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# Parts Of Classes



## Synopsis

Does the notion of part and whole have any application to classes? Lewis argues that it does, and that the smallest parts of any class are its one-membered "singleton" subclasses. That results in a reconception of set theory. The set-theoretical making of one out of many is just the composition of one whole out of many parts. But first, one singleton must be made out of its one member - this is the distinctively set-theoretical primitive operation. Thus set theory is entangled, with mereology: the theory of parts and wholes.

## Book Information

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## Customer Reviews

A university press should get this back into print pronto! The book is filled with Lewis's tart wit and gentle humor. Had more math been of this nature, I would have majored in math. While this is a book on the foundations of mathematics, it contains almost no symbolic notation whatsoever (except in an Appendix) and that is its main flaw. A bit of notation would have made the argument easier to follow. Anybody who does not understand first order logic, the ZF axioms of set theory, and the Peano axioms has no business attempting this book. Otherwise it is a wonderfully readable contribution to the foundations of mathematics. The formal theory of the part-whole relation, mereology, assumes a primitive relation of parthood. Parthood completely describes the relation of a set to its subsets. Sets are built out of atomic sets, called singletons. Hence the universe of sets is tied together by the parthood relation of classical mereology. Tarski showed in 1929 that mereology requires but two axioms: parthood is transitive, and there exists a unique fusion of any finite number of individuals. Singletons are formed from atomic individuals, the "urelements" of Zermelo and others. Lewis's axioms for singletons are essentially those for the successor function of Peano

arithmetic, with interpreting the successor of  $x$ . This is implicit in Zermelo's 1908 formulation of the axiom of Infinity. The final part of Lewis's argument consists of some ontological assumptions, of the nature of "if grant X, then Y will be the case." Lewis's most curious argument is that the null set can be any individual, and that it is most convenient to take as the null set the mereological fusion of all individuals. This is very far from the intuitive notion of the empty set as an empty container. Lewis was not the first person to argue that the Zermelo-Fraenkel axioms for set theory can be derived from simpler mereological axioms. He freely admits that a fellow named Harry Bunt scooped him in 1985. Richard Martin (1916-85) made this point even earlier in his "Common Names and Mathematical Scotism".

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