks as though the form ϕ is the actuality and sometimes as though the ϕ thing (ϕx) is the actuality. For the form, see, e.g., *De An.* II.1, 412a9–11, 412a21–28; *Met.* H.2, 1043a5–6, 1043a12–28; H.3, 1043a29–36. For the ϕ thing, see the discussion of levels of potentiality and actuality in *De An.* II.5, 417a21–b16. Cf. *Met.* Z.9, 1034a16–18; Θ.6, 1048b3–9. In *Met.* Θ.8, the examples of things in actuality that are prior to things in potentiality in account, time, and substance are material composites or immaterial beings, like the prime mover.

[25] See *Phys.* III.1, 201a29–34.

[26] See *Phys.* III.1, 201b9–13.

[27] See *GC* I.7, 323b29–324a5.

[28] *GC* I.7, 324a9–11.

[29] See *GC* I.7, 324b14–18.

[30] Because the resulting form can be active or passive, Figure 3 designates it with a superscript '$^{p/a}$'.

[31] See Gill (1989), 214–227.

[32] Aristotle's text is confusing, because he uses κίνησις (and its cognates) sometimes as a generic term that applies to both changes and activities, and sometimes as a specific term that applies to change as defined in *Phys.* III.1-3, a motion that takes an object from a privative to a positive state, or from one location to another. When he speaks of κίνησις in this specific sense, he distinguishes it from ἐνέργεια, a motion that is complete as soon as it starts. I translate κίνησις as 'motion' when I take the term to be generic. He also uses μεταβολή and its cognates for change in the strict sense, so I translate this term too as 'change'. To make matters worse, Aristotle defines κίνησις as a sort of ἐνέργεια or ἐντελέχεια. We have looked at his definition of change as an ἐντελέχεια (an incomplete ἐντελέχεια) in *Physics* III.1; cf. *Phys.* VIII.5, 257b8–9. In the doublet of *Phys.* III.1 in *Met.* K.9, he gives the same definition but replaces ἐντελέχεια with ἐνέργεια (1065b16). Both ἐντελέχεια and ἐνέργεια can mean 'actuality' (first or second level), or 'activity' (ἐνέργεια is his more usual choice for 'activity'). Aristotle's use of these key terms is fluid, but his distinctions are quite precise.

[33] In Figure 4 the entity that is both agent and patient is designated as the whole complex: $\phi^a\phi^p x$. The second potentiality-actuality model can also apply to artificial cases in which the agent and the patient are distinct individuals but act and suffer in respect of the same positive character ϕ. For instance, a violinist and her violin act and respond in respect of the same positive character, and violin-performance is the joint second actuality of both.

[34] For Aristotle's account of roles of nutritive soul and nutritive body (and food) in the activity of nutrition, see *De An.* II.4, esp. 416b20–23.

[35] See *De An.* II.4, 416b13–17.

[36] Cf. the discussion of pleasure in *EN* X.4. Pleasure is an activity, which Aristotle contrasts with changes.

[37] I owe this vivid label to Wedin (2000).

[38] See, e.g., *Met.* Z, 10, 1035b24–25; *GA* I.19, 726b22–24, II.1, 734b24–27; *Meteor.* IV.12, 389b32–390a2 and 390a10–13.

[39] For a recent discussion of the homonymy principle, see Shields (1999), ch. 5.

[40] The classic discussion of this topic is Ackrill (1972–1973).

[41] See esp. *GC* I.10, 327b22–31.

[42] In fact, the components extracted are typically not of the sort used in its production but elements – earth, water, air, and fire – that composed the original ingredients. See Aristotle's cyclical model of generation and destruction in *Met.* H.5, 1044b29–1045a6.

[43] Cf. *Met.* Z.12., 1038a25–34.

[44] I discuss this topic in Gill (1989), ch. 5. I develop my interpretation further and respond to some objections raised by Loux (1995), Lewis (1995), and Harte (1996), in Gill (forthcoming).

[45] Aristotle's favorite example of this sort of case is the snub. See Z.5. Cf. Z.11, 1036b21–32, 1037a29–b7.

[46] See above n. 44.

[47] I discuss this topic in Gill (1989), ch. 7.

[48] See Aristotle's discussion of the heavenly bodies in *Met.* Θ.8. Because they do not have the same sort of matter as sublunary objects, they never tire of their proper activity, as do perishable things. Matter of perishable things is the cause of tiring and perishability (1050b20–28).

[49] Note that in *De An.* II.1 Aristotle defines the soul as "the first actuality of a natural instrumental (ὀργανικοῦ) body" (412b5–6). Cf. II.4, 415b17–20.

[50] I read a version of this paper at the conference, "Process: Analysis and Application of Dynamic Categories", in Sandbjerg, Denmark. I am very grateful to Johanna Seibt for organizing that rich and memorable event and to all the participants for the stimulating discussion of process.

REFERENCES

Ackrill, J. L.: 1972–1973, 'Aristotle's Definitions of *psuchē*', *Proceedings of the Aristotelian Society* **73**, 119–133. Reprinted in J. L. Ackrill, *Essays on Plato and Aristotle*, Oxford: Oxford University Press, 1997, pp. 163–178.

Driscoll, J.: 1981, 'EI ΔH in Aristotle's Earlier and Later Theories of Substance', in D. J. O'Meara (ed.), *Studies in Aristotle*, Washington, D.C.: The Catholic University of America Press, pp. 129–159.

Frede, M. and G. Patzig: 1988, *Aristoteles Metaphysik Z. Text. Übersetzung und Kommentar*, 2 vols. München: Verlag C. H. Beck.

Gill, M. L.: 1989, *Aristotle on Substance: The Paradox of Unity*, Princeton: Princeton University Press.

Gill, M. L.: 2001, 'Aristotle's Attack on Universals', *Oxford Studies in Ancient Philosophy* **20**, 235–260.

Gill, M. L.: forthcoming, 'The Unity of Substances in *Metaphysics* H.6', in the Conference Proceedings of the 2002 conference on Aristotle on Substance and Predication in São Paulo, Brazil.
Harte, V.: 1996, 'Aristotle's *Metaphysics* H6: A Dialectic with Platonism', *Phronesis* **41**, 276–304.
Irwin, T.: 1988, *Aristotle's First Principles*, Oxford: Oxford University Press.
Kosman, L. A.: 1969, 'Aristotle's Definition of Motion', *Phronesis* **14**, 40–62.
Kosman, L. A.: 1984, 'Substance, Being, and *Energeia*', *Oxford Studies in Ancient Philosophy* **2**, 121–149.
Lewis, F. A.: 1991, *Substance and Predication in Aristotle*, Cambridge: Cambridge University Press.
Lewis, F. A.: 1995, 'Aristotle on the Unity of Substance', *Pacific Philosophical Quarterly* **76**, 222–265. Reprinted in F. A. Lewis and R. Bolton (eds.), *Form, Matter, and Mixture in Aristotle*, Oxford: Blackwell, 1996, pp. 39–81.
Loux, M. J.: 1991, *Primary Ousia*, Ithaca, N. Y.: Cornell University Press.
Loux, M. J.: 1995, 'Composition and Unity: An Examination of *Metaphysics* H.6', in May Sim (ed.), *The Crossroads of Norm and Nature: Essays on Aristotle's Ethics and Metaphysics*, Lanham, Md.: Rowman and Littlefield.
Shields, C.: 1999, *Order in Multiplicity: Homonymy in the Philosophy of Aristotle*, Oxford: Oxford University Press.
Wedin, M.: 2000, *Aristotle's Theory of Substance: The Categories and Metaphysics Z*, Oxford: Oxford University Press.
Witt, C.: 1989, *Substance and Essence in Aristotle*, Ithaca, N. Y.: Cornell University Press.
Woods, M. J.: 1967, 'Problems in *Metaphysics* Z, Chapter 13', in J. M. E. Moravcsik (ed.), *Aristotle: A Collection of Critical Essays*, Notre Dame, Ind. Notre Dame University Press, pp. 215–238.

JOHANNA SEIBT

FREE PROCESS THEORY: TOWARDS A TYPOLOGY OF OCCURRINGS

ABSTRACT. The paper presents some essential heuristic and constructional elements of Free Process Theory (FPT), a non-Whiteheadian, monocategoreal framework. I begin with an analysis of our common sense concept of activities, which plays a crucial heuristic role in the development of the notion of a free process. I argue that an activity is not a type but a *mode of occurrence*, defined in terms of a network of inferences. The inferential space characterizing our concept of an activity entails that anything which is conceived of as occurring in the activity mode is a concrete, dynamic, *non-particular* individual. Such individuals, which I call 'free processes', may be used for the interpretation of much more than just common sense activities. I introduce the formal theory FPT, a mereology with a non-transitive part-relation, which contains a typology of processes based on the following five parameters relating to: (a) patterns of possible spatial and temporal recurrence (automerity); (b) kinds of components (participant structure); (c) kinds of dynamic composition; (d) kinds of dynamic flow (dynamic shape); and (e) dynamic context. I show how these five evaluative dimensions for free processes can be used to define ontological correlates for various common sense categories, and to draw distinctions between various forms of agency (distributed, collective, reciprocal, entangled) and emergence (weak, strong, as 'autonomous system' (Bickhard/Christensen)).

The study of processes and process-based theory formation is a surprisingly short chapter in the history of ontology. Despite Aristotle's sophisticated investigations into change and interactive development, despite Whitehead's bold attempt at a comprehensive process metaphysics, the traditional research focus in ontology has been on 'static' entities such as objects (substances), properties, relations, and facts. Those contemporary ontological schemes which are deemed 'revisionary' demote the primacy of 'substances' merely to turn still to other types of 'static' particulars such as tropes or states of affairs.

As I have shown elsewhere, current analytical ontology still abides by the (about twenty) presuppositions that characterize the "myth of substance", research paradigm that has been so dominant in ontology, and I have argued that the 'substance paradigm' hampers ontological explanations of identity, qualitative sameness, and persistence.[1] In the following I sketch some elements of 'Free Process Theory', a new (non-Whiteheadian) process-ontology which, to my knowledge, abandons more substance-ontological principles than any other revisionary scheme hitherto pro-

J. Seibt (ed.), Process theories: Crossdisciplinary studies in dynamic categories, 23–55.