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Author(s): Roderick M. Chisholm
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ARTICLES

PARTS AS ESSENTIAL TO THEIR WHOLES *

RODERICK M. CHISHOLM

I

ONE KIND OF PHILOSOPHICAL PUZZLEMENT arises when we have an apparent conflict of intuitions. If we are philosophers, we then try to show that the apparent conflict of intuitions is only an apparent conflict and not a real one. If we fail, we may have to say that what we took to be an apparent conflict of intuitions was in fact a conflict of apparent intuitions, and then we must decide which of the conflicting apparent intuitions is only an apparent intuition. But if we succeed, then both of the intuitions will be preserved. Since there was an apparent conflict, we will have to conclude that the formulation of at least one of the intuitions was defective. And though the formulation may be imbedded in our ordinary language, we will have to say that, strictly and philosophically, a different formulation is to be preferred. But to make it clear that we are not rejecting the intuition we are reformulating, we must show systematically how to interpret the ordinary formulation into the philosophical one. The extent to which we can show this will be one mark of our success in dealing with the philosophical puzzle. Another will be the extent to which our proposed solution contributes to the solution of still other philosophical puzzles.

I shall consider a philosophical puzzle pertaining to the concepts of whole and part. The proper solution, I believe, will throw light upon some of the most important questions of metaphysics.

II

The puzzle pertains to what I shall call the principle of mereological essentialism. The principle may be formulated by saying that, for any whole x, if x has y as one of its parts then y is part of x

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in every possible world in which x exists.   The principle may also be put by saying that every whole has the parts that it has necessarily, or by saying that if y is part of x then the property of having y as one of its parts is essential to x.   If the principle is true, then if y is ever part of x, y will be part of x as long as x exists.

Abelard held that "no thing has more or less parts at one time than at another."[1]   Leibniz said "we cannot say, speaking according to the great truth of things, that the same whole is preserved when a part is lost."[2]   And G. E. Moore gave us this example:

> Let us take as an example the relational property which we assert to belong to a visual sense-datum when we say of it that it has another visual sense-datum as a spatial part: the assertion, for instance, with regard to a colored patch half of which is red and half yellow: "This whole patch contains this patch" (where "this patch" is a proper name for the red half).   It is here, I think, quite plain that, in a perfectly clear and intelligible sense, we can say that any whole, which had not contained that red patch, could not have been identical with the whole in question: that from the proposition with regard to any term whatever that it does not contain that particular patch it *follows* that that term is other than the whole in question—though *not* necessarily that it is qualitatively different from it.   That particular whole could not have existed without having that particular patch for a part.   But . . . it seems quite clear that, though the whole could not have existed without having the red patch for a part, the red patch might perfectly well have existed without being part of that particular whole.[3]

Instead of considering such things as sense-data and visual patches, let us consider physical things.   Let us picture to ourselves

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[1] See D. P. Henry, *Medieval Logic and Metaphysics* (London: Hutchinson University Library, 1962), p. 120.

[2] *New Essays concerning Human Understanding*, Book II, Chapter xxvii, Section 11 (Open Court edition, p. 247).   Compare Hume, *Treatise of Human Nature* Book I, Part IV, Section 6.

[3] *Philosophical Studies* (London: Kegan Paul, Trench, Trubner & Co., Ltd., 1922), pp. 287–88.   Compare also J. M. E. McTaggart: "For if a whole is a combination it is built up of parts which could exist without being combined in that way, while the combination could not exist without them." *Some Dogmas of Religion* (London: Edward Arnold, 1906), p. 108.

a very simple table, improvised from a stump and a board. Now one might have constructed a very similar table by using the same stump and a different board, or by using the same board and a different stump. But the only way of constructing precisely *that* table is to use that particular stump and that particular board. It would seem, therefore, that that particular table is *necessarily* made up of that particular stump and that particular board.

But to say of the table that it is necessarily made up of the stump and the board is not to say of the stump and the board that *they* are such that they are necessarily parts of the table. And it is not to say that the stump is necessarily joined with the board. God could have created the stump without creating the board; he could have created the board without creating the stump; and he could have created the stump and the board without creating the table. But he could not have created *that* particular table without using the stump and the board.

Let us be clear about the view that is here set forth. It is no spurious essentialism. (That is to say, it is not the kind of essentialism that is arrived at in such arguments as these: "Szigeti was a violinist; necessarily all violinists are musicians; therefore Szigeti was necessarily a musician"; and "The word 'Homer', as we use it, connotes or intends being a person who wrote the *Iliad* and the *Odyssey*; therefore Homer, if he existed, was such that he necessarily wrote the *Illiad* and the *Odyssey*.") We are saying, in application to our example of the table, that there exists an x, a y, and a z such that: x is identical with this table, y is identical with this stump, z is identical with this board, and x is such that, in every possible world in which x exists, it is made up of y and z. Our statement says nothing whatever about the way in which human beings may happen to conceive or to look upon such things as this table. And, a fortiori, it says nothing whatever about the way in which we may happen to describe this table or use the language we do. Its subject-matter is no more nor less than this table, the parts of this table, and the possible worlds in which this table exists.

Considered in the abstract and considered in application to such simple examples as these, the principle of mereological essentialism may seem to be obvious. Indeed, I would say that it ought to seem to be obvious. Yet the principle appears to conflict with certain other truths which, perhaps from a somewhat different point of view,

would *also* seem to be obvious. I will indicate these other truths by formulating two objections to the principle of mereological essentialism.

(A) "(i) My automobile had parts last week that it does not have this week and it will have parts next week that it never had before. But (ii) the principle of mereological essentialism implies that, if anything is ever a part of my automobile, then that thing is a part of my automobile as long as the automobile exists. And therefore (iii) the principle of mereological essentialism is false."

(B) "(i) I could have bought different tires for my automobile. (ii) If I had bought different tires for my automobile, then it would have had different parts from those it has now. Therefore (iii) my automobile could have had different parts from those it has now. Hence (iv) my automobile is such that, in some possible worlds, it has parts it does not have in this one. But (v) the principle of mereological essentialism implies that in every world in which my automobile exists it has exactly the same parts it has in this one. And therefore (vi) the principle of mereological essentialism is false."

Philosophers who are interested in the ways in which people ordinarily talk may wish to multiply examples at this point. But I believe that our two examples are enough.

I would say, then, that we have here a typical philosophical puzzle—an apparent conflict of intuitions.

III

Before we try to solve the puzzle, let us consider the antithesis of extreme mereological essentialism. This would be what we might call complete, unbridled mereological *inessentialism.*

Complete, unbridled mereological inessentialism would seem to be manifestly absurd. This would be the view that, for any whole w, w could be made up of any two things whatever. For, given such a view, one could say, of *this table*, that it could have been made up of the number 36 and the property blue.

Perhaps it will be conceded that the set of things which are capable of being parts of this table must be restricted in at least a general way—say, to things of the same ontological category as the table. Suppose, then, one says that, for any two physical objects, this table could have been made up of those two objects.

If the view is true, then *this table*, this physical thing that is before us now, is such that it could have been made up of my left foot

and the Grand Central Station.   Or, to be more exact, if extreme
mereological inessentialism is true, then this table, my left foot, and
the Grand Central Station are three things which are such that there
is a possible world in which the first is made up of the second and
third—in which *this table* is made up of what, in this world, are my
left foot and the Grand Central Station.

Indeed, there would be indefinitely many such possible worlds.
In trying to imagine this table being made up of my foot and the
station, perhaps we thought of my foot and the station as they now
are, with all the particular parts that they now happen to have.   But
if extreme mereological inessentialism is true, then the foot and the
station could have had parts entirely other than those that they have
in fact.   The foot could have been made up of Mt. Monadnock and
Mr. Robinson's necktie and the station could have been made up of
a certain horse and a certain fish.   So, of the indefinitely many pos-
sible worlds in which this table is made up of the foot and the station,
some of those will be such that in them the foot is made up of the
mountain and the necktie while the station is made up of the horse and
the fish, but others will be such that in them the station is made up
of the horse and the necktie while the foot is made up of the mountain
and the fish.

It is difficult to imagine how even God could tell these worlds
apart.   Which are the ones in which the necktie is made up of the
horse and the station and which are the ones in which the mountain
is made up of the fish and the foot?   One would have to say, of the
mountain and the necktie and the horse and the fish, that they could
have been made up of other things, too.   Hence, of those worlds in
which the foot is made up of the mountain and the fish, there will be
those in which the fish is made up of the necktie and the station. . . .

But we need not formulate such extreme examples.   Consider
just two tables, x and y, and suppose, what from one point of view
would seem to be reasonable, that these tables are such that they
could survive replacement of any of their smaller parts.   We con-
sider, then, the consequences of exchanging certain of their smaller
parts; then there will be a world possible in respect to this one in which
x has one of the parts that y has in this world and y has one of the
parts that x has in this world; then there will be a world possible in
respect to *that* world, and therefore also in respect to this one, in which
x and y will have exchanged still other smaller parts.   We can im-

agine the process continued in such a way that it will remind us of
the ancient problems of The Ship of Theseus and The Carriage.
There will be a possible world which is like this one except for the fact
that in that one x has the parts that y has in this one and y has the
parts that x has in this one.   We have only to reflect a moment to see
that there will be indefinitely many such possible worlds.   Thus of
those possible worlds W, which are such that the thing u which is one
of the legs of x in this world is the corresponding leg of y in W
and the thing v which is one of the legs of y in this world is the corre-
sponding leg of x in W, there will be those worlds W′ which are such
that the things that are parts of u in this world will be parts of v in
W′ and there will be those worlds W″ which are such that the things
that are parts of v in this world will be parts of u in W″, and so on,
ad indefinitum.

These reflections, on the consequences of extreme mereological
inessentialism, may suggest to us that *some* version of mereological
essentialism must be true—even if it is not the extreme principle we
have set forth.   But instead of trying to formulate plausible alterna-
tives to the extreme principle (a task which I have found to be extra-
ordinarily difficult), let us return to our philosophical puzzle and see
whether the extreme principle might not be defended.

<div align="center">IV</div>

Let us begin by introducing some mereological definitions and
axioms, taking as undefined "x is part of y" where "part" is under-
stood in the sense sometimes expressed by "proper part."   Now it is
possible that the term "part" is taken in one way in our formulation
of the principle of mereological essentialism and in another way in
our formulation of the objections to it.   In the principles that follow,
we will use the term "S-part" instead of "part."   Use of "S-part"
will indicate that we are speaking strictly and philosophically.   Then
we may formulate, without ambiguity, certain questions about the
relation of "part" in its ordinary, or loose and popular, sense, and
"S-part" or "part" in its strict and philosophical sense.

Of the three axioms and the three definitions that follow, the
first two in each group were set forth, though in a somewhat different
terminology, by Whitehead in *The Organisation of Thought.*[4]

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[4] *The Organisation of Thought* (London: Williams and Norgate, 1917),
p. 158ff.   Whitehead adds another axiom, to the effect that, if x is part of y,

(A1) If x is an S-part of y and y is an S-part of z, then x is an S-part of z.

(A2) If x is an S-part of y, then y is not an S-part of x.

(A3) If x is an S-part of y, then y is such that in every possible world in which y exists x is an S-part of y.

We are suggesting, then, that the principle of mereological essentialism be taken as a basic principle of the theory of part and whole. We add these definitions:

(D1) x is discrete from y = Df (i) x is other than y and (ii) there is no z such that z is an S-part of x and z is an S-part of y.

(D2) w is strictly made up of x and y = Df (i) x is an S-part of w, (ii) y is an S-part of w, (iii) x is discrete from y, and (iv) no S-part of w is discrete both from x and from y.

(D3) x is strictly joined with y = Df There is a w such that w is strictly made up of x and y.

Making use of the above terminology and principles, as well as the concepts of spatial and temporal location, let us now consider the make-up of certain ordinary and familiar things.

V

Consider the history of a very simple table. On Monday it came
Mon AB into being when a certain thing A was joined with a
Tue BC certain other thing B. On Tuesday A was detached
Wed CD from B and C was joined to B, these things occurring
in such a way that B remained throughout as a part of a table. And
on Wednesday B was detached from C and D was joined with C,
these things occurring in such a way that C remained throughout as a
part of a table. Let us suppose that no other separating or joining
occurred.

I suggest that in this situation there are the following three
wholes among others: AB, that is, the thing made up of A and B; BC,
the thing made up of B and C; and CD, the thing made up of C and
D. I will say that AB "constituted" our table on Monday, that BC
"constituted" our table on Tuesday, and that CD "constituted" our
table of Wednesday. Although AB, BC, and CD are three different

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then there is a z such that z is part of x. Whitehead applies his theory of part and whole to *events*. I believe it is accurate to say that he conceives events in such a way that they may be said to have their parts necessarily.

things, they all constitute the same table.   We thus have an illustration of what Hume called "a succession of objects."[5]

One might also say, of each of the three wholes, AB, BC, and CD, that it "stands in for" or "does duty for" our table on one of the three successive days.   Thus if we consider the spatial location of the three wholes, we see that on Monday AB occupied the same place that our table did, on Tuesday BC occupied the same place that our table did, and on Wednesday CD occupied the same place that our table did. And so we might define "constitutes" in the following way:

> (D4) x constitutes y at t = Df There is a certain place such that x occupies that place at t and y occupies that place at t.

The final clause could also be read as "y occupies exactly that same place at t."   We add this obvious definition:

> (D5) x constitutes at t the same physical object that y constitutes at t' = Df There is a z such that x constitutes z at t and y constitutes z at t'.

Every physical object will, of course, constitute itself.   But, according to our present suggestion, some things may constitute, and be constituted by, things other than themselves.   (Thus AB constituted our table on Monday; but AB, unlike our table, also ceased to be on Monday.)

What if our table should undergo fission with the result that on

Mon	AB
Tue	BC
Wed	CD
Thu	CE EF

Thursday there were two different tables, CE and EF? We cannot say that CE and EF *both* constitute the same table as does CD, BC, and AB.   For our definitions imply that, if two different things constitute the same table at the same time, then those two things are in the same place at that time; and CE and EF are not in the same place on Thursday.

It is possible, however, that one or the other, CE or EF, constitutes the same table as does CD.   Which one, then?   To answer *this* question, we would have to turn to the philosophy of tables, or to the

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[5] See *A Treatise of Human Nature*, Book I, Part iv, Section 6 (Selby-Bigge edition, p. 255): "all objects, to which we ascribe identity, without observing their invariableness and uninterruptedness, are such as consist of a succession of related objects."   In this same section, Hume affirms a version of the principle of mereological essentialism.

philosophy of furniture, and attempt to set forth *criteria* which a pair of things must satisfy if one of them at one time is to constitute the same table as does the other of them at another time. But this project is not relevant to our present discussion.

Similar remarks will apply to fusion—to what happens when two tables are joined to make a single table. The fused table will not constitute the same table as *both* of the original tables—but it may, or may not, constitute the same table as one of them.

And so we have described one possible way of looking upon what happens when, as we would ordinarily put it, a thing such as a table undergoes a change of parts. I propose that we consider our philosophical problem from this perspective. Before doing so, however, we should consider two objections to this way of looking at the matter.

(1) "You are committed to saying that AB, BC, CD and our table are four different things. It may well be, however, that each of the three things AB, BC, CD, satisfies the conditions of any acceptable definition of the term 'table'. Hence you are committed to saying that, in the situation described, there are *four* tables. But this is absurd; for actually you have described only *one* table."

We will find the answer, I think, if we distinguish the strict and philosophical sense of such expressions as "There are four tables" from their ordinary, or loose and popular, sense. To say that there are four tables, in the strict and philosophical sense, is to say that there are four different things, each of them a table. But from the fact that there are four tables, in this strict and philosophical sense, it will not follow that there are four tables in the ordinary, or loose and popular sense. For there to be four tables in the ordinary, or loose and popular, sense, it must be the case that there are four things, not only such that each constitutes a table, but also such that no two of them constitute the same table.

We may, therefore, explicate the ordinary, or loose and popular, sense of "There are *n* so-and-so's at t" in the following way:

> (D6) There are, in the loose and popular sense, *n* so-and-so's at t = Df
> There are *n* things each of which constitutes a so-and-so at t and no two of which constitute the same so-and-so at t.

The term "so-and-so" in this schematic definition may be replaced by any more specific count-term, e.g., "table" or "ship."

And so the answer to the above objection is this: In saying that there are four tables in the situation described one is speaking in the

strict and philosophical sense and not in the loose and popular sense;
and in saying that there is just one table one is speaking in the loose
and popular sense and not in the strict and philosophical sense.   The
two assertions, therefore, are not incompatible.[6]

(2) The second objection to our way of looking at the simple
table—or tables—above may be put as follows.

"You say that the thing constituting our table at a given time
may be something *other* than the table itself.   Yet you say that it
occupies exactly the same place that the table does.   Therefore what
you say is incompatible with the principle according to which it is
impossible for two things to occupy exactly the same place at the
same time."

The expression "It is impossible for two things to be in the same
place at the same time" may be taken either in a strict and philosophi-
cal sense or in a loose and popular sense.

If we take it in a strict and philosophical sense it tells us that it is
impossible for there to be an x and a y such that x is diverse from y and
x occupies at a certain time exactly the same place that y occupies at
that time.   If we take the principle in this sense, then we must say
that it is false.   For a shadow and a part of the surface of a physical
object may occupy exactly the same place at the same time; so, too,
for a hole in a shadow and a part of the surface of an object; so, too,
perhaps, for a person and a part of his body; and so, too, for any two
things one of which constitutes the other.   Thus the AB of our ex-

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[6] It may be noted that we have defined the loose and popular sense of
the expression, "There are *n* so-and-so's at t" and not the more general,
"The number of so-and-so's that there ever will have been in *n*."   For the
loose and popular sense of this latter expression is not sufficiently fixed to be
explicated in any strict and philosophical sense.   The following example
may make this clear.   In the infantry of the United States Army during
World War II each private carried materials for half a tent—something like
one piece of canvas, a pole, and ropes.   Two privates could then assemble
their materials and create a tent which would be disassembled in the morn-
ing.   On another night the two privates might find different tent compan-
ions.   Occasionally when the company was in camp the various tent parts
were collected, stored away, and then re-issued but with no attempt to as-
sign particular parts to their former holders.   Supposing, to simplify the
matter considerably, that all the tents that there ever will have been were
those that were created by the members of a certain infantry company, how,
making use of our ordinary criteria, would we go about answering the ques-
tion "Just how many tents *have* there been?"   Would an accounting of the
history of the joinings of the various tent parts be sufficient to give us the
answer?

ample is other than the persisting table x; yet on Monday AB oc-
cupies the place that x does; but in so doing AB does not get into the
way of x, for on Monday it is AB that does duty, so to speak, for x.
Hence it is no objection to say that our way of viewing the table is in-
compatible with the strict and philosophical sense of the principle,
"It is impossible for two things to be in the same place at the same
time."

And what we have said is not incompatible with the loose and
popular sense of the principle. Taken in that sense, the principle
tells us that it is impossible for there to be two physical objects, in the
loose and popular sense of "There are two physical objects," occupy-
ing the same place at the same time. What we have said does not
imply that there are two physical objects, in this loose and popular
sense, occupying the same place at the same time. Looking back to
D6, we see that there cannot be two physical objects in this sense un-
less there are two physical objects neither of which constitutes the
other.

VI

We are now in a position to reply to the two objections to our
version of mereological essentialism.

The first objection was this: (A) "(i) My automobile had parts
last week that it does not have this week and it will have parts next
week that it has never had before. But (ii) the principle of mere-
ological essentialism implies that, if anything is ever a part of my
automobile, then that thing is a part of my automobile as long as the
automobile exists. And therefore (iii) the principle of mereological
essentialism is false."

In reply to this objection one may observe that the term "part"
is used in one way in the first premise and in another way in the second
and hence that the conclusion rests upon an equivocation. But if the
reply is to be taken seriously, one must state what the two uses of the
term "part" are and how they are related to each other.

In formulating the principle of mereological essentialism, we used
the expression "S-part," suggesting that this might be read as "part
in the strict and philosophical sense." (Perhaps the reader would
prefer to read it as "part in the philosopher's sense.") We proposed
three axioms in the attempt to explicate "S-part." This is the sense
in which "part" should be taken in premise (ii) of the above objection.

What of premise (i)? Here, I suggest, "part" must be taken in
the loose and popular sense. (Perhaps the reader would prefer to

say: "Here 'part' must be taken in its ordinary sense.") How, then, are we to relate this loose and popular sense of "part" to the strict and philosophical concept of S-part?

To say, for example, that a certain tire is now a part of my automobile is to say that what now constitutes that tire is a part, in the strict and philosophical sense, of what now constitutes my automobile. And to say of a certain other tire that it was a part of my automobile yesterday is to say that something that constituted that tire yesterday was a part of something that constituted my automobile yesterday. I propose, then, this definition of the ordinary sense of "part" in terms of the vocabulary we have here introduced:

(D7) x has y as a part at t = Df Something that constitutes y at t is [an S-part of something that constitutes x at t.

Taking "part" in this ordinary, or loose and popular sense, we may now say of a physical thing, such as my automobile, that it may have one part at one time and another part at another time. And saying this will be quite consistent with saying, as our principle of mereological essentialism requires us to say, that in a strict and philosophical sense if a thing y is ever a part of a thing x then that thing y is a part of x at any time that x exists.

The second objection was this:

"(B)(i) I could have bought different tires for my automobile. (ii) If I had bought different tires for my automobile, then it would have had different parts from those it now has. Therefore (iii) my automobile could have had different parts from those it has now. Hence (iv) my automobile is such that, in some possible worlds, it has parts it does not have in this one. But (v) the principle of mereological essentialism implies that in every world in which my automobile exists it has exactly the same parts it has in this one. And therefore (vi) the principle of mereological essentialism is false."

Here, too, we may observe that the term "part" is used equivocally—in the loose and popular sense in premises (ii) and (iii) and in the strict and philosophical sense in premise (v). But now we must show how the "could have" of premises (ii) and (iii) is to be explicated in the strict and philosophical vocabulary. And when we have done that, we may consider the status of premise (iv)—the premise according to which my automobile is such that in some possible worlds it has parts it does not have in this one.

The statement, "My automobile could now have a certain thing as one of its parts," even when restricted to its ordinary or loose and popular sense, has a certain ambiguity. On the one hand, it could be taken in a somewhat narrow sense to mean the same as (A) "My automobile could have O as one of its parts and remain an automobile while having O as a part." On the other hand, it could be taken more broadly to mean the same as (B) "My automobile could become a thing that has O as a part," where there is no implication that the thing which is my automobile remains an automobile after it has taken on O as a part. Let us define "x could have y as a part at t" in this second, broader sense. For given this broader sense of "could" one can then readily express in terms of it what is intended by the narrow sense (in our example, "x is an automobile and x could be at t an automobile having O as a part").

If something w is strictly made up of two things x and y, then x is strictly joined with y (see D2 and D3). Our principles imply that, in such a case, w is necessarily such that it has x as a part, in the strict and philosophical sense of the term "part." But they do not imply that x is necessarily such that it is a part of w. And they do not imply that x is necessarily such that it is joined with y. Returning to our very simple table which, we supposed, was strictly made up of a stump and a board, we may recall that, although the table is necessarily such that it has the stump as a part, in the strict and philosophical sense of the term "part," the stump is not necessarily such that it is a part of the table and it is not necessarily such that it is joined to the board.

To say, then, in the loose and popular sense, that my automobile could now be a thing having a certain tire will be to say that something that now constitutes a part of my automobile could be joined with something that now constitutes the tire.

Let us say, then:

> (D8) x could have y as a part at t = Df There is a w and a v such that (i) w is an S-part of something that constitutes x at t, (ii) there is a time at which v constitutes y, and (iii) there is a possible world in which w is strictly joined with v.

If we say, then, in this loose and popular sense, that my automobile could have a certain tire as one of its parts, we are *not* saying that there is a possible world in which that automobile does have that tire as one of its parts. We are saying, rather, that something that constitutes

a part of my automobile and something that constitutes the tire are such that there is a possible world in which *they* are joined together.

And so now we see that the fourth proposition in our objection does not follow from the second and third.   From that fact that my automobile *could*, in this loose and popular sense, have a certain tire as a part, it does not follow that my automobile is such that in some possible world *it* has that tire as a part.

If, for any reason, we should persuade ourselves that this table could have been made up of my left foot and the Grand Central Station, we need not be led to the infinity of indiscernible possible worlds discussed earlier.   We need not suppose that, in some of the worlds in which this table is made up of the foot and the station, some are such that the foot is made up of the mountain and the horse and others are such that it is made up of the necktie and the fish.   For we may say what we like about the possible make-up of the table, the foot, and the station, without committing ourselves to the thesis that any of these things exist in any possible world other than this one.

The theory of possibility does not require us to say, of any of these common sense objects—the automobile, the table, the station, the mountain, the horse, the foot, the necktie, and the fish—that they exist in any other possible worlds.   But it does require us to say, of the strict and philosophical wholes that constitue these common sense objects, that *they* exist in other possible worlds.

This last point, however, must be put more precisely.

VII

Let us consider two ordinary tables, x and y, that evolved in the way depicted on the accompanying diagram. We are supposing that on Monday there were two things, each of them a table, one made up of A and B and constituting x, and the other made up of C and D and constituting y ; that these two

	x	y
Mon	AB	CD
Tue	BC	DE
Wed	CD	EB
Thu	DF	AB

things "evolved" into BC and DE, respectively, on Tuesday, then on Wednesday into CD and EB, and finally on Thursday into DF and AB.   We will suppose further that no additional joinings or separatings took place.

Our present question is: can we put precisely the difference between the two kinds of things that are here involved—the difference between such things as x and y on the one hand and such things as AB, BC, CD on the other?

It is tempting to say that the ordinary or vulgar things, x and y, differ from the strict and philosophical things AB, BC, and CD in that, whereas the ordinary things are constituted by different things at different times, the philosophical things are never constituted by different things at different times.   We cannot say this, however, although we will say something very much like it.

The relation of constituting, as we have defined it in D4, is symmetrical.   Hence, not only does AB constitute x on Monday, but x also constitues AB on Monday.   But AB constitutes y on Thursday and therefore y constitutes AB on Thursday.   Therefore the philosophical object like the vulgar object is constituted by different things at different times.

Let us say that our diagram depicts two *object series*—where the term "object series" is an alternative for Hume's "succession of related objects."   An object series will be a set of objects related to each other as the constituents of our ordinary table x are related to each other and as the constituents of the ordinary table y are related to each other.   The mark of an object series will be that it is a set of things related by succession: AB was succeeded by BC, BC was succeeded by CD, and so on.   But instead of saying that the individual thing AB was succeeded by the individual thing CD, let us think of succession as relating *sets* of things.   We will say that the set consisting of AB and Monday was succeeded by the set consisting of BC and Tuesday; and so on.   (Thus, although we might be able to say that the individual thing CD was succeeded by DE on Tuesday and by DF on Thursday, we cannot say anything comparable of the set consisting of CD and Monday.)   We will introduce, then, the concept of an *object-pair*.

> (D9) C is an object-pair = Df C is a class containing just a thing and
>   a time such that the thing constitutes an object during the time.

In this definition and in those that follow, the term "object" may be replaced throughout by any count-term—for example, "table" or "ship."

Let us introduce the notation "[x,t]" as an abbreviation for the locution "the object-pair having as members the individual thing x and the time t."

To define succession, we first define *direct succession*, construing the latter concept in such a way that: [BC,Tue] directly succeeds

[AB,Mon]; [CD,Wed] directly succeeds [BC,Tue]; and [DF,Thu] directly succeeds [CD,Wed]. We will also be able to say that: [DE,Tue] directly succeeds [CD,Mon]; [EB,Wed] directly succeeds [DE,Tue]; and [AB,Thu] directly succeeds [EB, Wed]. Each object-pair may also be said to be its own direct successor. Direct succession is not otherwise exemplified in the things depicted in our diagram. I propose this definition:

> (D10) [x,t] is a direct object successor of [y,t'] = Df (i) t does not begin before t'; (ii) x constitutes at t the same object that y constitutes at t'; and (iii) either x is identical with y, or there is a z such that z is an S-part of x, z is an S-part of y, and at any time between t and t' inclusive there is some w that then constitutes the same object that y constitutes at t', and z is an S-part of w.

Our definition enables us to say, then, that [BC,Tue] is a direct object successor of [AB,Mon]. Or, replacing "object" in our definition by "table" throughout, we may say that [BC,Tue] is a direct table successor of [AB,Mon]. The definition assures us that B persisted throughout the period from Monday to Tuesday and that, at all times within that period, B was an S-part of a table—an S-part of something that constitutes the same table that AB constituted on Monday.

We should note that, given our definition, we may say of any object-pair that it directly succeeds itself. And this will be true not only of direct succession, but of succession more generally.

Of the "table-pairs" depicted in the x column of our diagram, the Wednesday and Thursday pairs were not *direct* successors of the Monday pair, but they were *successors* of the Monday pair, just as the Thursday pair was a successor of the Tuesday pair. Similarly for the table-pairs depicted in the y column. Succession is related to direct succession in the following way: u is a successor of v, if and only if, it is true either that u is a direct successor of v, or u is a direct successor of a direct successor of v, or u is a direct successor of a direct successor of a direct successor of v, or . . . and so on. Hence we may define "successor" in the way that was suggested by Frege. Let us say:

> (D11) [x,t] is an object successor of [y,t'] = Df t does not begin before t'; and (ii) [x,t] belong to every class C which contains [y,t'] and everything that is a direct object successor of any member of C

We may now say, of each of the "table pairs" depicted in our two columns, that it is a "table successor" of itself and of each of the "table pairs" depicted above it in the column.

Our two columns may be said to depict two "table series"—if we think of x and y as coming into being on Monday and as ceasing to be on Thursday. The more general concept of "object series" may be defined this way:

> (D12) C is an object series = Df C is a class having as its members an object-pair x, all the object successors of x, everything of which x is an object successor, and nothing which is unrelated to x by object succession.

The final clause is, of course, short for: "nothing which is such that neither it is an object successor of x nor x is an object successor of it." Hence any two members of an object series will be such that one of them succeeds the other. We add this definition:

> (D13) C is an object series corresponding to x = Df C is an object series, and every member of C contains a thing and a time such that that thing constitutes x at that time

If x should pass away and then come into being again at a later time (assuming for the moment that this is possible) then there will be more than one object series corresponding to x.

We are now in a position to state the difference between ordinary things such as x and y, on the one hand, and the stricter things such

	x	y
Mon	AB	CD
Tue	BC	DE
Wed	CD	EB
Thu	DF	AB

as AB, BC, CD, on the other. We have noted that it is not enough to say that, whereas the ordinary things are constituted at different times by different things, the stricter things are always constituted (when they exist) by the same thing. For the ordinary things are always constituted (when they exist) by themselves, and the stricter things may be constituted at different times by different things—as the stricter thing AB is constituted by x on Monday and by y on Thursday, and the stricter thing CD is constituted by y on Monday and by x on Wednesday. But we may now characterize the difference between the two types of thing by reference to their corresponding object-series.

The object-series corresponding to the stricter things will be more constant than those corresponding to the ordinary things. Let us call the stricter things *primary objects* and define the concept as

follows, by reference to the constancy of object-series:

> (D14) z is a primary object = Df No object-series corresponding to z
> has two members which are such that nothing belongs to both
> and z belongs to neither

Thus neither the x nor the y of our diagram is a primary object.
The object series corresponding to x has at least two members—e.g.,
[AB,Mon] and [BC,Tue]—which are such that nothing belongs to
both and x belongs to neither. Similarly for y.

But AB, BC, CD, DF, DE, and EB will be primary objects. It
is true that AB is constituted by x on Monday and by y on Thursday.
But [x,Mon] and [y,Thu] are not members of the same object series;
for neither one is a successor of the other. Analogously for CD and
[y,Mon] and [x,Wed].

The S-parts of AB, BC, CD, DF, DE, and EB will also be pri-
mary objects. For any S-part of a primary object is itself a primary
object.

Consider now the following objection to what has been said.
"You say that, in the strict and philosophical sense, there were two
different tables in one and the same place on Monday—one of them,
AB, which ceased to be when A was disjoined from B, and the other
of them, x, which was constituted by BC on Tuesday and by CD on
Wednesday and which, therefore, persisted for at least three days.
Now suppose that the world had been destroyed late on Monday.
Would there still have been two tables—AB and x? Or would there
have been just one? And if the latter which one?"

In describing the situation, we supposed that there occurred no
joinings or disjoinings other than the ones that were mentioned.
Hence the situation involved three primary tables and one nonpri-
mary table. Had the world been destroyed late on Monday, then the
situation would have involved just one primary table and no nonpri-
mary one. In short, there would have been just table AB and no
table x. "Does your answer imply, then, that x did not come into
being until Tuesday?" No, for a nonprimary object comes into being
with the earliest members of its object pairs. And if an object pair
is such that it is going to have a direct object successor which is other
than it is, then the thing w which belongs to it constitutes an object
which is other than w. "But had there been just AB and no x on
Monday, then our table would not have been such that it could have
had parts other than those that it does have. For, on your account,

only nonprimary objects are such that they could have parts which are other than they do have." The latter assertion is mistaken, Given D8, our definition of "x could have y as a part at t," we may say, in the loose and popular sense of "part," that primary objects are such that they could have parts other than those they have in fact, even though, in the strict and philosophical sense of "part," in the sense we have expressed by the term "S-part," they have exactly the same parts in every possible world in which they exist.

According to the principle of mereological essentialism if a thing loses any of its parts, then it ceases to be. In describing the history of table x, we said that on Tuesday A was detached from B. This means, therefore, that AB ceased to be on Tuesday. But now we find that what constitues y on Thursday is an object made up of A and B. Is this the same AB as the one that constituted x on Monday or is it a different one? I have assumed that it is the same AB—and, more generally, that if a primary object u is made up of the same things as is a primary object v, then u is identical with v.

What I have just said, however, is contrary to the opinion of Thomas Reid, who argues as follows: "I see evidently that identity supposes an uninterrupted continuance of existence. That which hath ceased to exist, cannot be the same with that which afterwards begins to exist; for this would be to suppose a being to exist after it ceased to exist, and to have had existence before it was produced, which are manifest contradictions."[7] But it seems clear to me that the propositions in question are *not* manifest contradictions. It would be contradictory to suppose a being to exist after it had ceased to exist *for the last time*, and to have had existence before it was produced *for the first time*. But these things are not what we are supposing when we say that a thing can come into being after it has ceased to be.

We may now put more precisely the point that was formulated above as follows: "The theory of possibility does not require us to say, of any of these common sense objects—the automobile, the table, the station, the mountain, the horse, the neckties, and the fish—that they exist in any other possible worlds. But it does require us to

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[7] Thomas Reid, *Essays on the Intellectual Powers of Man*, Essay III, Chapter iv. Compare Locke's *Essay*, Book I, Chapter xxvii, Section 1: "one thing cannot have two beginnings of existence."

say, of the strict and philosophical wholes that constitute these common sense objects, that *they* exist in other possible worlds."

The theory of possibility does not require us to say of any *nonprimary* object that it exists in any possible world other than this one. But it does require us to say that *primary* objects exist in possible worlds other than this one. What we can truly say about the unrealized possibilities of nonprimary things may be reformulated more precisely in terms of the unrealized possibilities of primary things. We do not need to suppose, therefore, that there are possible worlds which are indiscernable except for the fact that some nonprimary things are constituted by one set of primary things in one of them and by another set in another. And what we say is entirely compatible with the principle of mereological essentialism: if x has y as one of its parts, in the strict and philosophical sense of the term "part," then in every possible world in which x exists, x has y as one of its parts.

VIII

Finally, let us note briefly how these suggestions relate to certain other philosophical questions and puzzles.

(1) Consider first what has been called "the Paradox of Increase." "It is impossible for anything to increase by the addition of parts, since when further parts are adjoined to a thing, neither that to which the parts are adjoined, nor the adjoined parts themselves, increase in the sense that they have more parts than they had before . . . What then can be made of the way in which both ordinary usage and logic appear to countenance increase?"[8]

We think we can make things bigger just by adding parts to things. But what *are* the things that we then make bigger? Suppose we have a certain thing A and then attach to it a certain other thing B. We then have a bigger object than we had before (assuming that neither A nor B shrunk or contracted during the process). But what object *became* bigger? It was not either A or B, for both of these remained the same size they were before. And it was not AB for AB did not exist until A was joined with B. That is to say, AB did not have two different sizes, a smaller one at one time and a larger one at another.

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[8] D. P. Henry, *op. cit.* p. 120.

We can say that none of the primary objects involved in the situation became any bigger—for primary objects do not get any bigger or any smaller unless they simply expand or contract. But if, in the situation that I have described, there is something that became bigger, then there is something—a nonprimary object—which was constituted by A or by B at one time and by AB at a later time and the thing that constituted it at the later time is bigger than the thing that constituted it at the earlier time.

(2) Consider secondly a puzzle about identity.

"Suppose that on Monday we cast a certain bar of metal into a statue. Then on Tuesday we melt the statue down and recast the metal into a vase. And on Wednesday we melt the vase and are left with just the piece of metal. Surely the statue *was* the piece of metal on Monday and the vase *was* the piece of metal on Tuesday. But the vase was not the statue and neither one of these was the piece of metal on Wednesday. Therefore we must say either that one and the same thing can be identical with one thing at one time and with another thing at another time or else that two things can be identical with the same thing. But both of these conclusions are absurd."[9]

Both of the conclusions are, of course, absurd. But if we describe the situation accurately, we will not be led to either. Thus we may say that what constituted the statue on Monday was identical with what constituted the piece of metal on Monday, that what constituted the vase on Tuesday was identical with what constituted the piece of metal on Tuesday but not with what constituted the statue on Monday, and that what constituted the piece of metal on Wednesday constituted neither the statue nor the vase on Wednesday. From the fact that the piece of metal and the statue constituted each other on Monday, we may not infer that they were identical with each other on Monday. For x is not identical with y unless x and y constitute each other during the entire time that either x or y exists. The statue, therefore, was not identical with the vase and neither of these was identical with the piece of metal.[10]

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[9] A slightly different version of this puzzle is set forth by Hugh Chandler in "Essence and Accident," *Analysis*, Vol. XXVI (1966), pp. 185–88.
[10] Did the piece of metal persist as a primary object throughout the period described? If the piece of metal constituted a statue at one time and a vase at another, then it changed its shape. But if a thing changes its shape, then it loses a part. For if it changes its shape, then some parts that

"But if the statue was other than the piece of metal, then two different physical objects—the statue and the piece of metal—both occupied the same place on Monday. And that is impossible."

From the fact that the statue is other than the piece of metal and that they both occupied the same place on Monday, it does not follow that two different physical objects occupied the same place on Monday. For to say that two different physical objects both occupy the same place on Monday would be to say that there are two things, neither of which constitute the same object on Monday, and both of which are in the same place. See D6.

One could also deal with the problem, of course, by denying that there were two things, a vase and a statue, in addition to the piece of metal. One could say that there was just the piece of metal which had the property of being statuesque on Monday and that of being vase-shaped on Thursday. But if we allow tables and automobiles to count as things that come into being and pass away, why not also vases and statues? The view that has been proposed here does allow us to say that there are the three things in the situation described.

Indeed, we could revive the traditional term *mode* and say that the statue and the vase were at different times modes of the piece of metal. A thing x could be called a mere *mode* of a thing y provided only (i) x is necessarily such that everything that constitutes it at any time also constitutes y at that time and (ii) y is not necessarily such that what constitutes it at any time also constitutes x at that time.

(3) Finally, let us note we can now answer one objection to Bishop Butler's thesis according to which, whereas most bodies persist only in a loose and popular sense through time, persons persist in a strict and philosophical sense through time. The objection is this: "Either a thing persists through a given period of time or it does not. If it does persist through that given period of time, then it does so in a strict and philosophical sense. And therefore if it does not persist in a strict and philosophical sense, it does not persist at all."

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were joined together will no longer be joined together and therefore the part that *they* made up will have ceased to be. Therefore the primary object of Monday did not exist on Tuesday, and the primary object of Tuesday did not exist on Wednesday. Yet all three could be said to be composed of *the same matter* in the following sense: x and y are composed of the same matter if every S-part of x has an S-part in common with some S-part of y, and if every S-part of y has an S-part in common with some S-part of x.

The answer is this. To say that a thing persists through a given period of time in the strict and philosophical sense is to say (i) that the thing exists at every moment within that period of time and (ii) that the thing is a primary object—that it has a constant object-series in the sense defined in D15. But to say that a thing persists through a given period of time only in a loose and popular sense is to say (i) that the thing exists at every moment within that period of time and (ii) that it is not a primary object. And therefore it is one thing to persist only in a loose and popular sense and quite another to persist in the strict and philosophical sense.

Brown University.