

Objects and Their Phases

Synopsis: I propose a solution to puzzles of material constitution on which constituted things are “phases” of their constituent matter, where a phase of matter is that matter instantiating a property or properties. A statue, e.g., is a phase of, but not identical to, the matter it’s made of. A statue can be destroyed without destroying its matter because it’s possible to destroy a phase of its matter (deprive it of the statue-shape) without destroying the matter itself. A statue and the quantity of matter it’s made of are not distinct coincident objects. The account applies to a wide variety of material objects, both natural and artificial. Moreover, I argue that the problem of constitution (the relation between a thing and its constituent matter) is not the same as the problem of composition (the relation between a composite thing and its parts), since the former can arise for material simples, while the latter cannot. Nevertheless, I consider applications of the apparatus I develop to puzzles of identity through loss or exchange of parts over time.

I clench my hand. My hand is now a fist. I unclench my hand. The fist is gone, yet my hand remains. And this seems a good reason to conclude that my hand and my fist are not the same thing. My hand survives unclenching, but my fist does not. Yet, while it exists my fist is in the same place as my hand. And if my hand is a physical thing and my fist is a physical thing, to say that my fist and my hand are in the same place at the same time is to say that distinct physical things are in the same place at the same time. But this seems impossible (at least for medium-sized physical things like hands and fists).

What, then, is the relationship between my fist and my hand?

The term ‘fist’ is a *sortal* – a term that picks out things of a certain *sort*. What sort of things does ‘fist’ pick out? Clenched hands. What is a clenched hand? A clenched hand is a hand in a certain state, a hand having a certain property (*clenchedness*). ‘fist’ is thus a kind of *phase sortal*, a term that picks out hands that are in a certain state – hands that are *clenched*.

‘water’, ‘ice’ and ‘vapor’ are also phase sortals – having in their extensions H₂O in various states: liquid, solid and gaseous. A single bunch of H₂O molecules can be in these different states over time, as, for example, a puddle, an ice cube and a cloud. The same

molecules in different states can constitute different kinds of things. A puddle is not an ice cube, an ice cube is not a cloud, a cloud is not a puddle. So what is the relationship between the puddle and those molecules? The puddle is those molecules in a liquid state. Likewise, the ice cube is those molecules in a solid state, and the cloud is those molecules in a gaseous state. Is the puddle something distinct from the clutch of molecules? Not, I submit, in any sense that should offend anti-coincidence intuitions. Clearly the molecules can survive freezing, while the puddle cannot. And they can survive vaporization, while the ice cube cannot. But it does not follow from this that the puddle, the ice cube and the cloud are objects over and above the molecules that constitute them. We could maintain that only the molecules are objects in the preferred sense, while still acknowledging that the puddle, the ice cube and the cloud are not *just* those molecules. What they are are those molecules *in various states*, where being in a state is a matter of having certain properties.

All kinds of things are related in the same way as fists and hands, and puddles, ice cubes or clouds and bunches of H₂O molecules. Ermines and stoats, for example. A stoat is a kind of weasel that is, most of the time, light brown. An ermine is a weasel of that kind when its fur has turned white in the winter. Perhaps stoats and weasels were assigned these different sortals by someone who thought that the brown ones and the white ones were different species. And it's easy to imagine why these terms might have stayed in use even after the truth was discovered. There may be differences in behavior or biology that zoologists think are important to distinguish and keep track of – just as there are important differences between, say, kittens and adult cats that warrant identification and attention. Having different terms for animals in different environments or at different stages of their lives enables zoologists to mark important natural

differences among the things in their field of study. Indeed, we have sortals for ourselves at different stages of our lives: ‘infant’, ‘toddler’, ‘child’, ‘adolescent’, ‘pubescent’, ‘tween’ ‘teen’, ‘adult’, etc., and for individuals of different genders: ‘male’, ‘female’, ‘trans’, ‘queer’, ‘non-binary’, etc. But coinage and use of these different sortals brings no new objects, in any potentially offensive sense, into existence. It merely serves to mark differences in characteristics that are already there.

We also have sortals for artifacts. I fold a piece of paper in a certain way. Now the piece of paper is a paper airplane. I unfold the paper and smooth it out. Now the paper airplane is gone. Yet the paper remains. But the paper airplane is not a distinct object from the piece of paper. It’s the *folded* (in a certain way) piece of paper. ‘paper airplane’ is a phase sortal. What distinguishes the paper airplane from the piece of paper it’s made of is its folded state – its having the property of being folded in a certain way. Likewise a wooden ship and the wood it’s made of. If I disassemble a wooden ship, I no longer have a ship, though the wood it was made of remains. But the ship is not an object over and above the wood it’s made of. It’s that wood *arranged in a certain way*. It isn’t something that competes for space with the wood.

Let’s call an object in the problematic, co-locational sense an “obtrusive” object. Obtrusive objects, if they exist, are potential contestants for or co-occupants of space with the matter they’re made of.

If we have reason to, we can also coin new sortals for what might seem arbitrary arrangements of things. For example, if I’m a used car salesman, I may find it useful to distinguish cars that have consistently been kept in garages from those that have been kept outside. The former – “in-cars,” I might call them – are worth more than the latter (which I call

“out-cars”), because, for example, their paint is less faded. I might buy a car fresh off the assembly line – one that hasn’t been kept anywhere – and resolve always to keep it in a garage, thereby turning a car into an in-car. Is the in-car an obtrusive object? No. It’s true that when I do what I just described I create an in-car. And I could change my mind and turn it into an out-car. But the in-car or out-car are not distinct objects competing with the car for the same space. They are, respectively, the car kept inside and the car kept outside. Are there in-cars, in addition to just plain old cars? Well, are there cars kept only in garages? If the answer is “yes,” then there are in-cars. Are there paper airplanes in addition to pieces of paper? Well, are there pieces of paper folded in the paper-airplane way? Most certainly. But to say that there are such things is just to say that things can be in various states, and that we have different sortals that refer to things irrespective of being in those states as well as things that are in those states, which we may call, on analogy with water, ice and vapor, *phases* of those things.

We can also coin *names* for phases of things – “phase nominals,” as I will call them. I might name my right hand “Hans,” and my right fist “Fausto,” or my piece of paper “Prunella” and my paper airplane “Amelia.” Hans is not identical to Fausto, since Fausto is always clenched, while Hans is not. Prunella is not identical to Amelia, since Amelia is always folded while Prunella is not. But Fausto and Amelia are not obtrusive objects with respect to Hans and Prunella – though they are of course related in intimate ways. Hans and Prunella are, we may suppose for the time being, objects, while Fausto and Amelia are *phases* of them – Fausto is Hans clenched; Amelia is Prunella folded.

Once upon a time people thought that a particular celestial body visible in the evening sky in a certain location at a certain time of year was a distinct, though similarly beguiling, body from

one visible in the morning sky in a certain location at a certain time of year. They gave them different names: 'Hesperus' and 'Phosphorus'. Later, when they found out that the evening body was the same body as the morning body, i.e., the planet Venus, they had reason to use the names interchangeably. But they might not have changed the way they used the names, perhaps as a way of marking differences that for scientific reasons they wanted to keep track of. Suppose, for example, that they discovered that Venus reflects evening light differently from the way it reflects morning light, and that this is a difference that was important to them. They would then be using the names 'Hesperus' and 'Phosphorous' as phase nominals. But they would not thereby be relapsing into their old view that Hesperus and Phosphorus are distinct celestial bodies. They would be using 'Hesperus' and 'Phosphorus' as names for distinct *phases* of Venus. And we could insist that there is only one *object*, in the privileged sense, present, Venus, even though Hesperus is not Phosphorus. In this scenario, Hesperus is not Phosphorus because appearing in the evening is not appearing in the morning.

This example, along with the in-car/out-car example, shows that we can have phase sortals, and phase nominals, corresponding to *relational* as well as *intrinsic* states of things. The differences between water, ice and vapor are intrinsic, resulting from differences in the states of the H₂O molecules that constitute them (though of course *these* differences depend upon the relations the molecules stand in to each other; but they are intrinsic to the bunch of molecules). Likewise the differences between fists and hands, paper airplanes and sheets of paper, ermines and stoats. Fists result from changes in the states of hands, paper airplanes result from changes in the states of pieces of paper, ermines result from changes in the states of stoats. The differences between being the evening star and the morning star, on the other hand, are extrinsic.

They depend upon the relationship between Venus and Earth. (The difference between being an in-car and an out-car depends on the relationship between the car and a garage or garages.)

Likewise the differences among meteoroids, meteors and meteorites. A meteoroid is a space rock of a certain size outside of Earth's atmosphere, yet close enough to be pulled into it by gravity; a meteor is a space rock falling through Earth's atmosphere; and a meteorite is a space rock on the surface of Earth, having survived its fall through the atmosphere. One and the same space rock can be, at different times, a meteoroid, a meteor and a meteorite. 'meteoroid', 'meteor' and 'meteorite' are relational phase sortals. What happens to the meteoroid – the extraterrestrial space rock – when it enters Earth's atmosphere? It ceases to be a meteoroid and becomes a meteor. And what happens to the meteor – the atmospheric space rock – when it hits the ground? It ceases to be a meteor and becomes a meteorite. When a meteoroid enters Earth's atmosphere, the number of meteoroids in the universe decreases by one; and when a meteor hits the ground, the universe loses a meteor. Yet the rock remains. But we should not conclude that the meteoroid, the meteor and the meteorite are obtrusive objects with respect to the rock. They are *relational phases* of the rock – i.e., the rock bearing certain relationships to Earth and its atmosphere. When astronomers introduced these sortals they did not create new objects, non-identical to but coincident with space rocks. They introduced terms that describe space rocks in different relational states, in order to mark the fact, presumably among many others, that those peculiar rocks we find on the ground came from outer space, and put on a light show on their way down.

If we call a particular space rock "Peter," we can introduce names corresponding to the various phases of its relationship with Earth. Let's call Peter orbiting perilously close to Earth

“Mark”, Peter falling precipitously through Earth’s atmosphere “Murray,” and Peter on the ground “Matt”. Mark, Murray and Matt are not identical, because Mark is a meteoroid, Murray is a meteor and Matt is a meteorite, and meteoroids are not meteors, nor meteors meteorites. They are, all three, phases of Peter. When Mark enters the atmosphere, Peter enters the atmosphere; when Murray falls, Peter falls, and when Matt is on the surface of Earth, Peter is right there with him. But when Mark enters the atmosphere he becomes Murray, and when Murray hits the ground he becomes Matt. When Mark becomes Murray, Matt is no more, and when Murray becomes Matt, Murray is no more. So Mark and Murray do not survive the trip to Earth. But Peter does. So neither Mark nor Murray is identical to Peter. And since Peter existed before Matt, Matt is also not identical to Peter. Does this mean we have four distinct objects here? No. No more than we have four distinct objects because meteoroids are not meteors and meteors are not meteorites. A space rock’s travels into and through Earth’s atmosphere to the ground is not a cavalcade of coincident *entia successiva*. It’s a journey of transformation from one *kind of* thing into another made by a single space rock. Meteoroids, meteors and meteorites are not obtrusive objects with respect to the space rock that undergoes these changes; nor are Matt, Murray and Matt with respect to Peter.

This might seem counterintuitive. How could Murray *cease to exist* when he hits the ground? We’re used to using names to refer to objects irrespective of their contingent properties, and it’s hard to believe that an object could cease to exist simply because it ceased to instantiate one of them – in this case because it changed its position relative to the surface of the Earth. But I’m suggesting that we can, and do, also use names to refer to *objects in certain states* – that is, objects insofar as they have certain properties. They are correlative with the terms we use to *sort*

objects in different states. What happens to Fausto when I unclench Hans? Fausto is no more. Why? Because Hans is no longer clenched. Fausto is a fist. Fists are clenched hands. Unclenched Hans is not clenched. So unclenched Hans is not a fist. So unclenched Hans is not Fausto. [relevant to Noonan 1997 objection to Burke]

Suppose I make myself a ham sandwich. A ham sandwich is not the same as the bread and ham that constitute it. A ham sandwich does not exist when the bread is in the grocery store down the block and the ham is in the refrigerator; and it cannot survive being dismantled or eaten. If I'm especially fond of a ham sandwich I've made, I might name it. I might call it "Dagwood." If I knock Dagwood off the table and his parts are scattered, the universe has lost a sandwich, though its ingredients remain. If I chew Dagwood up, again, a sandwich has been lost, though its finer parts remain. Dagwood is a sandwich. Neither randomly scattered bread and ham nor a bread and ham bolus is a sandwich. In either case, Dagwood is gone. He no longer exists.

It might seem weird (it probably is weird) to name a ham sandwich. But it's not weird to name a stack of snowballs. We have a sortal for some things of this sort – 'snowman' – and snowmen are frequently named. If I make one and name it "Coolio", what happens to Coolio if I dismantle him? He ceases to exist, because Coolio is a snowman, and snowmen can't survive being dismantled. They also can't survive being melted, because melted snow is water, and water is not snow.

Indeed, given that we are ourselves composites of things arranged in very special ways, our names are names of things like Dagwood and Coolio. What happens to Mitch when he is vaporized and his constituent horrible atoms are blasted across the universe? He ceases to exist.

Because ‘Mitch’ was a name of those atoms (for the moment ignoring change in constituent matter over time) in a certain very complex relational state. It’s only because we typically don’t *name* things like meteors or ham sandwiches that it sounds strange to say that Murray ceases to exist when he hits the surface of the Earth, or that Dagwood ceases to exist when I eat him. (But we do name meteorites. There’s one called “Gibeon,” for example.)

Moreover, I’m told, in some cultures people adopt different names at different stages of their lives. And one such individual might claim, for example, that her tween self, Sebastian, no longer exists, because she is now a teenager and no longer a tween, and as a teenager she’s Jessica. For her, it’s just as easy to say that Sebastian no longer exists as it is to say that her tweenage self no longer exists – because she is no longer a tween. And many people who transition from one gender to another (or to none) insist that their pre-transition name no longer refers to them, because it was a name of something that no longer exists. They are, for example, no longer David. They are Rose. David no longer exists. David was a man and Rose is a woman. Men are not women; so David is not Rose. These cases differ from changes of names that are not names of phases or stages. One might, as a friend of mine once did, change one’s name from “Chalmers Faggart” to “Chalmers Timmins” after one’s father dies, without intending that the referents of the names be different, or claiming that the bearer of the first name no longer exists.

So far I’ve been arguing that the relation between constituted material objects and the matter that constitutes them is the same relation that holds between liquid water, ice and water vapor, and the H₂O molecules that constitute them: constituted things are phases of their constituting matter (their “material content,” as I shall say).

For example, I would say that a statue is a phase of the matter it's made of, not an obtrusive object distinct from it, and that the reason the two have different survival conditions is that to be a clay statue is to be clay with certain properties – a particular shape, for example. (That statues are artifacts, and, much worse, works of art, introduces many complications with respect to determining *which* properties are such that giving them to the clay makes it a statue. But I think these complications are irrelevant to the basic question of the relation between a statue and the stuff it's made of, since the answer can be modified to accommodate any choice of properties.) To destroy the statue it's enough to deprive it of the property or properties that make it a statue. And this can be done without depriving the clay it's made of the properties that make *it* the kind of thing it is. Squashing a statue deprives it of the properties that make it a statue; but squashing a lump of clay doesn't deprive it of the properties that make it a lump. (You'd have to do something much more drastic to it to accomplish that.)

But there are other questions we can ask about the relation between a statue and the clay it's made of. For example, can the statue survive loss or replacement of parts of the clay? And it doesn't look like a *phases* account can provide an answer.

But I think the question I've tried to answer is the question we must answer first: what is the relation between a material object and the matter it's made of, its material content? Call this the *constitution* question. It is more fundamental than the *composition* question – i.e., what is the relation between a constituted object and the *composite* matter it's constituted by? And this is because the constitution question can arise in cases where the composition question does not.

Suppose there are material simples. And suppose that simples can have contingent intrinsic properties. Scientists think electrons are elementary particles, so let's suppose they're

simples. Electrons can have two kinds of “spin” – up-spin and down-spin. Since scientists detect properties of things on the basis of their interaction with other things and with various kinds of detectors, we can assume that having up-spin confers causal powers on electrons that they would not have without it. So there’s an important, objective difference between electrons with up-spin and electrons with down-spin. And a scientist might well coin snappier sortals for them – say “uptrons” and “downtrons”. Not all electrons are uptrons, and not all are downtrons, and no uptrons are downtrons, and *vice versa*. Consider a particular uptron. And suppose that electrons can change their spin. Now change its spin to down. In doing so, we have made it the case that the universe has lost a uptron. But it hasn’t thereby lost an electron. The uptron passes away while the electron persists. Shall we conclude that the uptron is a distinct obtrusive object? I say no. You may disagree; but the important point here is that we have a puzzle exactly analogous to the statue-lump puzzle, but where the constituting material thing does not have parts. It makes no sense to ask whether a particular uptron could survive removal of a part of its constituting electron, since electrons (*ex hypothesi*) don’t have parts.

It might be doubted that material simples can have contingent intrinsic properties, so that the situation envisioned above is impossible – maybe even metaphysically impossible. But it is certainly *conceivable*, and it seems to me that this is all that’s needed to make the point. In any case, as we saw above, there are relational sortals. So even if simples can’t have contingent intrinsic properties, they can have contingent relational properties, and such properties can be assigned sortal terms.

Suppose there is a cult of electron worshipers who also worship Diana as the goddess of the moon. One way in which they combine their beliefs is that they think that whenever there’s a

full moon, all electrons (regardless of spin) become sacred. And when an electron is sacred, they call it a “sacriion.” As the full moon changes its phase, sacriions lose their sacredness, and cease to be sacriions. The universe has lost all its sacriions. But it has not, thereby, lost any electrons. So not all basicons are sacriions. Shall we say, then, that when the moon is full every electron shares its space with a obtrusive sacriicon? I say no. But the point *here* is that constitution puzzles can arise for simples and relational properties. The cult might also worship only one particular electron, which they keep in a magnetic field in a shrine in a temple. And they may call it “Baal.” When the moon is full, only Baal becomes sacred. And when Baal is sacred, it is called “Aglibol.” When the moon changes phases, Aglibol ceases to exist.

The possibility of material things of kind *K* that are phases of simples has relevance to another kind of question one can ask about the relation between a material thing and its constituting matter, since such things focus attention on an important fact. Opinions vary with respect to whether or not a statue might have been, or come to be, made of different clay. But it seems clear that a particular electron or sacriion *could not* have been made of (or be a phase of) a *different electron*. To ask whether or not this is possible is to ask whether or not a particular electron might have been a different electron. And this question seems to have a perfectly clear, unproblematic answer: necessarily, *no*. Interestingly, it seems that the same is true for certain kinds of composite things. Could *this fist* have been made of (or been a phase of) a *different hand*? (Could *someone else* make *this fist*?) Again, it seems clear that the answer is necessarily *no*. And maybe this should be clear for statues, as well. Could *this statue*, which is a phase of *this clay* have been made of different clay? Furthermore, it doesn't seem completely out of line to say that if a particular thing of kind *K*, made of particular matter *M* could not *have been* made

from different matter, then it could not *come to be* made of different matter. And maybe this is a principled reason to resist change-in-parts-over-time-saving-identity intuitions and go full Chisholm.

I have been freely speaking of *things* constituting other things, but, of course, in typical puzzle cases the constituting “thing” is itself constituted. Statues are constituted of lumps of clay; but lumps of clay are also constituted – by clay particles. So I would also want to say that the clay is a phase of the clay particles. The conditions under which clay particles constitute a lump of clay are less specific than the ones under which some clay constitutes a statue. A lump need have no particular shape (though of course it must have *some* shape or other). But the particles that constitute it can’t be scattered across the galaxy (or even across your living room). The constituents of a lump must be close enough to each other. How close? Perhaps close enough to be held together by a particular quantity of water. Maybe it’s vague. But there are clear cases of things that are lumps of clay and things that are not. We tend to make statues out of the former.

But even if this isn’t the case, I think the constitution question is still more basic than composition questions, since the latter ask, among other things, whether a composite can lose or exchange parts while remaining the same thing. But this presupposes a constituting relation between a composite thing and its material content.

And of course the particles constituting the lump are in turn constituted by their parts, which are constituted by their parts, etc., etc., until we reach the simples. Or maybe we don’t reach simples because matter is infinitely divisible and, hence, gunky. On this view, everything that isn’t a simple (which might be *everything*) is a phase of something else. If there are simples,

all non-simples are pluralities of simples instantiating some property or properties, intrinsic or relational. If there are no simples, then everything is a phase of some *schmear* of gunk.

We're calling the matter constituting a thing of kind K – a K – its material content. The ultimate material content of a K can be either a simple or plurality of simples or a schmear of gunk. And what makes a thing of kind K a K is that it is in the extension of the property or properties of characteristic of K , which are encoded in the meaning of the sortal 'K'. These properties may be intrinsic or extrinsic. They may be simply properties of spatial *arrangement* (as in a stack of snowballs or a ham sandwich), or they may involve special physical relations among constituents (like water, ice and steam). K may be a natural kind, and artificial kind, or a completely made up kind (like *in-car*). To say that some material thing is a K is to say that there K -properties instantiated by some material content. We may talk about K s relative to their material contents as “objects” or “things,” but this doesn't entail that a K is object obtruding upon its material content.

Nor does the fact that some matter falls under a number, perhaps an indefinitely large number, of different sortals entail an ontological explosion. Suppose some fiend decides that my fist would make an excellent hood ornament. He lops it off and affixes it, ornamentally, to the hood of his car. My fist is now a hood ornament. If he later gets tired of it and removes it from the hood of his car, my fist is no longer a hood ornament. But it is still a fist. Shall we then say that my fist and the fiend's hood ornament are distinct obtrusive objects? And, if so, are there then three distinct co-located objects on the hood of his car when my fist is there, a hand, a fist and a hood ornament? No and no. My fist is a phase of my hand, and the hood ornament is a (relational) phase of my fist. And the fiend's hood ornament may become an exhibit in a trial, or

an item displayed in a museum of fiendishness. But none of these sortal transformations would result in the creation of a new obtrusive object.

Is a table something over and above its material content, or the simples that compose it? Yes, but not obtrusively. A table is not some *thing* over and above its material content, competing with it for space; though at the same time it's not *just* its material content. It's that material content, the simples that compose it (let's suppose), in a certain state – arranged table-wise, one might say. Tables *are* simples arranged table-wise.

I'll end with an objection I got from Dan Korman, and my response to it. Dan objects that the following valid argument refutes my claim that a fist and the hand it's made of are not identical, but are not distinct obtrusive objects.

If fists are clenched hands, then fists are hands. Hence, if Hans is a hand, then so is Fausto. Yet, according to me, Hans and Fausto are not identical. So, if they're both hands and they're not identical, then they're distinct hands occupying the same space whenever Hans is clenched. So my phase view doesn't avoid the obtrusive-object problem.

My reply is that it is not true, *simpliciter*, that Fausto is a hand. Fausto is of course *constituted by* a hand; but Fausto is more than that. Fausto is a fist – something like *a state of affairs involving* Hans. But states of affairs are not identical to any of their components. The state of affairs of a hand being clenched is not a hand. Hence, Hans and Fausto are not both hands.