**Mereology and Modality**

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Lokal: D734, utom den 14 november (F263) och den 12 december (F339).

**Course description**

The central theme of the course is the application of mereology in the articulation and development of the three-dimensional view of material objects (the continuants of Johnson’s continuants and occurrents—Johnson (1921, pp. 199-202), Fine (2006)), as opposed to the four-dimensional view developed by, for example, Sider (2001) and Hawley (2002). The emphasis will be positive, on the development of the conception of continuants, rather than negative, on the critique of the four-dimensional view. It will involve distinguishing matter as the essentially permanent stuff treated in chemistry as being of various substance kinds in various forms of aggregation, from the transient individuals which are constituted of matter, usually different matter at different times. I will be drawing on material presented in recent publications of mine (Needham 1981, 2000, 2007, 2010a and b).

After a general overview, the course begins in earnest with the formal development of the theorems of the basic system of mereology as a first-order theory, emphasising the mereological criterion of identity and the basic features of mereological relations (overlap, separation, …) and operations (sum, product, difference). This will be based on a modification of the system presented in Leonard and Goodman (1940). Varzi (2004a) provides a useful overview. (Simons (1987) is also a classic review of the whole area.) This will take up the first session and possibly some of the second.

The polemic then gets under way with a discussion of the classic problem deriving from the Stoics (see Sedley 1982) and revamped in recent times as Geach’s problem of Tibbles the cat. The point will be to illustrate how mereological notions shouldn’t be applied. The discussion raises the issue of whether we should consider the mereological relations triadic, relativising them to time (Thompson 1983), and whether
we should accept van Inwagen’s reasons for adopting his view of the application of mereological concepts (van Inwagen 1981, 2006). We shouldn’t.

The application of mereological concepts is best illustrated with the classic area of application, namely to space, where the primary objects are thought of as extended regions standing in mereological relations of overlap, separation and so forth (Tarski 1926). Time may be similarly viewed as comprising extended temporal intervals which sustain mereological relations. This can be done with an eye to the treatment of material objects, and in particular determining how mereological principles are applicable to them. Material objects occupy regions of space and processes take time, but are there any material objects corresponding to the points, lines and surfaces of space or processes corresponding to instants of time? The mereologically-based formulations of theories of space and time are discussed in connection with the question of whether there are boundary objects, as suggested by Barry Smith and Achille C. Varzi (Smith and Varzi 2000 and Varzi 2004b), and instantaneous processes (Hamblin 1969, 1971).

The remaining time will be concerned with the mereological features of matter and the way matter constitutes individuals, together with the modal ramifications of these ideas. The example usually taken to illustrate the constitution relation is that of a statue said to be constituted of clay. Opponents of this view argue that the statue is identical with a lump of clay, so that constitution is just identity, and proponents argue that different things are true of the statue and the clay, if only modal features, and so they can’t be identical (see e.g. Lowe (2002), Hawley (2004), Olson (2001) and Robinson (2004), and literature referred to by these authors). I regard the statue as a special and not entirely typical case of an individual constituted by a quantity of matter for a time (an interval of time), and argue that there are such striking differences between individuals and quantities, the most notable being that individuals are transient things whereas quantities exist permanently, that there is no question of their being identical.

In order to develop this theory of constitution and address the various problems such as that of coincidence often raised as problems by opponents of constitution, something must first be said about the theory of quantities of matter. Following the line taken by certain philosophers (Cartwright 1965, 1970, 1975; Roeper 1983), but not others (see e.g. Barnett 2004 for a taste), the fundamental ontology of chemical substances will be developed on the basis of the principle of the indestructibility of matter which forms the basis of chemistry at least since Lavoisier (Needham 2000,
The principal features of the constitution relation can then be developed. The relation is not a mereological relation because it is a triadic relation with a place-holder for a time and because the other two place-holders apply to objects of different categories (Simons 2006). However, the mereological features of one of the relata, intervals of time, play a significant role in the development and the formulation of identity conditions for the individuals constituted of matter.

Finally, the bearing of these issues on the contemporary discussion of the interpretation of quantified modal logic will be taken up. The ideas Kripke developed in this area in the 1960s involved amongst other things the idea that things may exist in some possible worlds but not in others, calling into question the so-called Barcan formula and its converse. This has been questioned in more recent times (Linsky and Zalta 1994), but there is no overwhelming consensus on these issues. I am inclined to think that Kripke’s ideas are very useful.

Preparatory reading

In the first instance, I recommend reading the following items in order to prepare for the course:


References

Items marked “*” are compulsory reading.


