

LOGICAL AND PHILOSOPHICAL REMARKS ON PARTS AND WHOLES

BARRY SMITH, UNIVERSITY OF MANCHESTER

§1. Some Historical Background

There are two traditions in the logical and philosophical literature on part and whole. On the one hand there is what might be called the Leśniewski tradition, after the great Polish logician Stanislaw Leśniewski, who produced the first formally rigorous axiomatisation of a theory of part-whole relations in 1916. On the other hand there is what I should like to call the Husserl tradition, after Edmund Husserl, whose influence as the founder of phenomenology almost completely overshadowed his early work on the logic and mathematics of part and whole.

The two traditions are not entirely separate. They have a common root in the work of Boole, Schröder, Bolzano and other 19th century mathematicians working in the field of algebra of logic or in neighbouring fields. And Leśniewski was himself influenced by Husserl's great masterpiece, the Logische Untersuchungen (1900/01), though not directly by the sections of that work which deal with part and whole.

Leśniewski himself founded a school whose second and third generation members have continued his work. And Husserl himself, particularly in the early period of his philosophical activity, gathered around him a number of followers who sought more or less consciously to apply his part-whole theory in specific areas of

philosophical research. Neither of our two traditions is however restricted to any one group. The Leśniewski tradition includes, for example, Leonard, Goodman and Quine; it includes Joseph Woodger; and it includes many latter-day propounders of 'theories of aggregates' designed to supplement what is effectively the Leśniewski theory by appealing to some of the power of the theory of sets. The Husserl tradition includes virtually all methodologically interested schools of psychology of the period from Brentano to the 1930s. (Most importantly it includes Külpe, Bühler and the other members of the Würzburg school; Köhler, Lewin, Duncker, Rausch, Metzger, and other Gestaltists; Ehrenfels, Stumpf, Meinong, Höfler, and other followers or students of Brentano; and many more.) It includes Roman Jakobson, who successfully applied Husserl's ideas in many areas of linguistics (most importantly in phonology). It includes many members of the wider circle of Husserl-followers, including Adolf Reinach, who applied Husserl's ideas in the sphere of legal phenomena and specifically to those quasi-legal formations nowadays called 'speech actions' [*Sprechhandlungen*]. It includes Roman Ingarden, Alfred Schütz and Aron Gurwitsch. It includes Gelb and Goldstein and their colleagues in the sphere of holistic medicine and clinical psychology. It includes a number of economists, for example Shackle and some members of the Austrian School (as is revealed particularly in their work on complementarity). And it includes - for better or worse (see appendix below) - many other defenders of holistic positions in the scientific and pseudo-scientific literature of the last hundred years.

§2. Husserlian Part-Whole Theory and Contemporary Research

The Leśniewski tradition conceives part-whole theory or 'mereology' as the theory of one single (transitive) relation of part to whole. This relation generates a theory which proves to be very simple from the point of view of mathematics: it involves no more complexity than is to be found in a Boolean algebra. (The logico-mathematical power of Leśniewski's system arises only with the combination of mereology with the other branches of the system.)

The Husserl tradition, on the other hand, deals not only with ('vertical') relations between parts and their wholes, but also with the ('lateral') relations amongst the parts of a single whole. To put the matter simply and crudely: some parts of a whole exist merely side by side, can be destroyed or removed from the whole without detriment to the residue. A whole all of whose parts manifest exclusively such side-by-sideness relations with each other is called a heap or aggregate or, more technically, a purely summative whole. In many wholes, however, and one might say in all wholes manifesting any kind of unity, certain parts stand to each other in relations of what Husserl called necessary dependence (which is sometimes, but not always, necessary interdependence). Such parts cannot, as a matter of necessity, exist, except in association with their complementary parts in a whole of the given type. There is an infinite variety of such lateral dependence relations giving rise to an infinite variety of different types of whole which the Leśniewski approach is simply unable to distinguish. Yet Husserl saw that the theory of lateral, part-part relations can be embedded smoothly into a vertical mereological theory of the Leśniewski type, producing a

radical increase both in logical and descriptive power and in complexity of mathematical structure. (Leśniewski's mereology is then in fact a sub-theory of the theory which results.)

My own interest in the theory of part and whole grew out of the recognition that the Husserl-tradition in part-whole theory has been almost entirely neglected, even though many of its ideas would be accepted by many as a matter of course - and even though many of these ideas have been applied, knowingly or unknowingly, or were present already, in a wide range of philosophical and non-philosophical disciplines.

Why, it may be asked, should one concern oneself with a formal theory, where the ideas of this formal theory have in any case entered into the practice of the sciences? I would offer two answers to this question.

First, the theory has an intrinsic interest of its own, on a number of different levels. It is mathematically interesting, manifesting the structure of a pre-closure algebra (effectively a generalised topological structure). But it is also metaphysically interesting. It throws clear light, for example, upon the spectrum of positions between extreme atomism ('no necessary dependence relations amongst the entities making up the furniture of the world') and extreme holism ('one single necessary dependence relation configures all entities making up the furniture of the world'). Indeed the theory lends itself to the economic formulation and classification of virtually the entire repertoire of classical metaphysical theories, comprehending not only atomisms and holisms, but also the various brands of realism, monism, pluralism, solipsism, monadism, Aristotelianism, Kantianism, Hegelian/Marxian dialectical theories, and all possi-

ble permutations and combinations thereof. Idealism, for example, consists in its simplest possible form in the view that there exists a one-sided relation of necessary dependence of world upon consciousness, a notion which was exploited by Husserl in the development of his own metaphysic of 'transcendental idealism'.

And secondly: whilst the ideas of the theory are indeed to be encountered in many disciplines - from legal theory and linguistics to geography and biology - they have been employed in a loose and scattered way, and have often been associated with research programmes which have remained on the fringes of scientific respectability. Husserl's theory offers the hope, at least, of restoring the methodological balance, and of offering insights as to the ways in which loose and scattered uses of the ideas of necessary dependence and interdependence, of intrinsic unity and of structural complexity, may be replaced by coherent alternative approaches at the level of entire theories.

§3. On Holism vs. Atomism

I am interested here only in what might be called formally rigorous work on part and whole. Many other contributions to part-whole theory in defence of the holistic idea have of course cropped up in the general debates on holism/atomism which have taken place almost since the beginnings of philosophy and we should not be blinded to the fact that many of these contributions have been, to say the least, unrigorous. (And this not merely in the formal sense; the philosophy of the National Socialists in Germany was nothing more nor less than a brand of organistic holism.)

It seems to me nevertheless that general acceptance would be accorded to the thesis that, at least for the broad mass of scientific disciplines, there is something wrong with both extreme holism and extreme atomism, both from the methodological point of view and from the point of view of descriptive adequacy. It would I think be accepted also that the precise point on the holistic/atomistic spectrum which is most appropriate to any given discipline may differ from case to case, that some disciplines may be more or less atomistic than others. It is even conceivable that methodological needs of a discipline may dictate a different kind or degree of atomism or holism than is dictated by the needs of descriptive adequacy. I don't know.

Unfortunately, the positivistic methodology which holds sway amongst the members of the contemporary scientific mainstream has, for reasons which are well-known, imposed a certain bias against holism and in favour of atomism. There is therefore a clear need for research (and propoganda) on behalf of the holist camp, and then it is Husserl's, and not Leśniewski's approach to the formal theory of part and whole which can be of use in producing the rigorous formulations which are required.

MUSICOLOGY/MUSIC VIS-A-VIS SOCIETY AND CULTURE

F JOSEPH SMITH, CHICAGO

To most students of civilization and human culture it would appear self-evident that music is an essential part of the cultural and social whole. Musicology, as the science-of-music, has in fact been part of general science since the nineteenth century. Music as such was never considered anything else than a part of civilization until the advent of the specialization of our own era. The question of parts vis-à-vis the societal whole, or the physical whole, goes back to Greek philosophy. The problem of finding oneself painted into a specialized corner, and then having to work one's way out to a general whole, seems to be peculiar to our own times. Particularly today we seem to feel the urgency of reintegrating various specialties with general studies and with human culture.

Music history and musical archivism have proved significant in lending perspective to the art, and even qua historical study musicology can of itself lead readily to other sciences. A classic example in history is the monumental Speculum Musicae of Jacques de Liège (1330-1340, written), in which music is related in great detail to the entire universe, as then known, embracing the quadrivium, philosophy, and theology. This encyclopedic work of seven volumes is in a solid tradition of those times. The nineteenth century, however, while producing voluminous works of philosophers and students of human art and culture, found music theory embedded in pedagogy founded on a Rameau redux, and in an objective historicism that apparently took Von Ranke and objective science as mentor. Yet music is the activity of the creative human subject. A number of musicologists, such as Curt Sachs, have called for a broader perspective among musical specialists, and Manfred Bukofzer even pointed toward aesthetics, as the natural goal of musical studies.

SALFO has requested of seminar participants a kind of personal account of how we integrate our work with a socio-cultural whole. Let me give a running account of my own modest development in the arts, particularly music, a task that may prove of interest also to others. Of necessity it will be somewhat autobiographical. As a boy I grew up in a singing family in northern Wisconsin/Minnesota, USA. This happens, by the way, to be a region into which many Scandinavian immigrants came and left their influence on that culture. At school