Δ Calculus · 001 — A Few Words of Introduction

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Calculi of various sorts have played a huge role in science and intellectual history. They embody some of the most powerful and fundamental ontological insights about a subject matter, in such a way that hypotheses and ideas about that subject matter can be expressed in concise, cogent, and productive ways.

The differential calculus, for example, deftly incorporates, in its architectural design, ontological commitments shared across all its domains of applicability. In its use in physics, for example, it assumes that state takes the form of values of continuous "measure" functions, that the laws, both static and dynamic, are based on incremental changes expressible as derivatives[1] of these functions, etc.[2] Lisp, and the λ-calculus upon which it is based, founded on an assumption that computational behaviour can be understood as the computed value of a function of its input or input state, plays an analogous role in computer science—serving as a compact basis for numerous seemingly disparate programming constructs, well beyond its manifest foundation on functions, recursion, and functional programming. Think too of algebra, which had a powerful impact on the development of science, such as in the "arithmeticization of geometry"—or, even earlier, of arabic numerals and the "invention" of zero, a development, like the others, that unleashed huge epistemic depth and calculative power.

Others will differ, but I take the following six calculi to be perhaps the most important to have been developed to date:

1. Zero and arabic numerals
2. Algebra
3. Set theory
4. The differential calculus (built on top of algebra)
5. The λ calculus, and Lisp
6. Logic (propositional, predicate, quantificational, equational)

The proposed **fan calculus** (Δ calculus) aims to be a calculus *of the one and the many*—that is, to be a foundational calculus in which to express how it is that we take the world to consist of "things" that in some sense are unities, but at the same time pluralities and diversities of myriad types. It is based on many fundamental principles, of which the following three are perhaps the most immediately apparent:

1. *No notion of object identity is built in*, in contrast to the foregoing six—neither the identity of anything registerable or representable in the calculus, nor the identity of the elements constitutive of the calculus itself, qua calculus (i.e., nothing is taken to be ontologically "given").
2. Identity is taken not to be intrinsic fact of anything, but instead perspectival—a fact not of *what something is*, but of *how it is taken to be*, or as I say: "how it is registered" (though that way of putting it is ultimately untenable, even if initially useful, since it assumes a distinction between *what something is* and *how it is taken or registered*—a distinction that the underlying ontological theory aims to upend)
3. Anything registered as a singularity or unity can be "fanned out" and registered as a plurality or multiplicity, through a principle of unification; similarly, any plurality or multiplicity can be "fanned in" and registered as a unity or singularity.

In many calculi, various forms of the one and the many are syncategorematically built-in: functions and their arguments/values, sets and their members, properties (and predicates) and the objects to which they apply, types and their instances, etc. In the Δ calculus these are categorematic (not absolute) distinctions: perspectival, nuanced, etc. The only syncategorematic notion is that of "fan-in" and "fan-out," except for the fact that due to its being descriptively reflective, everything, including the fan-in and fan-out relations, are themselves available for categorical commentary.

And so on ...

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[1]Rather, say, than radii of curvature, which might have seemed more intuitive.

[2]I believe that these ontological features are responsible for the inexorable egocentricity or *I-ness* of the contents of consciousness.