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# Significant Parts and Identity of Artifacts

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**Abstract** By assigning numerical values to the atomic parts of a given artifact and, then, assigning the maximum of them to the artifact itself, we get a reasonable notion of *significance* for the parts of artifacts. Using this notion one can define artifact *identity* in a precise way. Namely, the identity is preserved exactly when all the significant parts are preserved. We show that this notion of identity has all the basic properties that one would intuitively expect. A limit case is also considered.

***1 Preliminaries*** In this note we are going to investigate certain aspects of the identity of artifacts using elementary logical means, i.e. some formal predicates modeling the basic relations among artifacts and ordinary predicate calculus. Such a treatment of identity began in Tzouvaras [2].

We shall use a soft formalization only—just what will allow us to be precise and brief. In [2], however, one can find a full formal treatment of everything concerning transformations and identity of artifacts.

Lower case variables $x$, $y$, $z$, dots will denote artifacts (called also simply "objects"). To be more precise, $x$, $y$ range over *states* of objects, if by "object" we understand something existing in time and thus changing, yet keeping its identity. It is better to think of $x$, $y$ as *instances* of such identities. Upper case letters $X, Y, Z, \ldots$ denote sets of arbitrary objects. The notation and concepts of intuitive set theory are freely used throughout this article. We have just two fundamental relations among artifacts by which we can express almost everything about them: first, a binary relation called the *fitness relation* and denoted $\mathcal{F}$, and, second, a binary *assembly operation*, denoted $\Box$. Their meaning is:

$x\mathcal{F}y$: *The objects x,y fit and may be assembled into a new object.*
$x\Box y = z$: *z is the assembly of x,y when the latter fit.*

Thus the first principles governing these relations are the following (we state them in the form of axioms):

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