International Phenomenological Society

Particulars in Particular Clothing: Three Trope Theories of Substance
Author(s): Peter Simons
Source: *Philosophy and Phenomenological Research,* Vol. 54, No. 3 (Sep., 1994), pp. 553-575
Published by: International Phenomenological Society
Stable URL: http://www.jstor.org/stable/2108581
Accessed: 16-05-2017 11:34 UTC

International Phenomenological Society is collaborating with JSTOR to digitize, preserve and extend
access to *Philosophy and Phenomenological Research*

Particulars in Particular Clothing:
Three Trope Theories of Substance*

PETER SIMONS
Institut für Philosophie
Universität Salzburg

> [W]hen we talk or think of any particular sort of corporeal
> Substances, as *Horse, Stone, etc.* though the *Idea*, we have
> of either of them, be but the Complication, or Collection of
> those several simple *Ideas* of sensible Qualities, which we
> find united in the thing called *Horse* or *Stone*, yet because we
> cannot conceive, how they should subsist alone, nor one in
> another, we suppose them existing in, and supported by
> some common subject; *which Support we denote by the
> name Substance*, though it be certain, we have no clear, or
> distinct *Idea* of that *thing* we suppose a Support.
> (John Locke, *An Essay Concerning Human Understanding*,
> Book II, Chapter XXIII, §4.)

1 Introduction

I propose to try and pick a safe path through part of that ontological
minefield, the problem of particulars and universals. Of those forms of nomi-
nalism which hold out any promise of success in the ontological assay of
corporeal substances like horses and stones, two especially clamor for atten-
tion. Both use the notion of a trope or individual property instance. The bun-
dle theory is perhaps at present the more popular. It has been strongly sup-
ported by Donald Williams and Keith Campbell, and says that a concrete par-
ticular is nothing but a bundle of tropes. The second is the *substratum* the-
ory, which asserts that a concrete particular requires, besides its tropes, a non-
trope ingredient which we may call a *substratum*. Substrata are sometimes
called *bare particulars*. Perhaps the most famous substratum theorist is Locke
(cf. the quote above), though there are similar tendencies in Aristotle and
Thomas. A prominent contemporary supporter of Locke and the substratum
theory is C. B. Martin. Each of these views has points in its favor and other

---

*   To the memory of Col. Marcus J. Gravel (1930–1992).

points against, which I shall discuss. In the end I shall prefer a third theory, which I call the *nuclear* theory, which is neither a bundle theory nor a substratum theory, but combines the advantages of both without, I hope, the disadvantages of either.

It is gratifying that discussion of the old problem of universals has advanced in recent years to a point where the alternatives have seemingly been more or less canonically charted and many standard moves in the debate have been codified. Foremost among those contributing to this advance has been David Armstrong. It is interesting to compare Armstrong's positions in his two works, *Universals and Scientific Realism* of 1978 and *Universals, an Opinionated Introduction* of 1989. The most prominent change concerns precisely the sort of position I think is correct, which is nowadays generally called *trope nominalism*. Armstrong's change of mind shows nicely how trope nominalism has come to be more widely known and accepted. Whereas in the earlier book he is fairly brief in dismissing the position, for what even he now accepts were bad reasons, his present view is that a kind of trope nominalism is the most promising rival to his own kind of *a posteriori* realism, and that while realism has a slight edge, the final decision between the two theories is probably awaiting arguments which have yet to be given. In a nutshell, and leaving personalities out of it, the inherent strengths of trope nominalism have found increasing recognition, and Armstrong, honest as ever, has not failed to call attention to these, despite their reflecting against his own view.

I shall not attempt to set out all the advantages of the trope theory over nominalism without tropes, or its advantages over theories replacing universals by tropes. These have been capably set forth both in Armstrong's later book and, with more personal conviction, in Keith Campbell's book *Abstract Particulars* (1990).

2 Why Tropes Have Been So Ignored

Tropes are now a relatively familiar, if still not popularly accepted category in ontology. Most philosophers raised on standard analytical fare in the English-speaking world probably on first acquaintance considered them as somewhat exotic creatures in the ontological zoo. By contrast, those with a more thorough grounding in medieval philosophy will have found them familiar as the individual accidents of Aristotle and the Scholastics. That they should have been thought exotic, and that they have been cursed with a plethora of unlovely names as numerous philosophers came across the need for them more or less independently, are perhaps due to the way analytic philosophy has been developed and taught in much of the world in this century, and more especially to the influence of Russell and Moore. Russell, in his discussion of properties and relations, never even raises the issue whether

these are universals or particulars, assuming simply that they are universals. Moore rather effectively drove people away from tropes in a famous criticism of Stout's trope theory, making realism about universal properties seem the only reasonable view.

Even a quite brief look at the relevant passages of famous philosophers from the past suggests that belief in tropes, under whatever name, has been the exception rather than the rule. Apart from the Aristotelian-Scholastic tradition, we have the (not unconnected) modes of Locke, the properties of monads in Leibniz, and (with qualifications) the ideas of Berkeley and Hume. Tropes are also prominent in the main tradition of scientific philosophy on the European continent around 1900, the pupils of Brentano. When Meinong spoke of properties and relations in his early work on the empiricists, he assumed without question that they were particulars, not universals.[1] A deepening of the analysis of tropes was effected by Husserl in his *Logical Investigations*.[2] Husserl extended the idea of a dependent content or idea, which he had found in Stumpf, from the psychological to the ontological sphere, and called dependent objects *moments*. Brentano likewise developed the idea of an object only one-sidedly separable from another. It is conceivable that Stout, whose *Analytical Psychology* was influenced by the Brentano school, also received impulses to his theory of abstract particulars from this direction.

My own route to tropes was somewhat deviant: not via Stout or the Scholastics but as Husserl's *moments*. In that context they do not feature as possible pieces in the game of universals, since Husserl also believed in universals, which he called *ideal species*. The first suggestion I found that tropes could be of use to nominalists was in Guido Küng's *Ontology and the Logistic Analysis of Language*, which was influenced by the nominalists Goodman and Leśniewski, and appeared in English translation in 1967. It was no accident that Küng was knowledgeable about both Husserl and the Scholastic tradition. Ignacio Angelelli's *Studies on Frege and Traditional Philosophy* (also 1967) showed how modern views had consistently suppressed the individual accidents from the "ontological square" of Aristotle's *Categories*, and from then onwards I was hooked. Tropes were put to use, again under the name *moments*, in the theory of truth-makers of Kevin Mulligan, Barry Smith and myself (1984).

Institutional and accidental historical reasons do not seem sufficient to account for the recent widespread ignoring of tropes, and Küng, in his book, offers three more systematic reasons:[3]

---

[1]   Cf. Grossmann 1974, p. 5.
[2]   Husserl 1970, Investigation III, "On the Theory of Wholes and Parts". For a commentary, see Simons 1982 (1992).
[3]   Küng 1967, pp. 166–68.

(1) *We are accustomed to say two things are equal because they are the same with respect to some properties, so we are inclined to think there must always be some reason why two numerically distinct things are alike.*

So if properties are equal, i.e., exactly resembling in themselves, yet possibly numerically distinct, then they are either identical, or are alike in virtue of some properties of properties. The first answer relieves us of tropes, the second is unsatisfying because either it gives us second-order universals supposedly explaining what could be better done by first-order ones, or else it threatens an infinite regress. Küng's answer to this point, which is surely the only one a trope theorist can accept, is that the equality of tropes is a basic relation in need of no further justification. In more recent works on tropes, the same view is explicated by saying that exact resemblance of tropes (Küng's equality) is an internal relation, entailed by the nature of the tropes, or that the fact that two tropes are equal is supervenient on their being the two individuals they are. Internal relations do not constitute ontological additions and arrest infinite regresses. Supervenience is ontologically innocuous.

(2) *The usual logistic languages contain no names for tropes, and we do not usually quantify over them.*

It may be added that natural languages also do not exactly thrust tropes under our noses. I think this can be given a pragmatic explanation. We largely use tropes as mere means to help us recognize and identify particulars which are of greater interest to us and so merit their own proper names. While numerous non-substantial individuals have their own singular terms, some may even be considered to have proper names (like battles, whose names are derived from but distinct from those of the places they occurred (*Trafalgar, Gettysburg*), I cannot think of a single proper name of a trope, and very few tropes attain such prominence in their own right that they merit a definite description. Candidate examples might be aesthetic, e.g. the shape of the Mona Lisa's mouth, the way Ingrid Bergman asked Sam to play "As Time Goes By" in *Casablanca*, or of historical moment, e.g. the trajectory of the movement of John F. Kennedy's head after the last head shot.

(3) *Tropes may be rejected out of fear of an infinite regress.*

If we have three exactly resembling or equal tropes, then the three consequent relations of equality must be equal (or else we smuggle in a universal, as in Russell's argument against resemblance nominalism), and these equalities must be equal, and so on. There are two ways out of this. One uses the supervenience or internality of equality to block further ontological addition. We do not have two tropes and a relation of equality, but two tropes, and given these two, they are equal. This is the way chosen by Campbell. Küng does not however mind the regress: for him, an infinity of relations of equal-

ity is not necessarily a barrier to their acceptance. The regress is not a hindrance to talking about things, since it is stopped in any language at the level where equality is pictured rather than represented, he says.

3 Terminology

Since the term 'trope' has now more or less established itself, and since it is at least opaque enough to be free from misleading connotations, I shall continue to use it. In earlier writings I used the term 'individual accident'. This is both longer and potentially misleading, as some accidents may be essential to their bearers. I still like Husserl's term 'moment', but apart from its other use for a temporal instant, it is really a German import and does not set the nice connotations jangling in English that it does in German.

The terms 'nominalism' and 'realism' are more damagingly equivocal. The denial that there are universals I shall call *particularism*, while their acceptance I call *universalism*. The defining characteristic of universals is that they may be multiply exemplified. This is usually taken to entail, via arguments about the occupation of spatio-temporal positions, that universals are abstract entities. We do not need to decide on this question, though I think such arguments deserve re-examination. So I shall distinguish the denial that there are abstract objects, *concretism*, from their acceptance, *abstractism*. The terms 'abstract' and 'concrete' have been used in two incompatible ways in connection with particulars and universals. The way I have used so far is the one according to which abstract objects have neither spatial nor temporal location, whereas concrete objects have at least temporal location, if not spatial location as well. This is distinguished from the use whereby concrete objects are those particulars which can exist of themselves, whereas abstract ones are incapable of independent existence. This is the sense used by Keith Campbell in his book *Abstract Particulars*. The equivocation had been noted as early as 1901 by Husserl.[4] The discomfort involved in calling tropes "concrete" is lessened if we distinguish between dependent and independent particulars. Since we have the term 'dependent particular', we best do to describe tropes as a kind of dependent concrete particular. This leaves open both that there can be other sorts of dependent concrete particular, such as events and boundaries, and that an abstractist might want to talk of abstract individuals or particulars, such as sets, which, if there are any, need not be universals. Also, such a set theorist might want to distinguish between independent abstract particulars, such as the null set, and dependent abstract particulars, such as the singleton set, which only exists if its member does. To have a convenient term for independent concrete particulars, I shall call them *substances*. I do not think this is very far away from the classical idea: at any rate, since my focus is not on substances, it is close enough for present purposes.

---

4   Husserl 1970, p. 426.

4 Bundle Theories

The idea that independent particulars are simply collections or bundles of tropes is a most tempting one. Berkeley essayed it for physical individuals, Hume for selves. Donald Williams espoused the view in his pioneering "The Elements of Being"[5] that ordinary substances are swarms or bundles of tropes related by an equivalence relation of compresence. Keith Campbell, following Williams, writes, "An ordinary object, a concrete particular, is a total group of compresent tropes. It is by being the complete group that it monopolizes its place as ordinary objects are ordinarily thought to do."[6]

The attraction of the bundle theory is undeniable. It holds out the promise of, in Campbell's words, a one-category ontology. It is elegantly Ockhamist. It dispenses with an unknowable substratum or bare particular. But it has its problems. The first group of problems concern the relation of compresence. Is it unanalysable? Does this not lead to a vicious infinite regress? What is to stop several tropes of the same kind, e.g. rednesses, from being compresent in one bundle? Do we not then need some further modal relation of spatio-temporal exclusion among co-specific tropes? The second group of problems concerns the objection that tropes are too insubstantial to give rise to sub-stantial individuals by bundling, that they remain a collection and not an in-dividual.

Consider first the relation of compresence. It is not clear whether this should be a two-place relation binding two tropes, or a three-place one link-ing a place with two tropes, or a relation of many more places binding the whole lot into a system. Consider the first alternative. Since normal sub-stances have many tropes, there must be many compresences all of which are compresent in order to build up a single substance. So we account for the bundling of the initial tropes by bundling of the compresence relations, which raises exactly the same problem we had to start with, but at a more rarefied level. The arithmetic also gets worse: with four compresent tropes there are six compresences, with five there are ten, and in general with n tropes there are $^{n}C_2$ compresences. It might be answered that we have no more a vicious regress here than we do in the case of resemblance. But I think the case is not as favorable. In the case of resemblance, it was plausible that the resemblance (exact or not) between two tropes is an internal relation, de-riving from the separate natures of the tropes themselves. But the compres-ence of two tropes is not always of this kind. There may be some cases where two or more tropes have to co-occur; but in substantial particulars many of the tropes are only contingently in that bundle: not that *they* could be else-where, but that *that substance* might be otherwise, and indeed can change. Suppose a certain bundle of tropes, corresponding to a sheet of paper, say,

---

[5]   Williams 1953 (1966).
[6]   Campbell 1990, p. 21.

has at a given time a certain shape trope S and a certain temperature trope T (it is not important whether the examples are wholly acceptable, the point is not dependent on that). Now we may envisage the object changing shape without changing temperature (bend the paper slowly) or changing temperature without changing shape. On the standard trope account of real change, change of a substance consists in the replacement of one trope by another. So S may continue to exist and be in the bundle with a new temperature trope T´, or T may continue to exist compresent with a new shape trope S´. In either case, the compresence relation between S and T lapses, suggesting that it is not because of the natures of S and T alone that S and T were compresent. Where two or more tropes essentially occur together, it is more plausible that their compresence is internal, but we surely do not want this to apply to all tropes.

Primitive internal relations serve to put a stop to vicious infinite regresses, and the regress of unification was known to Husserl. He criticised a view of Twardowski, relevant to what we have been discussing, according to which the unity of any two items in a whole is guaranteed by a third item which links them.[7] Obviously, Husserl says, this leads to a vicious infinite regress: not only do we have infinitely many items, but at no stage is unification achieved. Husserl's way out was to concoct a special relation, which he called a *foundation relation*, which serves to bind things into a unity without requiring any further glue. In fact he distinguishes two distinct kinds of foundation. An individual A is *weakly founded* on an individual B iff A is necessarily such that it cannot exist unless B exists. An object is weakly founded founded on its essential proper parts. But there is another sense of foundation, more appropriate here, which says that A is *strongly founded* on B iff A is weakly founded on B and B is not a part of A. Husserl's idea is to use foundation as a formal relation to secure unity without regresses: he explicitly says, "All things that truly unify are relations of foundation."[8] But does this suffice? Suppose that A and B are strongly mutually founding, that is, neither is part of the other, and neither can exist without the other. We may now ask, what is it about A and B that makes this so? Husserl's answer is that an object of one sort (a color trope, say) requires an object of another (an extension trope) by virtue of the kind, or ideal species, to which they belong. Foundation is primarily a relation at the species level, and is as it were inherited by the instances. But this answer works only for cases of essential compresence. We may admit that any extension trope requires *some* color trope, but it does not follow that *this* extension trope E requires just *this* color trope C, since E may continue to exist while C is replaced by another

---

[7] Husserl 1970, pp. 478–79. The regress is of course related to one made famous by Bradley.

[8] Cf. Husserl 1970, p. 478.

color trope C′ of a different kind. This standardly happens when a stationary object changes color. Husserl is careless about the distinction between foundation relations holding in virtue of a dependence at the species level, like *Any pitch (of a tone) requires an intensity*, and those holding at the individual instance level: *This pitch requires this intensity*. Specific foundation is compatible with individual flexibility. Incidentally, it is misleading to describe the two kinds of foundation or dependence as *de dicto* for the specific and *de re* for the individual. Both are *de re*. Rather one should distinguish *de specie* dependence from *de individuo* dependence. The result is that Husserl's idea of using foundation as the cement of groups of tropes into more substantial wholes will only work for tropes which are individually founded on one another. Between contingent or accidental tropes (even though they be of kinds, of each of which an instance is required) there is no foundation relation.

It would seem that what we need to link two accidentally compresent tropes is their common relation of dependence to the larger bundle of which both are elements. But this cannot serve as the definition of compresence, since it presupposes what the relation of compresence is supposed to itself accomplish, namely the welding of a collection of tropes into a whole.

Another suggestion which might seem useful is to explicate the relation of compresence between two tropes in terms of a three-placed relation between these and the place where they both are: A and B are compresent in the place P. Then A and B are compresent in the old binary sense iff there is *some* place P in which they are compresent. This has three drawbacks. One is that it presupposes places can properly be the terms of relations. That is a form of absolutism about places which it would be nicer not to have to presuppose if possible. Another objection is that the relation in effect makes places substrata, since a number of tropes will all be compresent (in the two-placed sense) iff there is a place P with which they are all compresent, so that it is the identity of P which secures the integrity of the whole bundle. This is a substratum theory, not the bundle theory. It differs from the standard substratum theory only in not making the place P the bearer or support of the tropes A, B etc. The third objection is that the theory makes the motion of substances more mysterious than it should be. If places were bearers, tropes could not move, since the moment a trope ceased to occupy the place it was in, it would cease to be, even if replaced next door by an exactly similar one. If tropes could not move, neither could bundles thereof, and the identity of substances over time would be lost. The present theory is not quite so badly off, since A can remain compresent with B although they are compresent with more than one place in succession, so tropes can genuinely move. When a substance moves, its tropes move with it. If a substance is the compresence bundle associated with a place P, then for the bundle to move is for the whole series of 3-place compresence relations with P to be replaced by a similar series with other places P′, P″ etc. What explains the fact that all of these com-

presence relations with P´, P˝ etc. not only affect all the same tropes, but that they are all generated at the same time and all lapse together, in perfect harmony? What keeps the tropes from wandering off in different directions? If we can account for the bundlehood of the bundle in some other way, these facts are easily explained in one sweep by the fact that the bundle as a whole moves. Otherwise we are faced with a mystery or a miracle. Notice that this objection does not apply to the version of the substratum theory which makes substrata something other than places, since the togetherness of the motion of a bundle of tropes in a substance is explained by their all being bound to the same substrate. That theory has the further advantage of being neutral with respect to the question whether a relational theory of space is true or not.

The final possibility for compresence is that compresence is neither a binary nor a ternary relation but one with many more terms, as many as there are tropes in the bundle. We may not know what arity this relation has—it might even be infinite—and there might be different arities for different types of concrete independent particular, but there will be such a relation nevertheless. This has two drawbacks that I can see. In the first place, it is hard to see what explanatory force it has. All we are saying is that a bundle of tropes is held together by whatever relation holds it together. This is really giving up. The other objection is that again it is difficult to see how contingency and change can be explained. If some tropes are essential to their substances, and others are accidental, this is not marked in the huge relation binding them all together. And the relation does not of itself explain why when a substance changes, part of the bundle remains fixed, while other tropes of similar kind slip into the slots just vacated by their expiring colleagues. For these reasons, it seems to me that it is a despairing move to adopt this alternative. One point worth retaining from it though is that we might look for different kinds of concrete independent particular to have not just different kinds of trope, but perhaps also different numbers of tropes.

The second group of objections concern the apparently insubstantial nature of tropes and their consequent inability to make a substance by being bundled. Martin says, "An object is not a collectable out of its properties or qualities or properties as a crowd is collectable out of its members. For each and every property of an object has to be had by that object to exist at all. The members of a crowd do not need to be had by that crowd in order to exist at all."[9] Levinson, Seargent, and Armstrong think of tropes as individualized ways. It is hard to see how a substance can be composed of a bunch of ways. Tropes are supposed to be dependent entities: that I take it is the common thrust of both Martin's and Armstrong's objection to them if substances are to be composed of them. That, says Armstrong, is why trope theorists try to

---

[9]   Martin 1980, p. 8.

"build tropes up into something more substantial".[10] Well, of course they do, since they are trying to account for appearances, which are of complex individuals. Perhaps however the idea is that no amount of collecting or tying together of dependent entities will result in anything but a dependent entity, or a collection of dependent entities. So the existence of an independent entity, at least one of which must exist if anything at all exists is not accounted for.

Martin's comparison of trope bundles with crowds of people is not completely apt. Trope bundles are not meant to be mere collections, and certainly not collections of self-subsistent individuals which could first exist and then be assembled into a whole like an army is built by putting men together, or a ship is built out of divers bits of steel etc. A sensitive account of the relationship holding tropes together will not only take account of their dependence, it will also try to show why having a large number of dependent tropes together can yield something, whether it be a collection or an individual, which has the emergent property of independence. To find such an account, we can look again to Husserl. Husserl distinguishes a number of concepts of whole. The most important one for our purposes is what he calls that of a *whole in the pregnant sense*, what I shall call simply an *integral whole*.[11] The following explanation is based on Husserl's, but uses more modern terminology.[12] Firstly, two particulars are said to be *directly foundationally related* if either is founded, whether weakly or strongly, on the other. Two particulars are then *foundationally related* iff they bear the ancestral of the relation of direct foundational relatedness to one another. A collection forms a *foundational system* iff every member in it is foundationally related in it to every other, and none is foundationally related to anything which is not a member of the collection. An object is an *integral whole* iff it can be partitioned into parts which form a foundational system.

Notice how the relation of foundational relatedness is defined in terms of dependence or foundation. The definition of a foundational system requires that the dependence needs of each member of the collection is met within the collection, and further requires that the whole system be fully connected. Thus while two substances would be independent, their joint collection of tropes would not form a foundational system, since there is no dependence relation crossing between the two collections of tropes. The tropes would fall into two (or perhaps more?) disjoint foundational systems. Can the presence of a foundational system ensure independence? It would seem so, provided we add the supplementary principle: *A collection of particulars, all of whose foundational needs are met within the collection, is itself independent.* This

---

10   Armstrong 1989, p. 115.
11   Husserl 1970, p. 475.
12   See the accounts in my 1982 and 1987, Chapter 9, for more details.

562   PETER SIMONS

principle seems difficult to contradict. So independence can emerge from dependence. But notice that we have spoken only of the independence of a collection, whereas the substance is supposed to be not a collection but an individual. I am not sure this is a severe objection. A foundational system is not just a mere collection or plurality of things, but a connected system. In a similar way, while an army is in some sense a collective entity, it is not a mere collection or plurality of soldiers. Not just any plurality of soldiers makes an army. And, to recall Martin's example, not just any plurality of people makes a crowd: they have to be all the people who are close together and not separated by physical barriers: someone too far away or separated from the rest is not in the crowd, and anyone close enough to another in the crowd and not physically separated by a barriers is in the crowd. A crowd is a kind of "spatial proximity system". We even use the singular: *a* crowd. That we do not regard some kinds of substance, such as physical bodies, as collectives, may simply be due to our not perceiving their constitutive elements, and registering only their aggregative or Gestalt qualities rather than the relationships among their elements.

There are however two disquieting aspects about this Husserlian solution. The first is that again it overlooks the distinction between essential and accidental tropes in a substance. And secondly, whether substances are individuals or collective systems, it treats tropes as parts of substances. Husserl is quite open about this: for him, a part is anything that goes into the actual make-up or constitution of an individual. What we standardly call 'parts' are a special kind, *independent* parts or *pieces*: the other sort, *dependent parts*, are what he calls *moments*.[13] Now it seems to me quite implausible to think of tropes as *parts* of their substances. If Seargent and Armstrong are right that tropes are individualized *ways* a thing is, it is surely wrong to think of them as parts. *How* something is is something about it, but not a part of it. Examine all the parts of a complex artifact, like an airplane. You will find its wings, its radar systems, its engines, its ailerons, etc., down to smaller parts like bolts, rivets, transistors, and bits of cable. You will not find its being 10·5 tonnes in weight among them. Parts is one thing, properties another (and properties of parts something else again). The temptation to think of tropes as parts (whether in a straightforward sense or in some analogous sense to the usual one) seems to me to arise, if not from the bundle theory itself, from considerations about spatial position. Where else can the redness of the red glass cube be if not where the cube itself (or at least its outer surface) is? So if the location of the redness is part or all of the location of the cube, in the same way that the location of a spatial chunk of the cube is part of the location of the whole cube, surely, one might reason, it does not hurt to say the

---

13   Husserl 1970, p. 437. Among moments he recognizes, besides qualities, also intensi -
      ties, extensions, boundaries and relational forms (ibid., p. 456).

redness is part (in some sense) of the cube. But the temptation should be resisted, for then we think of substances as being made up of their tropes instead of other (smaller) substances standing in relation to one another.

Levinson has argued, and Seargent and Armstrong have seconded him,[14] in the view that universals are best construed as not things at all, no matter how tenuous, but ways something can be. Now this is universal talk: a particularist cannot accept ways as such, but only instances of ways. But this is subject to the same remarks about naturalness that we made for tropes above, so is not an obstacle: we just talk of "particularized ways". I have another, linguistically motivated reservation about calling all tropes "ways". Think of how we standardly talk about things. We use nouns for the things we talk about, saying what they are, adjectives for their qualities, saying what they are like, whereas adverbs (sc. of *manner*) describe not things but events or actions: he spoke quietly, she walked briskly, etc. The term *way* is not tailored to first-order tropes, that is tropes of substances, at all, but to second-order ones. Another way (!) to see this is to consider an old way (!) of considering the Aristotelian categories. Aristotle had no category of ways, and there is a reason why. As Aristotle himself doubtless intended, and as commentators on the *Categories* at least from Averroes and Ockham onwards have emphasized, the Aristotelian categories are closely related to the different basic kinds of question one can ask about a substance, and only those questions of the form "What is it?" invite a nominal answer. Answers like "red", "twelve yards", "kicking", "being kicked", "older than Alfred" and "under the tree" are not names. Grouping the kinds of answer and nominalizing to name what the groups are about would in honest Saxon yield abstract terms of frequently rude barbarousness such as *howness, howmuchness, doing, undergoing, bearing-to-ness* and *wherehood,* which would lend our philosophy an almost Heideggerian earthiness, were it not that we can already use noble Norman nominals like *quality, quantity, action, passion, relation, place* for the same purpose. The terms *way* (Saxon) and *manner* (Norman) do not readily occur here, and the reason is not hard to find: they refer to *how* something is *done* or *takes place* or perhaps how it is *arranged* rather than what it is *like*, how much it is, what is being done etc. If an action is an accident, the mode or manner or way of doing it is an accident of an accident, and Aristotle did not accept such things except as accidents of their original substances. Describing all tropes as ways of *being* distorts this aspect of the term, at the same time as riding in on the back of that most unsubstantial nominalization *being,* which, since *be* describes no state or activity, has not even the secondary decency of an honest gerund like *kicking.* At the same time, since a trope of a trope is more remote from being a substance, calling tropes *ways* highlights their non-substantiality. A description of a way is a natural answer to a

---

[14]   Levinson 1978, Seargent 1985, Armstrong 1989.

564   PETER SIMONS

"How?" question, which most naturally tells us what actions and other events are like, and not what substances are like. So while I accept that some tropes are particularized ways, i.e. that ways are natural kinds of such tropes, not all tropes are ways.

The point of seeing tropes as particularized ways is to ensure that they are as unsubstantial as possible. This move, and the use of *way*, once again recall Ockham. When Ockham wanted to stress that a certain way of speaking did not commit one to entities, he tended to use an oblique Latin case. Rather than say that a substance has a particular way or mode of being (*modus se habendi, modus essendi*), he speaks of its being thus or so, somehow, *alio et alio modo, aliquo modo*.[15] The temptation to reify so-nesses or somehows or thusses is meagre to say the least. Nevertheless, our natural tongues constrain us to talk *about* things by putting noun phrases in subject position and predicating. Provided we are not inclined to think of tropes as parts of substances, there is no need to artificially raise the barrier to so thinking of them by regarding them all as particularized ways.

We should not however take seriously the view that tropes, whether they are ways or not, are not entities at all. Clearly a bundle theorist cannot, because then he would be building entities out of non-entities. Ways and other tropes are not nothing, hence they are something, hence they are entities. But they are not THING-like, if by that we mean substance-like. They are not *res*, they are *rei* or *rerum*. But bundle theorists are forced to be less conservative than substratum theorists about substances, and when we look at what is said to happen on a microscopic scale, the substantiality of substances starts to look much thinner. It is prudent not to be too dogmatic about the gulf in being between substances and tropes.

The main unresolved objection from this section on bundle theories is that the most promising version of the theory, based on Husserl's concept of foundation, has difficulty accounting for anything like the distinction in status between accidental and essential tropes of a substance.

5 Substratum Theories

Substratum theories claim that there is more to a substance than a bundle or collection of tropes: there is a further something, the substratum, which both bears the tropes (and hence accounts for their dependent status), and also accounts for the unity of the class of tropes borne, since they are all borne by one and the same substratum. Of course, substratum theories are also found among universalists, who invoke substrata as individuators to yield individual substances from what would otherwise be bundles of universals. But we shall be concerned only with particularist versions. We find the beginnings of substratum theory in Aristotle (not a universalist in my view), who in

---

[15]   See Adams 1985, pp. 181–82.

Metaphysics Z talks about stripping away the properties of a substance and arriving at the common bearer of these properties, which of itself has no properties except *in potentia*, and this bearer is the *materia prima*: "When all else is stripped off evidently nothing but matter remains [...] the ultimate substratum is of itself neither a particular thing nor of a particular quantity nor otherwise positively characterized nor yet is it the negations of these, for negations will belong to it only by accident."[16] Whether this was Aristotle's considered view or not, it finds its echo in Thomas, who lets non-substantial forms be predicated of substance, but substantial form is predicated of matter. In its inherent formlessness, lack of properties, supporting function and role of ultimate subject of predication, *materia prima* lacks only one thing which would convert it into the bare particular of Bergmann: individuality.

Bergmann's bare particulars are principally individuators: he expressly admits that if we "assay" an individual into a complex of universal properties, we cannot distinguish individuals having the same properties, and need bare particulars, whereas a nominalist already has individuality and so "In strict logic, a nominalist is therefore [...] not forced to search for further constituents [of a substance beyond its tropes]."[17] But some of the standard objections to bare particulars in the context of a universalist theory[18] also apply in a particularist context: bare particulars cannot be objects of acquaintance, they appear to be inconsistent in that it is essential to them that they have no properties (tropes) essentially, and essential that they be not in more than one substance at once. Another objection is that if a bare particular has no properties essentially, it is indestructible except by the kind of miracle Leibniz ascribed to the destruction of monads. None of these objections is perhaps lethal, but taken together they provide a strong incentive to look for another account of substrata.

A genuine alternative appears to be provided by Charlie Martin, whose theory is the one Armstrong prefers. Martin argues that "If properties are not to be thought of as parts of an object, and the object is not then to be thought of as a collection of properties, as its parts may be, then there must be something *about* the object that is the bearer of properties that under any description need to be borne. And *that* about the object is the substratum."[19] And again, "When we are thinking in the most general possible way of the attribution of properties (*each* and *every* one) to an object, we are thinking of, or partially considering, the object [...] simply *qua* or simply in its role as, the bearer, not itself borne, of its properties without at the same time considering it in terms of the actual properties it undoubtedly bears."[20] There is no

---

16   1029a 10–25.
17   Bergmann 1967, pp. 22–23.
18   For which see Loux, 1978, chapter 8.
19   Martin, op. cit., pp. 7–8.
20   Ibid., p. 9.

question here that we have a strange kind of particular which has no proper-
ties and yet cannot survive the loss of certain properties by its associated sub-
stance. Nor is the substratum, so considered, a part or constituent of its sub-
stance. But the very innocuousness that Martin claims for substrata robs
them of their *raison d'être*. That about a bearer of properties (i.e. here,
tropes), that it is a bearer of tropes, is either not itself a trope, or, more plau-
sibly, it is a second-order trope, supervening upon there being first-order
tropes the substance has. In either case, it does not explain how it comes
about that there is something other than the bundle of tropes that bears the
tropes, nor does it help to explain what this relation of bearing is. Martin's
substratum is ineffective as a trope-gatherer. If we want to talk about this
second-order trope, well and good, but the problem of the relation of tropes to
substance is not carried forward. Rather the account of substratum as a sub-
stance *qua* non-borne bearer of tropes, whether there are genuine items called
qua objects or rather there are just different ways of partially viewing sub-
stances, presupposes we have a satisfactory account of what it is to be a sub-
stance and of the notion of bearing. Martin's account then refers us back to
the original problem: we have a substance, and we have its tropes, and it
bears its tropes, that is, they depend on it and not vice versa. If no further ex-
planation is forthcoming, we have not a substratum theory but a particularist
equivalent of what Loux calls a *substance theory of substance*. That is to say,
the notion of substance remains basic. Now it may be that the notion of sub-
stance has indeed to remain basic, but we had already made some progress
along the path of explaining what bearing is with the idea of foundation or
dependence, which we needed for the bundle theory. Can we do better?

6 A Nuclear Theory

Consider the following view. Rather than a bare something as bearer or tie
for the bundle of tropes, and rather than take the whole bundle, neglecting the
distinction between essential and accidental tropes, consider a two-stage ap-
proach. In the first stage, we have a collection of tropes which must all co-
occur as individuals. These form an essential kernel or *nucleus* of the sub-
stance. For them we could have a substratum tying them together, but in
view of the problems mentioned in the last section, which carry over, I prefer
a bundle theory in the style of Husserl. Since these tropes are all directly or
indirectly mutually founding as the individuals they are, they form a founda-
tion system in the sense discussed above. Such a nucleus forms the *individual
essence* or *individual nature* of a substance, but will usually not be a com-
plete substance, since there are further, non-essential properties that the sub-
stance has. The nucleus will require supplementation by tropes of certain de-
terminable kinds, but not require particular individual tropes of these kinds:
its dependence will be specific, not individual. The other tropes it has, and

which may be replaced without the nucleus ceasing to exist, may be considered as dependent on the nucleus as a whole as bearer (they will then be dependent on each necessary trope in the nucleus, by the transitivity of necessary dependence). Their dependence is partly one-sided, for while these accidental tropes depend on the nucleus for their existence, it does not depend on theirs, though it requires some trope from that family. The nucleus is thus itself a tight bundle that serves as the substratum to the looser bundle of accidental tropes, and accounts for their all being together. The nuclear theory thus combines aspects of both bundle theory and substratum theory. If we had a separate substrate for the nucleus instead of accepting a bundle theory, we would arrive at a theory rather like that of Aristotle or Thomas, where matter is the substratum, the substantial form corresponds to the nucleus, and serves as the bearer for further, non-substantial tropes. The theory I have suggested is simpler in that it dispenses with an ultimate substratum.

Obviously if I had thought of lots of objections to this theory (ones which at any rate are not shared by any other trope theory), I should have preferred one of the others. So let me leave it to you to come at me with objections, while I mention one or two advantages, apart from those which are evident in view of the theory's avoiding the major difficulty of each of the other theories.

One is that the theory is in fact rather flexible. It allows nuclei of different sizes and complexities. Perhaps there are substances without a peripheral cloud of accidental tropes, ones which are all nucleus. These would be like Leibnizian monads: each of their properties would be *de individuo* necessary to the substance. It might be that the most basic building blocks of the physical universe are like this, that all their non-relational properties are essential, that they can only be destroyed by total annihilation, and that all contingent complexity into which they enter is a matter of contingent external relations between them, or between them and other things. Then again, perhaps there are substantial collections of tropes without a nucleus. This does not mean that there could be free single tropes, but it might mean that which particular tropes an individual trope is associated with in the course of its career is always a matter of accident. While such a trope could not perhaps exist alone, it might change all its partners in its life, and that even if it originally had to consort with some particular others at the beginning. Finally, we might have a single nuclear trope, which required a periphery of tropes from particular families, but which could survive the loss of each of them, provided it was replaced by another from the same determinable family. Such a trope would be a genuine substratum to the others, and its destruction would annihilate all those dependent on it.

Among the tropes in the periphery of a substance, we may want to distinguish those which are of kinds that are required from those that are optional extras. Perhaps a given substance might gratuitously acquire a few extra

tropes. I cannot think of any example, but it might be prudent not to rule the possibility out *a priori*.

Another source of flexibility is that the periphery may consist not of single tropes but of clumps, each of which has its own subnucleus satisfying most of its needs, but having some member in the nucleus or periphery which needs to be appended to another nucleus. So some properties may themselves be complex. Or we might have clumps of almost-free, almost-substantial tropes, which hold together via a narrow bridge of one or two relations.

Yet another possibility is that among the peripheral tropes of one substance are relational tropes which require that two or more substances be related, yet because each could be replaced by another, the relationship is not essential to either. Here I am envisaging the possibility of relational tropes, that is, tropes requiring more than one nucleus for their existence. While numerous philosophers have tried to rule out such things *a priori*, most notoriously Leibniz in his correspondence with Clarke, it is a likelihood I take seriously, and intend to examine at greater length elsewhere.

In general then, I think the nuclear theory shares with the bundle theory the merit of openness and flexibility which ought to characterize a scientifically acceptable ontology. This is a point which has been stressed for the bundle theory by Campbell. It should be evident that I prefer what is known as a sparse theory of tropes, by analogy with Armstrong's sparse theory of universals: not just any old predicate we happen to use corresponds to a kind of trope. Which kinds of trope there really are is in general a matter for empirical investigation rather than armchair pronouncement.

7 Fermions, Bosons, and Identity

It is a good test of a such a would-be scientific ontology to see whether it can be smoothly applied to areas outside the medium-sized world with which we are familiar, in particular to the objects of advanced physical science. This is an area into which fools rush at their own risk, since the physical facts and their interpretation are themselves frequently the subject of controversy among the scientists as well as the philosophers of that science. One can be little more foolhardy than to rush into a look at tropes in the context of quantum theory. If there is one thing on which all commentators on quantum physics agree, it is that the explanations quantum physics offers for numerous observed phenomena require a radical departure from our previous, "classical" way of thinking about things. The kinds of object for which trope theory was framed are those for which other theories of particulars and universals were framed, namely medium-sized objects of acquaintance like cabbages and kings. I shall be just a little foolish. There is not the space, and I have not the competence, to launch into a comprehensive discussion of quantum

theory, but I want to discuss a small issue whose standard terminology makes philosophers blanch, namely what physicists call "identical particles", which can be numerically distinct. Much of the discussion on tropes, bundles and the like is concerned with issues of identity, so it is to be expected that this will have repercussions for the theory of tropes. The authorities I lean on are Richard Feynman,[21] Bas van Fraassen,[22] and Peter Mittelstaedt,[23] all of whom have discussed the issue.

There is a reprehensible way in which physicists talk about "identical particles" which is easily avoided: elementary particles have a number of nuclear or essential properties like rest mass, charge, and quantum of spin.[24] Physicists sometimes call elementary particles whose nuclear properties are the same, e.g. all electrons, "identical". This is loose talk: they are in our terminology particles whose nuclei or, as I shall temporarily also say to avoid ambiguity in the context of microphysics, *kernels*, are exactly alike. No problem for the nuclear theory here. But particles also have contingent properties, e.g. their relative position, kinetic energy, momentum, direction of spin (all *at a time*) and so on.[25] It turns out that is physically possible for certain kinds of particle for two particles with equal kernels to have also exactly resembling peripheries, that is, for all of their tropes to be exactly resembling, including those having to do with relative position. In this case physicists describe such particles as being in the same state, and then it is more philosophically understandable to call them "identical", since the particles are thus indiscernible by their (absolute and relational) tropes, and since no other means are available for distinguishing them are given, they are indiscernible, period. Yet they are numerically distinct: the physics of the situations described requires us to assume the presence of more than one particle. Thus Feynman: "By *identical particles* we mean things like electrons which can in no way be distinguished from one another".[26] Now the talk of being able to distinguish particles is epistemological, not ontological. It does not rule out that the particles are distinct in fact, though we are unable to tell which is which. But there are two kinds of fundamental particles which differ radically in their interactions with their own kind. *Fermions*, which include electrons, are characterized by tropes which obey the *Pauli Exclusion*

---

21   Cf. Feynman *et al.* 1965.
22   Van Fraassen 1991, chapters 11–12.
23   Cf. Mittelstaedt 1986.
24   It might seem anachronistic to use the old essentialist vocabulary of *essential* vs. *accidental* to talk about fundamental particles, but I discovered after using it that Mittelstaedt 1986, p. 146 does the same.
25   Note incidentally that for elementary particles the determinables of their essential and accidental properties are finite in number. This is not a source of disquiet for a *sparse* trope theory, since there is no reason for there to be a one-to-one correspondence between tropes a thing has and predicates true of it.
26   Feynman, op. cit., p. 4–1.

Principle: no two fermions can be in exactly the same state. Thus the reason that a helium atom may have two electrons in its innermost shell is that their spins are in opposite directions, so they differ in one trope (maybe a second-order trope: spin-*direction*). Since electron spin direction of two superposed electrons is quantized so that it can only be in one of two opposite directions, the Exclusion Principle requires that a lithium atom must have its third electron in a second shell at a different energy level from the innermost ones.[27] The other sort of particles are *bosons*. They do not obey the Pauli Principle, and so two or more bosons can be in the same state at the same time, in particular they can both be in the same place at once and not differ in any trope at all. If electrons were bosons they could all three occupy the same space around a lithium nucleus. The most familiar bosons are photons, and it is their superposability in large numbers makes lasers possible.

Now if we have three electrons around a lithium nucleus, they occupy what are called mutually orthogonal states. This is physicists' jargon for their differing in at least one of the relevant properties. The electrons seem to be *in principle* distinguishable at a given time, if not in practice: though we have no way of distinguishing one from the other, they are *in fact* distinct: Van Fraassen puts the point in a more technically grounded way by saying that, in an aggregate of fermions, "each particle is in the same reduced state, which is a mixture of at least N mutually orthogonal pure states."[28] And, for all his reservations, van Fraassen is prepared for pragmatic reasons to look favorably on the "ignorance" interpretation of the (reduced) indiscernibility of fermions.[29] Feynman, on the other hand, runs epistemology into ontology when he says, "The third electron can't go near the place occupied by the other two, so it must take up a special condition in a different kind of state farther away from the nucleus [...] (We are speaking only in a rather rough way here, because in reality all three electrons are identical; since we cannot really distinguish which one is which, our picture is only an approximate one." (4–13) This is double-talk: the electrons are the same because they are indistinguishable, yet different because they occupy different quantum states. What we cannot do is to trace the histories of fermions across different interactions. If two electrons settle down into a helium shell and then leave again, we have no way to say which one is which, even though they were in principle distinguishable while superposed.

The way in which aggregates of bosons behave is different. Since they may be superposed in the same state, they sometimes cannot even be distinguished at a time, even in principle, by their tropes. In collisions between bosons (e.g. photons) which scatter "identical" particles, there is no way even

---

27   That electrons are fermions has far-reaching consequences: it means that matter as we know it is stable, and hence that we can be here, e.g., to find this out.

28   Van Fraassen, op. cit., p. 386.

29   Ibid.

in principle of telling which of two apparent outcomes takes place, so again no way of tracing the life-histories of "identical" bosons. So we cannot really talk about individual particles which enter into interactions and then go their separate ways. For both bosons and fermions, van Fraassen recommends, following Mittelstaedt, that "re-identification over time has no empirical significance in quantum mechanics."[30] The difference between fermions and bosons is then that while fermions can in principle be distinguished *at a time* if not over time, bosons cannot always even be distinguished at a time.

This suggests (though it does not entail) that the idea that we are talking about distinct particles is misleading. Where there is no procedure by which a wedge can be driven ontologically between two particulars we have a choice: there are two distinct particulars with the same properties (rejecting Leibniz's Law) or there are not two distinct particulars. What then exists in that place where like particles are superposed? A realist might say that electronhood is multiply exemplified in a certain way in a given region.[31] Apart from wanting to avoid universals, I do not find this description at all helpful, because it seems to require more than one substrate. Nor would I want to make the region the subject or substrate of electronnish properties. I prefer another account. It has often been noted in opposition to trope theories (as distinct from realist theories of properties) that there appears to be no logical or metaphysical reason why an individual cannot have two or more tropes of the same kind, e.g. two exactly like shape or color tropes. This problem does not arise for the realist of course, since he or she only has the one universal. Trope theorists tend to dismiss this objection rather out of hand, as I think they can do if it is taken as a general point in favor of realism (why cannot an individual exemplify an universal doubly?) But suppose we consider the nuclear double bundle of tropes making up the nature of an electron: its essential ones, making up the kernel, and its accidental ones. When an electron is physically isolated from others, it is a substance. When two electrons with opposite spin are superposed, e.g. in a helium atom, the electrons cease to be substances, but their tropes retain their identity, and are modified by their proximity. This is not electronhood twice, but two electron trope-bundles in one substance. Pauli's Exclusion Principle is a constraint on how bundles can be combined to produce a larger bundle with doubling up of some kinds of trope. The same consideration also applies to the more recently postulated quarks.[32]

---

30 Ibid., p. 430.
31 Van Fraassen talks in a similar way. He says: suppose we could understand *The species COW is multiply instantiated* in such a way that it does not imply *there is more than one cow*. Could we have a world in which there is multiple cowhood without individual cows? (Ibid., p. 436.)
32 Campbell, op. cit., p. 68, suggests (following Armstrong), that an electron might contain three charge-tropes of magnitude $e/3$ inherited from their "constituent" quarks. The physics is wrong here: only hadrons are composed of quarks, while electrons are

The same thing happens when bosons are superposed. What is called an aggregate of bosons is then a complex substance in which several of the relevant bosonic trope packages are superposed. Indeed, even this may be too optimistic a description. In the case of boson interaction not only the particle but also the tropes that constitute it cannot be ascribed identity across the interaction. Perhaps what happens is that two or more trope packages, when they get into proximity, expire in favor of new trope packages, some of whose own properties are derived from those of the originals, or in favor of a single trope package whose properties are not really, but only apparently inherited from their predecessors. The differences between fermions and bosons can be interpreted as imposing different kinds of constraint on how the combination or replacement may occur. In neither case are we called upon to describe several individual particles which are somehow indiscernible. Since the identity over time of "identical" particles is not defined except when they do not interact, it must be seen as an advantage to have a bundle theory, since a substratum theory thrusts an identifier upon us. Some theory along these lines at any rate seems to me to be a way out of the conceptual *impasse* created by the problems of "identical particles". I incline to think trope theory can also cope without gross upheaval with the problems of non-localization predicted in quantum theory and now experimentally confirmed.

While I have the impression that trope theory can provide the ontological tools to solve problems the others cannot reach, let me leave you with a puzzle which applies to trope theories as much as property theories, though I suspect the revisions required again cause less of an upheaval for trope theorists than for realists about properties. Of course physicists tend not to use scholastic or philosophical terminology, but that is not to say they do not recognize properties, so they can just as well be understood as talking about tropes. Particles have measurable properties (or something approximately measurable) which are vector and scalar magnitudes.[33] An electron for instance has spin in some direction (whose magnitude 1/2 is constant). Then there is momentum. But the magnitudes needed in quantum theory are essentially and necessarily complex ones (complex in the sense of requiring complex functions for their mathematical formulation). In fact a particle does not in quantum mechanics actually *have* a certain definite momentum, rather it has a momentum with a probability, or, as Feynman says, has a (complex) probability *amplitude* to have a momentum. The exact momenta are what Feynman calls the *base states*, i.e. what we use in conjunction with probabil-

---

leptons. But the general idea is right: a proton is supposed to consist of two up quarks, each with charge $+2e/3$, and one down quark, with charge $-e/3$. Incidentally, the fact that quarks may not be isolable is easy to accommodate for trope theorists: perhaps quarks are just non-independent trope clusters within larger substantial bundles.

[33] An adequate trope theory will have to provide a satisfactory account of scalar and vector magnitude tropes.

ity to describe the state of the system, so they need not in fact be realized by any individual. "The complete description of an electron, *so far as we know*, requires only that the base states be described by the *momentum* and the *spin*."[34] The actual state of an electron is given by an amplitude distribution over momenta and spins. (The probability of finding a given particle is proportional to the absolute value or modulus of the probability amplitude.) Because hydrogen atoms have internal structure, there is a further factor caused by the interaction of the electron and the proton: a hydrogen atom may or may not be in an excited internal energy state (having an electron not in the ground state). No such internal structure has been detected in electrons. But it is unclear to me at present what the superposition of probability amplitudes means in ontological terms. Is a particular exact momentum a trope of an electron, or is exact momentum a theoretical construct we bring to bear on much more ethereal tropes, namely probability amplitudes to have momenta? Trope theory to date does not help us to decide; more work needs to be done. Which reminds me of an admonition of Donald Williams: "We are only beginning to philosophize till we turn from the bloodless proposition that things in any possible world must consist of tropes to specific studies of the sorts of tropes of which the things in this world actually consist."[35] It is sobering to reflect that this was written almost forty years ago.

REFERENCES

Adams, M. M. 1985. "Things versus 'Hows', or Ockham on Predication and Ontology". In J. Bogen & J. E. McGuire, eds., *How Things Are. Studies in Predication and the History of Philosophy and Science*. Dordrecht: Kluwer, pp. 175–88.

Angelelli, I. 1967. *Studies on Gottlob Frege and Traditional Philosophy*. New York: Humanities Press.

Armstrong, D. M. 1978. *Universals and Scientific Realism*. Cambridge: Cambridge University Press.

——— 1989. *Universals: an Opinionated Introduction*. Boulder: Westview.

Bergmann, G. 1967. *Realism: A Critique of Brentano and Meinong*. Madison. University of Wisconsin Press.

Campbell, K. 1990. *Abstract Particulars*. Oxford: Blackwell.

Feynman, R. P., Leighton, R. B., & Sands, M. 1965. *The Feynman Lectures in Physics Vol. 3: Quantum Mechanics*. Reading: Addison-Wesley.

Grossmann, R. 1974. Meinong. London: Routledge & Kegan Paul.

Husserl, E. 1970. *Logical Investigations*. London: Routledge & Kegan Paul.

---

[34] Feynman *et al.*, op. cit., p. 8–5.
[35] Williams 1966, p.108.

574 PETER SIMONS

Küng, G. 1967. *Ontology and the Logistic Analysis of Language*. Dordrecht: Reidel.

Levinson, J. 1978. "Properties and Related Entities". *Philosophy and Phenomenological Research* 39, 1–22.

Loux, M. J. 1978. *Substance and Attribute. A Study in Ontology*. Dordrecht: Reidel.

Martin, C. B. 1980. "Substance Substantiated" *Australasian Journal of Philosophy* 58, 3–10.

Mittelstaedt, P. 1986. "Naming and Identity in Quantum Logic". In P. Weingartner & G. Dorn, eds., *Foundations of Physics*. Vienna: Hölder-Pichler-Tempsky, pp. 139–61.

Mulligan, K., Simons, P. M. & Smith, B. 1984. "Truth-Makers". *Philosophy and Phenomenological Research* 44, 287–322.

Seargent, D. A. J. 1985. *Plurality and Continuity. An Essay in G. F. Stout's Theory of Universals*. The Hague: Nijhoff.

Simons, P. M. 1982. "The Formalisation of Husserl's Theory of Wholes and Parts". In B. Smith, ed., *Parts and Moments*. Munich: Philosophia, pp. 113–59. Reprinted in Simons 1992.

_____ 1987. *Parts. A Study in Ontology*. Oxford: Clarendon.

_____ 1992. *Philosophy and Logic in Central Europe from Bolzano to Tarski*. Dordrecht: Kluwer.

Van Fraassen, B. C. 1991. *Quantum Mechanics: an Empiricist View*. Oxford: Clarendon.

Williams, D. C. 1953. "On the Elements of Being". *Review of Metaphysics* 7, 3–18, 171–92. Reprinted as "The Elements of Being" in his *Principles of Empirical Realism*, Springfield: Thomas, 1966, pp. 74–109.