Lambda-Omega Calculus under Scrutiny

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Abstract[1]

A bridge across many distant-yet-cogent bridges should suffice.

Beyond [Dys]Functionality: Negating Positivism to Unnarow It

We have long grown so used to and comfortable with the Cartesian legacy of functionality—those neat and elegant looking symbols packed together as if to hint at real-world processes as *preexistent* and *independent* regularities. This may stand to reason and "clarity" preferences (which criteria we may, too, have picked and learned alongside the special cases of formal logic); but does this (inspiring as it might seem when compared to the ugly smithereens of postmodern eclectics) really provide us with the vacuum cleaner to see and breathe through the dust and pest rather than sweeping it all under the rug? A few objections raised should be enough exercise in humility.

(O1) The philosophical community has long been split over the notions of *potential* as opposed to *actual* infinity—when it comes to numbers or objects. Does this issue not carry over to *processes* and *regularities* as both a special case of the latter and a generalization of the former? In other words, what makes us believe that processes are just that—functions that are preset in their disjoint entirety? Incidentally, this need not comply with either materialistic empiricism or creationism.

(O2) It would appear that the same holds for space, time, and similar chimeras that would supposedly be there to qualify these (stochasticity, discreteness or discontinuity, etc.) The issue is not really so much about their being myths or metaphors at best (somewhat schizophrenically straddling atomism and preexistence-as-whole, strong causality and chance); it's just that all of these should reasonably be internally entangled structures in their own right—and even more so externally.

(O3) The latter suggests that no regularity can be seen as dependence on one variable or a *particular* set of variables only. For that matter, none of these are either insulated from the

[1] I owe a rather peculiar debt of [in]gratitude to my highschool teachers of math (Yaroslav Mikhailovich) and physics (Messrs. Royzmann and Katz who lectured summarily), my college Profs. Akimov and Lavrynovych, and those numerous accidental fellow travelers who, for some tenuous reason, would urge me to write something up. For better or worse, I never did make much of a math person (nor ever planned to). O, had they never lulled my ego (into crafting that which should do the sobering job), to spare us all the pain of having to read all this in the first place!

rest of the regularities or have their parameters determined extraneously (i.e. by anything spontaneous but not by fellow processes being exposed to).

(O4) One is naturally led to infer that the previous point is to suggest that the very interlinkages have not been preset, either. They can neither be deemed as inherently present or co-present with *just* so many of peer processes nor be discarded and rendered orthogonal, try though one might exercising the "*ceteris paribus*" crutch of sequential (abstracted, piecemeal, atomistic, cardinalcy-plagued) reasoning as an ultimate vehicle rather than an interim bridge.

(O5) No process can be desolated, nor imposed just so many objects and variables on. Rather, this set of objects or dimensions has *itself* yet to be arrived at as a *solution* (or the filling in of a floating basis).

(O6) *Other processes* can be a special case of such objects—or indeed a generalization. In any event, a phenomenological narrowing may apply here without exhausting the scope (and possibly running counter to its inherently relational, ordual, completeness laden nature).

(O7) Each of these processes or relationships will be some kind of a "*resultant*" of so many of the rest (and possibly itself in a heredity setup). This is where reduction is *not* predominantly phenomenological.

(O8) A complete perspective could embark on both these modes or perspectives—taking phenomenological *angles* versus setting the *range* or reach with respect to the sample of reality (i.e. processes rather than their superficial representations as "data" or "facts") available.

Among other things, this angle-range dichotomy may be a special case (as well as a generalization) of the (Ω, Λ) representation (Shevenyonov, 2016b), an early account of Orduality and Gradiency that has been invoked more than once. It appears that the Heisenberg tradeoff in quantum mechanics as well as the equivalence principle of general relativity could be reconciled as special cases, thus wedding both these competing perspectives on at least some level of metaphysical (and hopefully ontological) generalization. As was pointed out previously, superstrings could follow suit along the overall ordinalcy lines as a matter of relational levels rather than oscillatory modes.

In terms of the previously exposited cognates (grand agnosia, azimuthality, levels of narrowing, etc.) the now-rethought tradeoff could be rendered as, $\{L^{-1}\Omega\}\{L^{-1}\Lambda\}$, where omega refers to the "third object" or floating basis X, and lambda to the object basis *{A}* as before. The narrowing operator may act with respect to either the collapsing object basis or the rho taking a particular value (possibly zero)—either version implying cardinalcy or causal functionality.

As a warming-up exercise, consider the following early guesses:

$$\{L^{-1}\Omega\}\{L^{-1}\Lambda\} = \{L^{1}\Lambda\}\{L^{1}\Omega\}$$

This would be akin to $(\Omega, \Lambda)^{L^{-1}} = (\Lambda, \Omega)^{L}$ while also alluding to 1^{L}. Alternatively, $[L^{-1} \equiv L^{-i}|_{i\equiv 1}] \equiv [L^{-\varphi} \equiv L^{-\sum_i^m i}|_{m\equiv 1}]$, suggesting singularity as a cardinalcy or functionality case. For that matter, $L^{-i}|_{i=1} \sim 1^{\frac{\rho_i}{\rho_{i+1}}}|_{i=1} = 1^{\rho-1}$, which is the dual (*m=2*) case.

So Straightforward as to Call for a Calculus

In fact, none of these *past* parallels are critical at this point, other than as *interim* analogies as hinted at and drawn upon in the exposition to be supplied shortly. Among other things, by drawing an analogy with (as well as across) things as disparate as, a differential over a composition or product, the variance of more than one process, and the dual operations on sets, one can surmise[2]:

$$\Delta(\Omega, \Lambda) = (\Delta\Omega, \Lambda) + (\Omega, \Delta\Lambda) + 2(\Delta\Omega, \Delta\Lambda)$$

Suffice it to provide a generic convention for starters, e.g. (1) $\Delta^{-1}(a, b) = \Delta(b, a)$ or the converse, with the LHS generalizing Δa and Δb alike, either one standing for a partial-basis narrowing (or second-order specificity). The key implications will now be listed succinctly, with demonstration being straightforward and left as an exercise.

$$(2)\ \ k(a, b) = +^{k}(a, b) = (ka, kb)$$

$$(3)\ \ (\Delta a, b) + (a, \Delta b) = (\Delta a + a, b + \Delta b)$$

$$(4)\ \ \Delta(a + b) = (a, b)\ iff\ (1)$$

$$(4.1)\ \ \Delta(\Omega, \Lambda) = (\Delta\Omega, \Delta\Lambda) = \Delta^2(\Omega + \Lambda)\ iff\ \ (4)$$

$$(4.2)\ \ \emptyset = \Delta[(\Omega, \Delta\Lambda), (\Delta\Omega, \Lambda)] + \Delta(\Omega, \Lambda)\ \ iff\ (4.1)$$

Auxiliary conventions can be tried out:

$$(4.3)\ \ k \equiv \Delta[\,]\ iff\ \ [\,] \equiv \Delta^{-1}k \equiv kX$$

$$(4.4)\ \ \Delta^{-1} = \Delta^{-1}1 = X \sim L$$

From (4.2), it appears that either or both might follow as below:

$$(5.1)\ \ \Delta(\Omega, \Lambda) = -[(\Delta\Omega, \Omega) + (\Lambda, \Delta\Lambda)]$$

$$(5.2)\ \Delta(\Omega, \Lambda) = \emptyset\ \ iff\ (\Delta\Omega, \Lambda) = -(\Omega, \Delta\Lambda) OR\ (\Delta\Omega, \Omega) = -(\Lambda, \Delta\Lambda)$$

$$(5.3)\ \ (\Delta\Omega - \Delta\Omega, \Omega - \Lambda) = (\Lambda - \Omega, \Delta\Lambda - \Delta\Lambda)$$

$$(5.4)\ \ (\emptyset, \Omega - \Lambda) = (\Lambda - \Omega, \emptyset)$$

$$(5.5)\ \ (\emptyset, X) = (-X, \emptyset)$$

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[2] I originally deploy a “circled plus/minus” sign for both the action *and* the operator.

Add *(X, X)* or *(X, 0)* to RHS and LHS to obtain: (6) $X(1,2) = X(0,1), (X, X) = (\emptyset, \emptyset)$ as an alternative to an *X=0* reduction. In fact, both implications resemble some findings of the ordual calculus—corner cases of strong symmetry or narrowing (for rho either 0 or 2) and a generalization for the least reduced representation. This, of course, should come as no surprise with the (1) convention in mind.

It can further be inferred that:

$$(7.1)\ \ (b - a) = \Delta(-a, b) = -(-a, b) = (a, -b)$$

$$(7.2)\ \ (X, \emptyset) = \Delta(X + \emptyset) = \Delta X = \Delta^2(\emptyset, X)$$

$$(7.3)\ (X + \emptyset) = \Delta^{-1}(X, \emptyset) = \Delta^{-1}\Delta X = X = \Delta(\emptyset, X)$$

$$(7.4)\ \Delta(\emptyset, X) = \Delta^{-1}(X, \emptyset)\ \leftrightarrow (\emptyset, X) = \Delta^{-2}(X, \emptyset) = (-X, \emptyset) = (\emptyset, X) = \Delta^{-1}X$$

$$(7.5)\ \ [(X, \emptyset), X] = \Delta^2 X + \Delta X$$

$$(7.6)\ \Delta \sim \Delta 1 = (1,0), \Delta^{\varphi} = (1,0)^{\varphi} = \Delta(\Delta^{\varphi-1}) = (\Delta^{\varphi-1}, 0) = \Delta^{\varphi-1}(1,0),\ \Delta^{-\varphi} = (0,1)^{\varphi}$$

$$(7.7)\ \ (\Delta X)^{\varphi} = X^{\varphi}(1,0)^{\varphi}, \Delta^{\varphi}X = X(1,0)^{\varphi}, \Delta X^{\varphi} = X^{\varphi}(1,0), X^{\varphi} = X^{\varphi}[(1,0)(0,1)]^{\varphi}\ \forall\varphi$$

What the latter suggests is just a special case of the delta inversion. However, the careful observer will notice that the scope of overlaps is far too overwhelming for the special triviality to dominate.

The Aftermath of Metamath

It will be shown occasionally how the emerging calculi reveal striking similarity—which first and foremost lends itself with the core paradigm and its rho calculus. To begin with, the initial levels-of-narrowness exposition can now be rendered in its general form as,

$$\{L^{-n}X\}\{L^{-n+k}X\} \equiv \{\emptyset\}\ \forall n > 0$$

This suggests a mutual or resultant existential status of narrowed or reduced representations, which in the event of *n=0* would yield unity as their joint truth-value. Now, of course, this "knife edge" appears far too restrictive and could be relaxed by how orthogonality could vary depending on *n* and *k*:

$$\{L^{-n}X\}\{L^{-n+k}X\} \equiv\ \rho(n, k)$$

It should be evident that the zero case for both power values yields the unbounded rho and the floating basis:

$$\{X\}\{X\} \equiv \rho(0,0) \sim \rho \sim (X, X)$$

Now suppose $X \sim (a, b)$ so that, by making use of $X^{\varphi} = (\Delta X)^{\varphi}(0,1)^{\varphi}$, it follows that:

$$(a,b)^{\varphi} = (b+a)^{\varphi}(0,1)^{\varphi}$$

$$(b,a)^{\sigma} = (a+b)^{\sigma}(0,1)^{\sigma}$$

The psi and sigma can always be picked such that,

$$(a,b)^{\varphi} = (b,a)^{\sigma} \leftrightarrow (A,a)^{\rho} \sim (a,A)^{\frac{\rho}{\rho-1}}$$

One would appreciate that, even if $(a+b) = (b+c)$, the psi and sigma generally may not turn out to be equal. This suggests one instance where the calculi can be deployed interchangeably as the setup on hand warrants.

References

Shevenyonov, A. (2016b). The Ordinalcy & Residuality Foundations: And Now for Greater Simplicity. *viXra: 1610.0357*.