Open and closed voids

Ryan J. Buchanan

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1 Background

1.1 Theories of Nothing

In 2022, Curt Jaimungal hosted the PACE1 competition on YouTube, attracting dozens of entrants. Among these was James Sirois, who entered with a video on his proposal for a new framework called "Infinity Limited." Over the course of the following months, a small subcommunity of the Theories of Everything (ToE) community formed, known as the TON (Theories of Nothing) community.

After a stimulating video call with approximately ten participants from the TON community, I quickly filled six pages of my notebook some mathematicizations of nothingness. I would shortly thereafter publish a document titled "On Nothingness: Existential Quantification and Typed Membership Conditions" which garnered a small shockwave of attention. This document is now private. I hope that the current paper at hand can serve as the (as of yet) definitive treatise on my inquiries into this realm.

2 Preliminary definitions

Definition 1 *Let $\mathfrak{C}$ be a class. A urelement, $\mathfrak{u}$, is a member of $\mathfrak{C}$ which fails to biject to SSets.*

Remark 1 *We will simply call urelements "elements" and treat them as such; however, we defined them merely to clarify the distinction between ZF+U and other models of ZFC which do not allow urelements. These models will largely be irrelevant to us.*

Definition 2 *A class, $\mathfrak{C}$, is a set of equivalence relations, where for every member x of $\mathfrak{C}$, there is an equivalence xRx, which is the* local identity *of x.*

Proposition 1 *Let $\mathfrak{U}|_g$ be a class-theoretic universe. Assuming the restriction to g is finite, there exists at least one urelement.*

Proof: Let $\mathfrak{U}|_g$ be regularly divisible; i.e., for every smooth map ϕ, there is a discrete binary representation ϕ_* which takes the ends of a path to centers of spheres. Let n(g) be the cardinality of g. Then, there is always some k-fold covering of $\mathfrak{U}|_{g|_\phi}$, such that

$$k > n$$

and so the pidgeonhole lemma applies. Ergo, if each divisible unitoid is to be treated as an element, at least one ought to be a urelement.

Definition 3 *A unitoid is unital magma which may be existentially typed.*

By existentially typed, we mean that there is an inclusion

$$(\Upsilon \in^* \mathfrak{U}_\infty) \leftarrow \exists$$

such that *strong existence*, or in other words, the classical existential quantifier, verifies or confirms the antecedence of some elemental form. In the bijective case, such a strong quantification exists for the typed member, but otherwise the existence of existentially typed elements fails to commute with strong existence.

Definition 4 *A* typeme *is an existentially typed unitoid*

This neologism is introduced to counterbalance the predominance of meme- and gene-based thinking.

Remark 2 *We can see plainly that the unitoids consist in both the atoms and the urelements; the elements consist in either the atoms, or in the unitoids, depending on one's choice of model. Here, we prefer the latter.*

Definition 5 *An* atomic element*, or simply an* element*, is any unitoid which is not a urelement.*

3 Voids

3.1 Overview

Let $\mathcal{M}$ be a Cartesian closed, symmetric monoidal structure, and let there be a pullback

$$\Phi \xleftarrow{\mathcal{I}} \mathcal{M}$$

in the category $\mathfrak{U}_k$. The corresponding functor in ${\mathfrak{U}_k}^{op}$ is forgetful, but faithful. We may freely associate Θ with a class of transcendental characters, i.e. characters which are not algebraic over $\mathcal{M}$, and write

$$\Theta \backslash \mathcal{M} \simeq \Theta^\dagger$$

This class, $\Theta^\dagger$ is special, because in the classical world, none of its unitoids should exist.

Definition 6 *An* admissible fiber*, f, is a fiber between a local identity and a universal metric, in which the base and total space are comparable.*

Definition 7 *Let $\mathcal{LX}$ be a loop stack. We call $\mathcal{LX} = \mathcal{V}$ a void if and only if there are no open neighborhoods containing $\mathcal{V}_{CENT}$ which admit connections outside $\mathcal{V}$.*

3.2 Choice

Whether or not a given loop stack constitutes a "void" essentially boils down to a *choice* of some small cardinal, c, which parameterizes the fineness of a space. We have

$$\mathcal{LX}_c = \sum_{p=1}^{c} \int \mathcal{TM}$$

where

$$\mathcal{TM} = \Omega_x{}^y 2\pi$$

and where

$$xRcRy \simeq Suc_\pi \mathcal{U}(c)$$

gives the necessary chain

$$\Box^{-q} \to (\mathcal{E}| \diamond |\mathcal{E}) = \mathfrak{N}$$

and $\mathcal{E}$ is the *chronic energy* of a static body along the field of outbound connections originating from c.

This gives us a map

$$\Box^{-q} \to M^2C^4; \forall q \in \mathbb{N}$$

By design, a void is so contrived as to be an arbitrary designation of isolation. That is to say, our choice of c gives us

$$LocSys(c) = \tau \to \tau - n$$

and we are free to choose some natural number to characterize the sample space.

Definition 8 *The* population *of a space $\mathcal{K}_i$ is the number of conformal holons observed at the projection of $\int_i$ to some manifold $\mathcal{M}$. Whereby* holon, *we mean a kinetic actor of arbitrary type which admits locally ringed with inner homs that locally resemble the homset of a universe.*

3.3 Non-existence

Proposition 2 *Non-existence*

$$x \notin^P \mathcal{V};$$

$$\forall \mathcal{V}, P \in \mathfrak{U}_\infty$$

This states that for any digit x, there is no place in a void $\mathcal{V}$ in which x is classically true. By classically true, we mean:

Definition 9 *Let $d(x,y)$ be the distance function on objects x and y. Let $\tau_{\mathbb{B}}$ be:*

$$\tau_c = \left\{ \begin{array}{cc} 1, & x = y \\ 0, & else \end{array} \right\}$$

A unitoid which has τ_c=1 will be called "classically true" and "classically false" otherwise.

In other words, a classical truth value of a variable x in a place corresponds to the strong existence of an algebraic character bijecting to x. This expresses the set of all fixed points under logics invoking the law of the excluded middle.

The astute reader will note that there may be some type $\mathcal{P}$ which bijects to a place a place for x in $\mathcal{V}$. In such a case, there is no atomic realization of x in any non-pathological field. For this reason, it may be worthwhile to consider the field of superreal numbers pioneered by Hugh Woodin.

3.4 Openness and closure

Definition 10 *Let $\mathcal{I}$ be an interval $(a, b) \cup \lambda$, where*

$$\lambda = Suc^{-1}(a) \cup Suc(b)$$

λ is then called the closure *of $\mathcal{I}$. Further, we define the* closure operator σ_λ *as a short trip from $\mathcal{I} \backslash \lambda$ to $\mathcal{I}$.*

3.4.1 Open Voids

Let $\mathcal{D}$ be a dynamical system. We have

$$x \in^{\mathcal{D}} y := x : X; DRX$$

giving us the membership-existential duality. On the left hand side (the definiendum), we have two unitoids, x and y, and single typeme $x \rightarrow^{D} y$. On the right hand side (the definiens), we have a class-level inclusion of a free variable into a type, and a relationship between said type and the dynamical system.

Definition 11 *A void, $\mathcal{V}$, shall be called* open *if there is some map $\mathcal{D} \rightarrow \omega$ which makes the inclusion $x \in^{\mathcal{D}} y$ classically true for a fixed x and y.*

An open void is characterized by the property that it requires some notion of *forcing*, or substitution of the $\mathcal{D}$-term in order to obtain a classically true embedding.

3.4.2 Closed Voids

A closed void is the sort of thing that most closely resembles the absolute nothingness one might envision. Therefore,

$$\bar{\mathcal{V}} = \aleph_{othing}$$

It is impossible to define a function using the character $\bar{\mathcal{V}}$, and so any such function will remain algebraically undefined, and there is no transcendental which may be invoked in order to recover a definable function.

We have:

$$\bar{\mathcal{V}} \star * = \mathfrak{undefined}$$

$$\forall *, \star$$

3.4.3 Incompleteness

Godel's incompleteness theorems tells us:

$$G(\bar{\mathcal{V}}) \neq n$$

$$\forall n$$

where

$$G(test) = \lim_{certainty} \propto \lim_{consistenty}{}^{-1}$$

3.4.4 Uncertainty

Heisenberg's uncertainty principle tells us that

$$K(\bar{\mathcal{V}}) \propto K(else)$$

so that

$$E(\partial x) + E(\int_x X) = 1$$

where

$$E(A)$$

is the normalized proportion of energy a given system has allotted for action A.