

## SOME COMPLETE CALCULI OF INDIVIDUALS

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1. *Introduction.*\* Goodman proposed and partially analyzed (in [2] and [3]) a notion of an individual which we seek to explicate in this paper. The necessary truths peculiar to this notion receive axiomatic treatment in formal systems (calculi of individuals) whose semantics is developed purely within set theory. These systems are semantically sound and complete and differ, in respects to be mentioned, from the calculus of individuals developed by Leonard and Goodman (in [4]).

For the convenience of the reader, a brief reconstruction of what is taken to be Goodman's notion of an individual is presently given. Goodman (notably in [3]) is understood to hold that the general theory of individuals differs from the general theory of classes, even though individuals may themselves be classes. The general theory of individuals is characterized chiefly by the adoption of a principle of individuation which may be informally rendered as follows:

- (1) *Individuals are identical just in case they have the same ultimate constituents.*

Ultimate constituents (also called 'atoms') appear to be *R-minimal elements* relative to a so-called 'generating relation' *R* (that is, they are elements of the field of *R* to which nothing bears the relation *R*). The notion of a 'generating relation' is not defined, but only exemplified (in [3]) by the ancestral of membership and by the relation of being a proper part, a relation which is given axiomatic treatment in [4]. It appears further that the theory of individuals is characterized by some principle of summation, a principle governing the formation of individual wholes on the basis of ultimate constituents. Such principles will be discussed below.

2. *Part-whole relations and universes of individuals.* In order to formulate a principle of individuation akin to (1) as well as further principles requisite to explicating the notion of an individual, some auxiliary set

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