DCal • Mandate

I • Background

A. The development of foundational calculi has played a crucial role in the history of science. The differential calculus was critical to the development of physics; logic to the study of reasoning & entailment; algebra to the arithmeticisation of geometry; etc. Getting a calculus "right" is hugely beneficial in allowing us to register appropriately, and thereby come to understand, diverse subject matters.[1]

B. In terms of ontic/metaphysical commitments—in how they register or allow registration of the world—calculi involve a division of labour between what is embodied or "built in" to the calculus itself, and what is then "said" in the calculus.[2]
   1. What is "built in" will typically be embodied in syncategorematic structures & operations, and/or in various primitives symbols & operators. We call such characteristics **kernel** (rather than primitive or syntactic), and thus speak of the **kernel (ontological) commitments** embodied in its structure. Thus the differential calculus makes a kernel commitment to the fact that the regularities is can be used to express will be formulated as derivatives & integrals of—usually temporally—dependent measure variables. Even purely mathematical calculi without obvious concrete subject matters, such as algebra & set theory, still typically embody specific ad/or particular kernel commitments.
   2. What is "said" in the calculus—i.e.,, the content of DCal descriptions—will be called **constructed**. **commitments**. So the net registration of the world embodied in a set of DCal structures will consist of its kernel & constructed commitments.
   3. Common use of a calculus helps facilitates the comparison & contrasting of divergent claims or registrations expressed within it. Sciences (such as contemporary syntactical linguistics) in which each theory is expressed in its own formalism makes such comparisons vexatious.
   4. Judicious allocation of ontic commitments across the kernel/constructed divide is one of the most normative criteria on a calculus' worth. Excessively general calculi (with little kernel structure & commitment) provide the theorist with no help in registering the world. Conversely, calculi can constrain imagination to regularities expressible in their terms; theories or suggestions that violate their kernel commitments can be difficult to communicate or express, often leading to misunderstanding.[3]

C. I take the following 5 calculi to be (±) the most important ones that have been developed to date:
   1. **Algebra**
   2. **Differential calculus** (built on top of algebra)
   3. **Set theory**
   4. **λ-calculus**
   5. **Formal logic** (propositional, predicate & quantificational)

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[1] Cf. Newton's early work on a calculus based on *radii of curvature*, rather than *slope*, in terms of which to frame the laws of motion—a project that didn't work out very well. The shift to the less-geometrically evident notion of *slope* was radically more congenial to the framing of the world's physical regularities.

[2] Calculi are thus a kind of language, though I make no claim here as to *what* kind. Among other things, calculi are clearly more "formal" than natural languages, implying that the divide between "the language itself" (its kernel commitments) and "what is said in the language" (its constructive commitments) is sharper than in the natural case. Note, however, that as with everything, what constitutes "DCal itself" versus an instantiation of DCal, extended with various constructed structures & commitments, is not an intrinsic matter; what is the case will depend on how the various systems are respectively registered (including the denotation of the name 'DCal', which again is not fixed by the system's design).

[3] In this sense calculi (and perhaps all languages) establish a particularly simple typology of the "domain of comprehensibility" within which the possible & the actual can be distinguished from the impossible but conceivable, as opposed in term to the inconceivable.

D. Some mathematical formalism & systems (such as dynamical systems theory [DST]) receive a lot of development for use as a framework in terms of which to register phenomena, but aren't themselves calculi (DST uses algebra & the differential calculus)

II • Principles

A. DCal is a *calculus of description*, designed to satisfy a dozen fundamental principles:

	Property	Description
P1)	*Perspectival identity*	· Identity is not taken to be an intrinsic property of anything (including DCal structures themselves), but "as taken" by how "it" is registered.
P2)	*Deferential semantics*	· DCal structures are (in a very broad sense) *representational*—meaning that they contain or convey information *about something else*, rather than (in general) being that of which they speak (in DCal we say that descriptions *register* their subject matters). Although registrations (including how they are used) shoulder responsibility for *how* they register their subject matters, and although there are normative considerations that stem from this use, it is nevertheless presumed that the *world is the truth maker*. In that sense the semantics is classically d*eferential*.
P3)	*Contextual registration*	· Descriptions are taken to be arbitrarily *contextual* (deictic/indexical, relative to conceptual scheme, etc.,) at arbitrary scale—not just "within sentences (or other complexes)."
P4)	*Dynamic registration*	· Descriptions can be used not only to register temporal phenomena—i.e., are not only dynamical—but can themselves be temporal or dynamic (cf. clocks & meters, but potentially much more complex)
P5)	*Non-conceptual content*	· While some descriptions may register their subject matters in terms of "classical ontology" (objects exemplifying properties, standing in relations, grouped in sets, and arrayed in states of affairs) DCal is not itself committed to such registration, and supports others as well (such as Strawsonian "feature-placing")
P6)	*Distinguished Holism*	· Rather than assume that the world is assembled from atomic or elemental parts, the background metaphysical assumption is that the world is *whole*, and that descriptions register *parts* of it under normatively-governed purposes.
P7)	*Meaning as (Partially) Use*	· It is not assumed that descriptions register *independently* of how they are used, nor that their significance derives *wholly* from how they are used. Rather, use is (in general) viewed as a *partially* determinate of meaning.
P8)	*Appropriate Registration*	· A traditional view of reasoning assumes a classical ontology (#5) and views the challenge as one of determining an appropriate (perhaps complex) series of inferential steps. DCal is founded on a somewhat different view, which views the determination of an appropriate registration scheme as a challenging and equally (if not more important) step, with the reasoning "in that scheme" as simpler.
P9)	*Reflection*	· DCal is reflective as well as recursive, giving the user unprecedented control over the structure, operation *and* semantics of their constructions. A kernel mechanism is provided with which to refer to or "mention" DCal structures, operations & interpretations—though what exactly it is that is thereby mentioned (type, token, meaning, etc.) depends on how it is registered. Structure, operation & interpretations can be overridden at will, providing that such overriding can itself (ultimately) be described in kernel terms.

	Property	Description
P10)	*Fusion* ·	The DCal structural field is defined so as (implicitly) to *fuse,* as much as possible, structures that "mean" the same thing with respect to the concepts & types in terms of which they register their subject matters.
P11)	*Formality* ·	In spite of being a well-defined computational calculus, DCal is thoroughly "non-formal" under a variety of meanings of that term. Any attempt to develop a set theoretically based model theory for DCal, or to prove its fundamental soundness &/or completeness, will be based on profound misunderstanding.
P12)	*Interpretation* ·	It is traditional to view formal calculi as "uninterpreted" systems of marks, with issues of semantic interpretation left outside the realm of the calculus, although in different calculi the kernel operations are typically defined with respect to (something like) a specific interpretation or interpretation schema (formal logic being the most extreme, in some peoples' minds challenging it claim even to be a calculus). DCal, however, *includes* an account of its own interpretation, in terms of which kernel operations are defined and reflective facilities described. As much as is effably possible, that is, DCal is intended to *embody* a particular ontological/metaphysical view.

III • DCal Architecture

To be written. The twelve principles are criteria to meet; they say nothing about how to do so. There should also be a section on the basic DCal design, at the very highest level: the notion of the (passive but demandingly-defined structural field), etc.

IV • Other things to mention?

— "Registration" as the basic intentional notion
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