

## Thomson's 'Parthood and Identity Across Time'

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### 1. Background: the Calculus of Individuals

A very simple theory of parthood, unfortunately based on a bizarre choice of primitive:  $x D y$ , 'x is discrete from y'.

Definition 1:  $x$  is part of  $y$  iff everything discrete from  $y$  is discrete from  $x$ .

Definition 2:  $x$  overlaps  $y$  iff something is part of both  $x$  and  $y$ .

Definition 3:  $x$  fuses  $S$  (a set) iff the things that are discrete from  $x$  are exactly the things that are discrete from every member of  $S$ .

(A more intuitive definition, equivalent to this one:  $x$  fuses  $S$  iff every member of  $S$  is part of  $x$ , and everything that overlaps any member of  $S$  overlaps  $x$ .)

Axiom 1:  $x = y$  iff  $x$  is part of  $y$  and  $y$  is part of  $x$ .

Axiom 2:  $x$  overlaps  $y$  iff  $x$  is not discrete from  $y$ .

Axiom 3: every nonempty set has a fusion

Theorem 1: if  $x$  is part of  $y$ , and  $y$  is part of  $z$ , then  $x$  is part of  $z$

Theorem 2 ('the fusion principle'): every nonempty set has exactly one fusion

Note: you end up with the same theory if you take Theorems 1 and 2 as the axioms. You can then take 'is part of' as primitive, and take Axiom 2 to be the definition of 'is discrete from'. This is much more intuitive!

### 2. Thomson's question (III)

We embrace collocation as the solution to the paradoxes of material constitution. JJT's example: the tinkertoy house  $H$ , and either  $W$  ('the fusion of the tinkertoys on the shelf'), or  $W$  ('the wood on the shelf').

But we aren't happy just to state that  $H$  isn't the same thing as  $W$  or  $W$  and leave it at that:

So it is the identity sentences (3) and (3) which have to go. But it seemed intuitively right to say that a Tinkertoy house is made only of Tinkertoys. It was that intuition which led us to identity  $H$  first with  $W$  and then, anyway, with  $W$ . There has got to be something right in that intuition; but what is the something right in it, if (3) and (3) are not true? How is  $H$  related to  $W$ —and to  $W$ , if there is such a thing as  $W$ ? (p. 28)

The doctrine of temporal parts has an answer to this question:  $H$  and  $W/W$  share a temporal part at the relevant time.

### 3. Thomson's presentation of the doctrine of temporal parts (IV)

Definitions:

$x$  is a **cross-sectional temporal part** of  $y$  iff there is a period of time  $T$  such that  $x$  and  $y$  both exist throughout  $T$ , and no part of  $x$  exists at any time outside  $T$ , and at every instant during  $T$ ,  $x$  and  $y$  occupy exactly the same place.

$x$  is a **temporal part** of  $y$  iff there is a period of time  $T$  such that  $x$  and  $y$  both exist throughout  $T$ , and no part of  $x$  exists at any time outside  $T$ , and at every instant during  $T$ ,  $x$  occupies a subregion of the region of space occupied by  $y$ .

'Metaphysical principles':

$M_1$ : if  $x$  is a temporal part of  $y$ , then  $x$  is a part of  $y$

$M_2$ : if  $y$  exists throughout  $T$ , then  $y$  has a temporal part at  $T$

$M_3$ : if  $x$  is part of  $y$  and  $y$  is part of  $x$ , then  $x = y$

$M_4$ : Everything is a temporal part of itself

Theorem: if  $y$  exists throughout  $T$ , then  $y$  has *exactly one* cross-sectional temporal part at  $T$  (from  $M_1, M_3$ )

Theorem: if  $x$  is part of  $y$ , then  $x$  exists only at times when  $y$  exists (from  $M_4$ )

Surprising consequence: pieces of wood, cloth, etc. aren't parts of chairs

**Sider's response to this objection:** our ordinary talk about parts uses the time-relative notion ' $x$  is part of  $y$  at  $t$ ', which can be defined in terms of the atemporal notion of parthood as follows:

( $P@T$ )  $x$  is part of  $y$  at  $t$  iff  $x$  and  $y$  each exist at  $t$ , and  $x$ 's instantaneous temporal part at  $t$  is part of  $y$ 's instantaneous temporal part at  $t$ .

### 4. Thomson's argument against the doctrine of temporal parts (V)

[According to the doctrine of temporal parts,] As I hold the bit of chalk in my hand, new stuff, new chalk keeps constantly coming into existence *ex nihilo*. That strikes me as obviously false. (p. 36)

(i.e. at every time, a thing that is made of chalk starts to exist)

Why does she say the temporal parts come into existence '*ex nihilo*'?

### 5. Thomson's answer (VI)

The relation between  $H$  (the Tinkertoy house) and  $W / W$  is this: each is part of the other at the time in question.

NB: Sider, at least, agrees with this.

Thomson's 'cross-temporal calculus of individuals'