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ARE ALL ESSENTIAL PARTS ANALYTICALLY ESSENTIAL?

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1. Essentiality of parthood

What is an essential part? We need to disambiguate. To be or to have a part essentially, that is the question. From the point of view of the whole, a part is essential if that object, that whole, could not have existed unless it that part existed and was its part. In symbols:

$$N(Ew \rightarrow p < w).$$

This is the relation upon which I shall concentrate in this paper. It is to be distinguished from the other essential part-whole relation, where from the point of view of the part, it is essentially part of a whole, if it could not exist unless that whole existed and had that part as its part. In symbols

$$N(Ep \rightarrow p < w).$$

Call an object essentially dependent on another object if the first cannot exist without the second.

$$a \text{ dep } b := N(Ea \rightarrow Eb).$$

Then

$$N(Ew \rightarrow p < w) \rightarrow w \text{ dep } p$$

and

$$N(Ep \rightarrow p < w) \rightarrow p \text{ dep } w$$

So there are two notions of essential part and they reverse the order of dependence. Of course it is not ruled out that a part and a whole be essential to each other, in which case they are mutually dependent. In each case the dependence, and the essentiality of parthood, is rigid with respect to the second object. A whole w cannot exist without this individual p as its part; alternatively, the part p cannot exist except as part of this whole w .

It is quite a different matter if a whole needs a part of a certain kind but when it is not important which individual it is which supplements or satisfies its need. This is generic dependence. An adult human being needs some heart, but as we now know from transplant surgery, it is not essential that it be and remain the original one, so the dependence of human on heart is not modally rigid. Similarly with wholes: such *generic* dependence of part on whole or vice versa is important in its own right but is not what we are interested in here.

Let us then return to rigid dependence and look out for examples of essentiality of a part to its whole. Whatever else it has, a table has to have a top. If it didn't have a flat top, it wouldn't be a table. Further, a particular table T cannot exist unless its top P is its part, and indeed its top. Likewise a knife has to have a blade, as does a sword or a spade, as a chair needs a seat, as a boat needs a hull, and so on.

We have to be careful in using the expression «An A needs a B » because sometimes this describes mere generic dependence, as in «A human being needs a heart». A house needs a roof, but houses can be re-roofed. So the part in question has to be in some sense individually irreplaceable as part of this whole. Its loss or destruction must spell the destruction of the whole of which it is part. Also, if the whole in question had not had this individual as its part, it would not have existed.

The examples to date have been of artefacts, which are ontologically special. Let us consider some cases of essential parts among natural objects. A given atom has one or more nucleons, positrons or neutrons. Each positron or neutron is an

individual and if it is part of an atom is an essential part of that atom. That is

$$\forall x \forall y ((x \text{ is an atom and } y \text{ is a nucleon and } y < x) \rightarrow N(Ex \rightarrow y < x))$$

The loss of a given nucleon spells the end of that atom, and had the nucleon been combined with other nucleons than the ones with which it is in fact combined, then not that atom but some other atom would have existed.

Let us take a biological example. Like nearly all sexually reproducing eucaryotic organisms, we each originate from single zygotic cell produced by the fusion of an egg and a sperm¹ The zygote from which a human being comes makes up that human being completely, though not for long, as it soon ceases to exist by fission. Later, no particular cell is essential to a human being, but for that brief period, they coincide. The human being is coincident with but of course were not identical with the zygote². Then the zygote splits. Could either of the two cells into which it splits continue to exist without the other? The answer is «Yes». When such paired cells split but continue to exist the result is identical twins (or n -tuplets for some $n > 2$). Of the split cells, ones could die and the other continue to live. Our *original* cell is necessarily a part, indeed the whole of us, for that short period.

Biology is a slippery science, replete with counterexamples to every putatively true generalization. Brain, heart and lungs are parts which every normal exemplar of the human species has, and the loss of which normally spells death. But as we learn more and as medical science advances, the limits of the mereological changes that we know a human being to be able to sustain are extended.

Nevertheless, it seems that your brain is definitely an essential part of you. But then, who or what are you? Are you essentially an organism? Are you a Lockean person? Could you survive a brain transplant, in either capacity? I suggest we don't know clear

1 The exception would be if one were cloned, either naturally (as an identical twin) or artificially.

2 The sense of 'coincident' is that they share all parts: see Simons 1987: 180. It follows that they are when coincident in the same place.

answers to these questions. So I conclude for the moment that we are not so sure about finding individual essential parts in the realm of biology, except for those cases where an organism is initially constituted by a single cell, which are not directly germane to our study since they make up the whole organism and not a part of it.

This lack of examples is illuminating. It shows that when we go humbly to nature looking for essential parts, she has many surprises for us, but few essential parts.

2. Analytically essential parts

Let us revisit a couple of these examples. Take the knife and its blade on the one hand and the helium atom and its proton on the other. In what does the essentiality of the parthood consist? If the knife K were to permanently lose its blade B , either because B were destroyed or because B were permanently separated from the knife handle H , K would cease to exist. If a knife K^* is made of a different blade $B^* \neq B$ then $K^* \neq K$. Similarly for the helium atom.

Recalling the uncertainty in the biological examples, how can we be so sure that a proton in a helium atom is an essential part of it? Why can we not envisage a counterfactual situation in which this very knife K comes into existence with a different blade B^* ? Why can we not imagine the helium atom surviving the loss of one of its protons, even if the proton were replaced by another one?

The reason we can be so sure is, I claim, that the concepts in question decide the issue for us, and since we are the authors of the concepts, *we* decide. That is why nature cannot surprise us or trick us into being mistaken. It is not that nature is very docile and fails to come up with a counterexample. On the contrary, we have so styled our language in this area that nothing nature can throw at us will count as a possible counterexample. Take a familiar example from elsewhere. The reason we can be so sure that no vixen is male is that the term 'vixen' has been determined to *mean* 'female fox'. Even if nature throws monsters and sexless or hermaphrodite foxes at us, we would withhold them the

appellation 'vixen' *because* they are not female. Likewise, it is our concept *knife* which incorporates the data that a knife's blade is essential to it. If a helium atom were to lose one of its protons, the remaining object would not be a helium atom but a tritium atom. If it were to exchange one proton for another one we'd still have a helium atom, but a *new* one. That is what we understand by a helium atom: those identity and persistence conditions, while they may be suggested by regularities of nature, are *imposed* by us and regulate our concept of a helium atom.

I stress that this does not mean that helium atoms *per se* are constructions of the human mind, in whole or in part. Rather, those things which exist independently and do what they do and change as they change, are delimited, individuated and identified by us according to a conceptual schema which is ours. What the schema reveals is not constructed but revealed, but if we did not use that schema, *those* things would not be revealed to us. Helium atoms do not depend on us or our conceptual schemata or individuating practices for their existence, but by employing those practices we reveal *them*.

The knife's blade is essential to it because our concept of knife stipulates that a knife's blade is a part of it and loss of the blade or creation with another blade means the end of the knife or the existence of another knife. We do allow a blade to be detached from the handle, especially temporarily for cleaning or repair, say, without detriment to the knife's continued existence. We might have had a slightly different conceptual scheme and different concepts, taking the separation of the blade from the handle to spell the end of that knife, and any later reassembly of the same blade and handle to mean a new knife came into existence, no matter how like the old one it is. On that alternative scheme, the knife could not survive dismantling. Our actual conceptual scheme is relatively liberal about dismantling. Many artefacts such as frame tents, Christmas Chimes and clarinets spend most of their lives dismantled. I think we often allow that a knife may receive a new handle and still be the same knife. In that case we have repaired the knife with a new part. The same would not be allowed of the blade: the blade is essential in a way the handle is not. But again one could imagine a concept of knife

similar to ours except that blade and handle are both equally essential.

Now in fact I am not so sure about our concept of *knife*: it is not so determinate on this point. There are two possible conceptual clarifications. According to one, the handle is definitely essential to the knife, according to the other it definitely is not. Which of the two more unequivocal concepts we prefer may depend on our interests and concerns. A butcher may not scruple to call a knife the same although it has been given a new handle, but a museum curator would be most alarmed if a new handle were given to a Bronze Age blade: she would deny that the original knife is preserved by such a change. So one concept is more practical, the other more antiquarian. The actual and merely statistically determined concept is a general working compromise between these two positions. Nevertheless both concepts agree on the essentiality of the blade as well as the inessentiality of small particles or incidental attachments such as say a carrying ring. For the extant and average concept let us call the handle a *penumbrally* essential part. It is neither clearly essential nor clearly not essential. Our concepts of particular sorts of artefacts often, perhaps always, carry such penumbra or areas of indeterminacy as to what is essential and what is not. Usually the concepts are averaged out over a range of more or less similar variants. For some people the engine might count as essential to a car and the body not, for others both, for yet others neither. «The» concept of car is an average across such variations of time, place, context and person, not a completely firm disposition. This is logically rather distracting but it is on further thought one of the most useful features of such everyday concepts, their very looseness lending them much of their utility. But the nature of the case may vary in quite detailed and small-scale ways, from one artefactual kind to another yet closely related one. For example there are multi-bladed knives like the famous Swiss Army knives. For such knives, it is quite likely that none of the several blades itself counts as individually essential: the knife would be a damaged and defective one without that blade, or could be repaired and continue to exist with a different blade. But again there is room

for manoeuvre: if one blade were much larger or more important than the others it might be taken to be essential and the others not.

The fact that our sortal concepts for many artefactual kinds have these areas of indeterminacy in what they count as mereological essential is a source of paradoxes of which the most notorious is Plutarch's and Hobbes's Ship of Theseus. In the face of such examples, two extreme positions may be adopted. One is to rule that any part is essential to any whole of which it is part. This is *mereological essentialism* (ME), and is most frequently associated with Roderick M. Chisholm (1976: 148-158), although the view can be found earlier³. According to this view, which typically has both a modal and a temporal component, nothing could have been made of anything other than the parts of which it is actually made, and nothing can either lose or gain a part and remain in existence. This view is so far out of alignment with our actual concepts of artefacts that it can only be considered worth adopting if these regular concepts lead us into such dire difficulties that the revision is worth the effort. It is precisely the office of Ship of Theseus style paradoxes to attempt to provide such strong grounds for revising our everyday conceptual practice regarding the essentiality of parts. However, if alternative plausible accounts of the paradoxes are forthcoming, then the stringent revisions required by ME may be avoided. I have argued elsewhere (1987: 198-204; 272-280). that the Ship of Theseus cases result precisely from the penumbral slack in our everyday concepts of artefacts, and that nothing ontologically untoward results, so that the difficulties of being forced to adopt ME may be avoided.

The other extreme is to say that nothing has any essential part. This is not to allow that anything might be composed of anything. A knife must still have *some* blade and a broom *some brush*, but which ones these are is not fixed. We retreat in other words to generic rather than rigid dependence. This is also too extreme, because examining many of the artefact concepts we actually employ shows that some parts are essential to some artefacts of some kinds: its blade to a knife, its top to a table, their lenses to a pair of spectacles. That is just how it is. We might have had other

3 Leibniz seems to have upheld mereological essentialism earlier.

concepts but in fact don't. Nevertheless such a reform away from accepting any essential parts among artefacts would be less radical than adopting ME.

In the area of natural kinds too we notice that some of the concepts we actually employ accept some individual parts as essential, as in the helium-proton case, or a water molecule and its three constituent atoms. But here too the three different cases we noticed for the knife may occur. There are several isotopes of helium, including one, Helium-3, which has two protons but only one neutron. Normally helium arises from tritium (a hydrogen isotope with two neutrons) by beta decay. But although it does not physically happen this way, were an atom of Helium 4 to lose a neutron, and still be the same Helium atom, then that neutron would not be an essential part of the helium atom, nor by parity would the other one be. Only the protons would be essential to the helium atom. We could leave it indeterminate whether each neutron is essential to a helium atom. We could take them to be essential (so if a helium-4 atom lost a neutron then *that helium atom* would cease to exist and be replaced by another, a helium-3 atom. Or we could definitely take the neutrons to be inessential. Nothing that happens in nature is made any different by our choosing among these alternatives. We are simply deciding where to draw lines around individuals, *which* individuals to recognise out of the ones we could recognise. In theory we could recognise both helium atoms which could survive the loss of a neutron alongside ones which could not: we would need different expressions for them to avoid confusion but that is all. The in-between case of penumbally essential neutrons would be a half-way house between these two alternatives, and might be accepted for practical reasons, or suggested by the weight of observed phenomena. Since as far as I know He-4 never decays into He-3, there is no practical need for a decision. Such penumbra of essential parthood are more frequent higher up the periodic table where matters become more complicated.

There are scientific phenomena which are relevant to our choice of concepts, for example what isotopes exist in nature and the extent to which chemical properties mark a clear distinction between distinct kinds (such as the distinction between He-3 and

tritium, H-3). We tailor our concepts of natural kinds according to what nature puts before us in the way of regularities, and over these regularities we have no power of decision, but which particular sortal concepts we fit within these constraints is not always uniquely prescribed.

3. Biological kinds

The examples I have given of essential parts among natural kinds are chemical. Philosophers often use the term 'natural kind' to cover also biological species such as the lion and higher taxa such as the mammals. This usage is unfortunate and ought to be discontinued. Biological species, with the limited exception of asexually cloning or agamospecies do not form natural kinds in the sense of Putnam and Kripke, classes of things sharing a microstructure. This is true despite the genetic similarity between members of the same species and the genetic affinities between members of the same higher taxa, genus, family, class, order, phylum and so on. The reason is that biological kinds are too fluid and mobile in their characters to be captured by necessary and sufficient membership conditions. Biological kinds are delimited over time genealogically, by historical facts of origin and descent, and they are delimited at a time by relations of co-reproductivity, and these are vague relationships. They have no stable necessary essence which is guaranteed to remain unchanged, and in this respect they are quite different from the natural kinds dealt with in physics and chemistry. For example *Homo sapiens* is factually distinguished from other animals by a large brain, bipedal gait, opposable thumbs, and the use of language. None of these characters is essential. Not only are there humans lacking one or other of these characters, the whole species could develop by genetic drift under environmental pressure in the direction of losing any of them, and provided this development were not accompanied by extinction or speciation, *Homo sapiens* would continue to exist in the absence of the trait in question. So despite its name, *Homo sapiens* is not necessarily brainy or rational.

Returning to mereology, it is rather clear that no part of any organism is permanently essential to it. We know of course that the flux of small parts in a large multicellular organism such as a human being means that none of these small parts is essential. We know from numerous cases of accident, illness and defect that human beings can accidentally lack larger parts. Finally we know from advances in medical technology that few indeed of our actual parts are individually essential, and there is no telling what the future may bring in this regard. That is why a question mark hangs over even the most likely putative essential part of a human being, the brain. But whatever the status of the brain for an adult or reasonably grown human, we know for certain that the brain is not essential to any individual human being, because in the earliest stages of their existence as an embryo no human has a brain.

Up to now I have not distinguished, as Locke advised us to do, between human beings and human beings who are persons⁴. Retention of mental abilities despite a complete change of body and brain would incline us to talk of the same *persons* rather than the same *human being*, and there would be very good grounds for keeping those two cases distinct, as they would have distinct persistence conditions. At present most of the persons we know about are humans. However I stress that these thought-experiments are speculative. Given our present state of relative ignorance it would be unwise to offer strong predictions on what will happen should such experiments eventually become practical. All I would stress is that the term 'person', unlike the term 'human being', is very open-textured and not obviously a substance sortal at all.

4. No non-analytic essential parts

This very uncertainty that we have at present underlines the sceptical conclusion towards which I am moving. My hypothesis is that there are no clear cases of essential parts where the nature

4 I say 'person who is a human being' rather than just 'person' because there is no reason why humans should have any monopoly on personhood.

of the necessity is not analytical, that is, where it does not rest in the concepts we employ or equivalently in the particular lexical meanings of certain uses of words. That this or that individual is an essential part of something is so of analytic necessity and not because of natural, metaphysical or logical necessity. It is analytically true that this table must have this top, or that this helium atom must have this proton as part; in just the same way as it is analytically necessary of this electron that it has a negative charge.

The comparison is chosen deliberately to highlight what is in our power and what is not. The electron, a light particle with negative electric charge, was discovered by J.J. Thompson in 1897. Its antiparticle the positron was predicted theoretically by Paul Dirac in 1931 and observed (uninfluenced by Dirac's prediction) by Carl Anderson in 1932. The positron differs from the electron only in having positive rather than negative charge, of the same magnitude. In the early papers positrons were frequently conceived, as in Dirac's original idea, as not particles but as «holes» in a sea of negative electricity, But even where they were regarded as particles, they were called 'positive electrons'. During this stage, anyone who stated that some electrons were positively charged would have been speaking correctly. By 1933, Anderson had coined the term 'positron' and the term 'electron' was thenceforth restricted in the physics community to the negatively charged particles. After 1933, it became analytically true to say that electrons have negative charge: before that time, the lexicon had not fixed this property, even before the discovery of positrons. The term 'electron' underwent a change in meaning.

The point is that neither electrons nor positrons were in any way changed in their own nature by the terminological convention adopted by physicists in the 1930s. They are as they are and behave as they behave irrespective of our names for them or how we draw the boundaries around kinds. It would have made perfect sense to continue to use 'electron' for both positively charged and negatively charged particles and the terminology of particle physics would have been slightly different from what it now is. So the nature of the necessity involved in saying that electrons are essentially negatively charged is analytic: it is not

logical or metaphysical or natural, though of course regularities motivate our terminological choices. The difference between ourselves and a physicist of 1925 on the question whether electrons are essentially negative reflects that it is within our power to legislate where some word's extension runs, and therewith to include some properties as essential. We *discover* that electrons *are* negative, but *legislate* that they *must* be.

It is, I suggest, the same with essential parts. There are many cases of kinds of things where we see them preserving certain parts through changes and this is a basis for but not yet sufficient for us to be sure that all such objects must have such parts. That helium atoms have their protons essentially lies in the concept *Helium*, or equivalently, in the way we use the word 'helium' and its synonyms. This usage is strongly guided by natural regularities, but these never confer the certainty of necessity. The reason we can be so sure that the loss of a proton would spell the end of a helium atom is not because we have some intuitive insight into a law of nature or metaphysics, but because we know that is how we use the word 'helium': we are parties to that usage.

Before moving on I wish to discuss two concerns about my examples and thesis. The first is that we might be accused of naivety in treating electrons, protons etc. as if they were little material bodies when in fact their truer and more elusive nature is revealed by the wave-particle duality of quantum theory. If we could peer closer into a helium nucleus we should not see discrete little points but smeared somethings which are the result of the superpositions of eigenstates of various fields. Does this not mean that talk of part and whole is inappropriate when we get down to physical fundamentals? Of course such a possibility cannot be ruled out, but when field quantities can be summed as the resultant of quantities which have a straightforward interpretation in isolation, we are still entitled to treat the contributory phenomena as parts of the whole, as when two superposed water waves or sound waves may be seen as the resultant of two distinct simpler waves. So even something as unarticulate as a wave may be considered – *sensu strictu*, not by analogy or metaphor – as having parts.

This brings me to a second concern, which is related to the first. The trope ontology within which I consider it prudent to interpret and situate the theory of field quantities is one where the distinction between a part and a quality instance breaks down. If, as I believe, a wave-particle like an electron is a nexus or bundle of tropes unified by formal foundation relations, then the negative charge of an electron is a part of it, but a dependent, not detachable part. So the electron case and the helium case are not so different after all: a helium atom is simply a more complex bundle, with qualitatively identifiable sub-bundles, whereas the electron appears not to exhibit internal sub-constituents apart from its actual tropes, taken as a single unified nexus.

5. Essential parts of occurrents

Of course not just continuants, that is, things which endure but lack temporal parts, have parts. Occurrents, things which endure through time by the accretion over time of temporal parts or phases, also have parts, and not just temporal ones. An explosion or a collision is an event with different temporal phases as well as spatial parts and spatio-temporal segments. Similar remarks apply to all manner of occurrents: smiles, processes of growth or digestion, all have manifold parts, including temporal phases with no part in common. What of their essential parts?

It seems at first sight that our intuitions about what parts occurrents have essentially are much hazier than for the case of continuants, not least because we speak about occurrents less frequently and with less intense interest than continuants. One position which at first seems extreme is that all parts of occurrents are essential to them⁵. This seems less in conflict with our views about what occurrents are than the corresponding view about continuants.

Let us illustrate the point with an example. Suppose Lucy takes a walk to her local shop to buy a newspaper. She can walk faster or slower as she wishes, she can stop to admire her neighbour's roses or new car, talk to the children next door, cross

5 This position is canvassed in Simons 1987: 281-3.

the road to read a notice, and so on. Suppose ME applied to all such events. Then no part of the walk which actually took place could not have taken place. So if a counterfactually mereologically distinct walk took place, say one lasting 10 seconds less, this would have to be a distinct walk. But if Lucy simply walks more slowly to look at the roses because she wants to, but all other features of the walk are the same, are we really prepared to say it is a wholly different walk rather than the same walk with a few different parts in the counterfactual situation? Both positions seem quite reasonable in fact: it is not clear whether we have any solid intuitions here.

Take the continuant Lucy herself. She happens to have a non-essential part that some people lack: an appendix. She might have had appendicitis at some earlier age and have had her appendix removed, but she did not. But no one would doubt that in the situation in which Lucy had lost her appendix, that it would have been the same woman. All the events that befall Lucy's appendix are parts of her life, and if she had lost her appendix earlier those parts would simply not have taken place. So if we consider the large complex occurrent *Lucy's life* to be governed by mereological essentialism then it would seem that since the parts of her actual life involving her appendix could not have been absent, so Lucy could not have lost her appendix, so her appendix is after all an essential part of her. It seems then that ME for occurrents is incompatible with the rejection of ME for continuants, since the lives of continuants are occurrents. Even worse, ME for occurrents seems to commit us to determinism for continuants. Surely this is too high a price to pay for ME for occurrents.

However, there is a reply to the objection and it goes like this. Many, in fact nearly all of our names for events are definite descriptions or contain other reference-determining descriptive content. There are apparent exceptions such as names of battles, usually borrowed from the names of the places they occurred, but even a name like 'Waterloo' should be construed as meaning 'the Battle of Waterloo'. Definite descriptions are not modally rigid, but modally *flaccid*⁶. That means in the idiom of possible worlds

6 Honderich 1995: 282 (entry by Wayne Davis).

that they may designate different individuals in different worlds. 'The 34th President of the United States' refers to Dwight D. Eisenhower, but it might have referred to Thomas E. Dewey had the 1948 election gone his way. So the expressions 'Lucy's walk to the shop on 17 October 2000' and 'Lucy's life' are also modally flaccid and may designate different events in different worlds. Lucy's life might have been quite different. She might have been born in Australia rather than England if her parents had decided to emigrate in 1955, she might have become a mathematics teacher in Melbourne rather than a bank manager in Leeds, might have met and married a different man and had different children. None of those events described in the alternative possible life of Lucy are events in her actual life, yet it would still be her. So determinism and incompatibility with the denial of ME for continuants are avoided.

There remains a more subtle issue. We cannot counterfactually vary the events of a life arbitrarily and it still remain the life of that thing. Lucy could not have been born to Chinese parents in Shanghai in 1930 if she was born to English parents in Leeds in 1955, any more than a helium atom might have been a water molecule or a tree might have been a mouse. Are there any occurrents in Lucy's life in which she *must* participate? I suggest there is *at most* one, and that is her actual creation. That actual fusion of those two cells was her origin. But again 'Lucy's origin' might be a modally flaccid term: had those two cells fused earlier or later or in a different place, would it have been numerically the same event? We can agree that fusion of different cells would not have been Lucy's origin. But provided it was the very same cells which fused, I think we are happy to identify the resulting human being as Lucy. We can therefore imagine Lucy's life starting an hour earlier or later than it in fact did, and it still being her life, but a numerically different one, with in fact no single occurrent in common with her actual life, despite whatever descriptive similarities might reign.

Here is a third objection⁷. Take a very complex event like the Battle of Waterloo, and consider a small and insignificant part of it, such as a soldier's firing a certain bullet which let's say misses

7 Due to Christopher Hughes.

its target. Perhaps the soldier brought that bullet rather than another one quite accidentally. Could the soldier, thinking about this possibility, reasonably think to himself, «If I had brought the other bullet rather than this one, I could have prevented this battle from taking place»? Clearly there is something odd about this idea: certain things could have prevented the battle, such as Wellington failing to get his troops to Waterloo, or Napoleon deciding to avoid a fight, but the trivial action of a minor participant seem not to be in this league.

The answer is in this case that the soldier can and indeed if I am right correctly *should* think that thought, but that there is a huge difference between preventing *this* (particular, individual) battle from taking place, and preventing *any* battle from taking place. It is a trivial matter to as it were divert history so that a different battle of Waterloo takes place: any one of the many participants could do that by any one of many alternative possible actions. Numerically it is then no longer the same battle: we must remain strict. But in the midst of a raging battle no action or alternative action can bring it about that *no* battle takes place. Once something denominated as a battle has started (and it takes enough of the right kind of events coming together for it to be a battle and not preparations or skirmishing) not even divine intervention can cause no battle to have happened. The objection turns on not taking the individuality of the actual battle seriously.

I conclude that there is no obvious intuitive obstacle to ME for occurrents, and that this position fits in well enough with our somewhat shaky intuitions on the subject.

6. Ontological primacy of occurrents no obstacle

I have argued elsewhere (2000a & b) that occurrents are ontologically prior to continuants because with continuants alone we are unable to find suitable truth-makers for propositions of the form *c exists at t* where 'c' names a continuant, but occurrents which are vital to the existence of *c* and which have temporal parts at *t* provide us with such truth-makers. Continuants however do not fail to exist, as eliminativist and four-dimensionalist

ontologists would have us believe: rather they are invariants over collections of occurrents under certain equivalence relations. This holds for all continuants without exception: it holds for more complex continuants like Lucy the lady as well as simpler continuants like Eric the electron. But does not the dependence of continuants on their occurrent basis mean that ME for occurrents again forces us to accept ME for continuants after all? No it does not, for the dependence of a continuant on its vital occurrents is generic. *It*, that very same continuant, could have had other vital occurrents, provided only they were of the right kind. Lucy could have had a completely different collection of heartbeats sustaining her than those that in fact sustain her, and it still be Lucy. We see here the value of a clear distinction between rigid dependence and generic dependence in ontological analysis. Thus the dependence of a continuant on its vital and other life-occurrents is a rather light and liberal affair, and it is this relatively relaxed relationship which allows continuants to be counterfactually identified across variant occurrent bases. In this respect therefore, though occurrents are generically necessary and basic to continuants, the dependence is not so stringent that one is justified in claiming continuants could be *reduced* to occurrents. If they could, surely continuants' identities would not be so robust. That continuants are invariants does not mean they are created by us or discerned only as abstracta, indeed as Strawson has argued, recognition of continuants is more stable to our cognitive and conceptual system than recognition of occurrents, even though I hold there can be no continuants without occurrents. Epistemological or cognitive primacy is no obstacle to ontological secondariness. There are deep issues involved here about the relevance of cognitive choices to ontology, and I have only touched on some of them in connection with the question of our freedom of delimitation, but I cannot penetrate the issues more deeply here in the course of another topic and must leave them to another occasion.

7. Mereological essentialism given its rightful place

So here is my somewhat ironic conclusion with regard to Chisholm's mereological essentialism. ME is correct for occurrents, that is, objects with temporal parts, and it is so because our whole conceptual scheme accords with it. The irony is that Chisholm himself rejects ontologies based on occurrents, such as Rescher's process ontology⁸. That occurrents have all their parts essentially is however itself an analytic truth, concerning the concept of an occurrent, so my main thesis that all essentiality of parts is analytic is not undermined. Now it is too facile to say that this is because of the way we have decided to use terms like 'occurrent', 'event' etc. It is decidedly *not* like the helium case. Expressions like 'event', 'process', 'occurrent' are highly abstract and to some extent philosophically artificial, so to simply seek to pass the responsibility onto some local or limited decision or convention is very implausible. Rather we should look at global features of our use of event and other occurrent terms and indeed our use of verbs, adverbs etc. in sentences which don't name events and other occurrents. This is indeed deep water. But in principle there is nothing except attachment to simple and simple-minded cases to be said against the idea that some things can be analytically true and yet very unobviously analytically true⁹. That its blade is essential to this knife is, let us be honest, a very boring and trivial example, a superficial aspect of our concepts regarding this type of artefact. It cuts little ice, so to speak. On the other hand, if it is analytically true of any occurrent and a part it has that it has this part, then this is almost certainly deeply inherent of our conception of occurrents as entities spread out over time, and not a superficial feature of the lexeme 'occurrent'. Concepts and their features are manifested in regularities of linguistic and cognitive practice as well as in the lexicon we command, so the concepts and their features can therefore be relatively opaque to us. Part of our task as philosophers is to bring such latent complexity to patency.

8 Chisholm, 'Reply to Rescher', in Hahn (ed.) 1997: 200.

9 Cf. Bennett 1966: 42.

If, as I have argued, ME applies to occurrents, then we have a clear way of seeing how it is that continuants may nevertheless participate in the events of their lives accidentally. Any two possible lives of Lucy must either have some initial part in common, or the materials of which Lucy is originally made must have some initial parts of their lives in common. The former case is the more straightforward and usual. Had Lucy stopped to talk to her neighbour rather than walking past on the way to the shop, her later life would have been numerically and in all its parts different, whatever the similarities of the later stages. We can envisage Lucy's possible lives after a given time as like a branching tree, and the events which determine how things turn out in large or small ways as pruning the tree so that only one path remains up to the present¹⁰.

The more complex case allows that the actual time and place of creation of an individual be not essential to it, but that all of its initial materials be essential to it. It would be conceptually neater if the originating event of a continuant be essential to it in all cases, but our concepts as a matter of fact do not operate this way.

8. Conclusion

I have used our fairly robust intuitions about what is or is not essential as a part to a whole to argue that all essential parts are so analytically, either for local lexical reasons or because of the character of the general notion of an occurrent in our thinking about the world. The thesis put forward strongly suggests a more radical general position, that all essentiality, whether of part or property or origin or material composition, or whatever else, is analytic. I have not argued for this more general thesis but I suggest that arguments can be put forward along the lines given for essentiality of parts. This in turn suggests a more radical position still, namely that there are only two kinds of real necessity. The first is lexical necessity, as in 'Necessarily, all

10 This idea is found in great clarity in McCall 1994. Unlike McCall I regard the tree idea as a *façon de parler* and not as designating anything metaphysically real.

vixens are female', or 'Necessarily, no handkerchief is a colour'. These are analytic truths, but trifling ones, to use Locke's derogatory description. The second and much more interesting kind of necessity attaches to groups of concepts which are very general and deeply embedded in our way of thinking about the world. The mereological essentialism of occurrents or the essentiality of origin of artefacts belong here, as does the special kind of necessity attaching to that slightly fuzzy group of concepts called the logical constants, and which gives us logical necessity. Whether we choose to call such broadly conceptual necessity 'analytic' or 'synthetic' is probably a terminological matter, but my preference would be to call it 'analytic', because it allows us to formulate in simple terms the deflationary statement that all necessity is analytic. I have not argued for this, but I am inclined to believe it and hope to have given some grounds for supporting it¹¹.

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