

Mereotopology and Polycontextuality

How are contextures behaving in transclassical constellations?

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Introducing mereotopology and polycontextturalty in logic and semiotics. Why are contextures in polycontextural constellations neither mereological nor topological?

Fragment: Not to be continued.

1 Mereology and mereotopology

Mereotopology comes with the double gesture of mereology and topology.

Mereology was introduced by Le'snievski, topology by Kuratovski.

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Topology: Closure

"Topological spaces can be conveniently characterized in terms of closure operators. A closure operator on a set A is a function c associating with each subset x of A a subset c(x) satisfying the following four statements:

- | | |
|---------------------------------------|---------------------|
| (A0) $\emptyset = c(\emptyset)$ | [Einbettung] |
| (A1) $x \subseteq c(x)$ | [Monotonie] |
| (A2) $c(c(x)) \subseteq c(x)$ | [Abgeschlossenheit] |
| (A3) $c(x) \cup c(y) = c(x \cup y)$. | [] |

http://www.columbia.edu/~av72/papers/Jpl_2003.pdf

The clusur definition is using the apparatus of set theory which should be defined as the universe of sets.

A nice term for 'closure' properties of sets is the German "Hülleneigenschaften".

"Classical first order logic with identity and descriptions will be assumed without ceremony."

(Barry Smith, Mereotopology: A Theory of Parts and Boundaries)

<http://ontology.buffalo.edu/smith/articles/Mereotopology1.pdf>

Ceremony

Thus, I'm scapegoated with my own endeavour. There is no contextuality without ceremony. I tried to escape this duty but in return I got punished with triviality.

The burden has to be taken and the work to be done. This might break its banks.

Smith continues:

"TP5 $yP\sigma x(\varphi x) \equiv \forall w(wPy \rightarrow \exists v(\varphi v \wedge wOv)$

y is a part of the *sum* of φ ers if and only if all parts of y overlap with some φ er.

"We define:

$1: = \sigma x(x = x)$ universe
 $x \cup y: = \sigma z(zPx \vee zPy)$ union
 $x \cap y: = \sigma z(zPx \wedge zPy)$ intersection
 $x': = \sigma z(zDx)$ complement
 $x-y: = \sigma z(zPx \wedge xDy)$ difference

Note that all *set-theoretical* associations of these terms are to be resolutely suppressed. Note, also, that intersections, complements and differences are not always defined.

We can however prove the following remainder principle:

TP7 $xPy \wedge x \neq y \rightarrow \exists z(z = y-x).$ "

This works well without ceremony (Smith, Herre). But does it work with ceremony?

At least, the proposed theory of a universe is formalized in "*classical first order logic with identity*".

As we learned elsewhere:

"The *domain of discourse*, also called the *universe of discourse* (or simply universe), is an analytic tool used in deductive logic, especially *predicate logic*. It indicates the relevant set of entities that are being dealt with by quantifiers."

"There is another approach to universes which is historically connected with *category theory*. This is the idea of a *Grothendieck universe*. Roughly speaking, a Grothendieck universe is a set inside which all the usual operations of set theory can be performed.

Axiom of Universes: "For any set x , there exists a universe U such that $x \in U$." (Wiki_Universe)

According to Achille C. Varzi the ceremony goes strict forward in plain text without confusing exclusivity, first for mereology, then for topology and finally for mereotology:

Mereology

"(P1) Pxx ;

(P2) $Pxy \dot{\cup} Pyx \textcircled{R} x=y$;

(P3) $Pxy \dot{\cup} Pyz \textcircled{R} Pxz$.

(Here and in the following we assume a standard first-order language with identity supplied with a distinguished binary predicate constant, 'P', to be interpreted as the (possibly improper) parthood relation. The underlying logic is understood to be a standard first-order calculus with identity.)"

PARTS, WHOLES, AND PART-WHOLE RELATIONS: THE PROSPECTS OF MEREOTOPOLOGY

Achille C. Varzi

From Universe to Polyverses

<http://memristors.memristics.com/Polyverses/Polyverses.pdf>

Therefore, we get, without ceremony or quarrel: *a universe is a Universe*.

On the other hand we faced many theories of universes. Are there therefore also many universa? Or do we have to be reunited circularly under Barry's umbrella of a unique (ontological) universe?

2 Contextures in polycontextural constellations

The sketched definitions of the roles universa of poly-categorical systems are playing in constructions like the famous bifunctorial interchangability is not so much a head of the construction as the general rules of behavior of the body of the formula but without doubt not more than the insinuation of a temporary *hat* from the mathematical designer-thrift shop.

Hence, without hat no head. And a body without head becomes virtual.

Interchangeability

HAT

$$\mathcal{U}^{(3)} = (\mathcal{U}_1 \amalg_{1,2} \mathcal{U}_2) \amalg_{1,2,3} \mathcal{U}_3$$

$$(\mathcal{U}_1 \cap_{1,2} \mathcal{U}_2) \cap_{1,2,3} \mathcal{U}_3 = \emptyset :$$

$$\mathcal{U}_i = \{f_i, g_i\}, i = 1, 2, 3$$

HEAD

$$\begin{bmatrix} g_1 & \square & g_3 \\ f_1 & g_2 & \square \\ \square & f_2 & f_3 \end{bmatrix} :$$

BODY

$$\left(\begin{array}{c} (f_1 \circ_{1,0,0} g_1) \\ \amalg_{1,2,0} \\ (f_2 \circ_{0,2,0} g_2) \\ \amalg_{1,2,3} \\ (f_3 \circ_{0,0,3} g_3) \end{array} \right) = \left(\begin{array}{c} f_1 \\ \amalg_{1,2,0} \\ f_2 \\ \amalg_{1,2,3} \\ f_3 \end{array} \right) \circ_1 \circ_2 \circ_3 \left(\begin{array}{c} g_1 \\ \amalg_{1,2,0} \\ g_2 \\ \amalg_{1,2,3} \\ g_3 \end{array} \right)$$

Judging people by their hats is always a god strategy to avoid to recognize their performance.

I had the pleasure of being able to avoid a discussion about my hats at a recent meeting. Unfortunately, I couldn't identify any attempt in the discussion to recognize the structure of the movements of the body and to try to invent the hats that would fit more properly to the behavior of the body.

Because there is some desire to understand this fragile inter-relationship between hats and bodies of queer formulas I will take the chance to explain it to some degree in this note.

2.1 Comparison

The Universe in category theory and monoidal category theory is in principle singular and unique.

Subversion of the concepts of monoidal category theory towards a polycontextural category theory based on a multitude of interacting universa.

3 Russian Dolls and Tangled Wholes

Contextures are not only appearing as complexions, called polycontextures, but are also subversing the part/whole relationship between contextures and intra-contextural context, and worse between polycontextural compound contextures and elementary contextures as part of the compound.

Hence, a compound may become an elementary contexture and an elementary contexture might be unmasked as a polycontextural compound contexture.

For short: there is a chiasitic interchange between parts and wholes for polycontextural systems (universa).

Gunther's universe is polycontextural, and the common universe is, according to Gunther, conceived as mono-contextural. Monocontextural systems are hierarchical, polycontextural systems are structurally heterarchical.

For hierarchical systems the metaphor of the Russian Dolls is constitutive, heterarchical systems are not easily modeled by identical constructions. Heterarchy is enforcing paradoxical and parallax structures, labeled temporarily as "Tangled Wholes".

The term "universe" is used by Gunther as a cosmological, metaphysical and ultimate meta-concept. Mathematicians are using the term less emphatic but with the same exclusivity of uniqueness, the "universe of discourse".

Is it not easier for monocontexturally limited minds like mine to convert to the belief of poly-verses of polycontextures?

Polyversa are containing elementary and compound contextures, or are labelled as mono- and polycontextural. Hence, both distinctions uni-/polyverse and mono-/polycontextures are two different, and even discontextural approaches, to deal with singularity and manifoldness.

to eat and to be eaten

"One tries to get inside oneself
that inside of the outside
that one was once inside
once one tries to get oneself inside what
one is outside:

to eat and to be eaten
to have the outside inside and to be
inside the outside."

Laing, R. D. (1970). *Knots*. New York: Vintage Books., p. 83

3.1 Gunther's universe of polycontextuality

reality, Being, contextures, universe, multiverse, world
mono-, poly-, dis-, trans-, intra-contextural

Citations from Gunther's "Life as Polycontextuality"

"By showing how Becoming has a component of Being as well as Nihilism, he [Hegel] unwittingly laid ground to a theory of "poly-contextuality". Because, if we want to establish such a theory, we should not assume that all contextualities can be linked together in the way a geographical map shows one country bordering on the next in a two-dimensional order. (p. 4)

"Each contexture is **logically finite** insofar as its structure is confined to two values. But their respective ranges are infinite because one can generate, within the respective domain, a potential **infinity of natural numbers**.

"It can be formulated as follows: **the Universe is, logically speaking, "mono-contextural"**. Everything there is belongs to the universal contexture of objective Being. And what does not belong to it is just Nothingness.

"We have insisted that a contextuality is a logical domain of a strictly two-valued structure and its range is determined by using the TND as an operator such that the generality of the alternative which the TND produces cannot be surpassed.

"In other words: if we consider the Universe as a compound-contexture it must be composed of an innumerable number of two-valued structural **regions** which partly parallel each other or partly penetrate each other since, as we pointed out, each observable entity in this Universe must be considered an intersection of an unlimited number of two-valued contextures.

"However, since any value (and its total negation) may be chosen as an ontological departing point for

a two-valued system, we may consider the **pyramid** of protostructure as an ontological **grid** which describes the mutual positions of single contextures. (p. 10)

It can be formulated as follows: the Universe is, logically speaking, **mono-contextural**". Everything there is belongs to the universal contexture of objective Being. And what does not belong to it is just Nothingness.

"In a **poly-contextural Universe** we do not have to consider Life as an element totally alien to inanimate matter, because **matter in itself already contains the seeds of Life** in its dialectical contraposition of Being and Nihilicity.

"It should be kept in mind that, if we postulate a polycontextural Universe, the barriers of **discontextuality** which now cut through this empirical world, have lost nothing of their intransigency by being multiplied.

http://www.vordenker.de/ggphilosophy/gg_life_as_polycontextuality.pdf

"Dieses empirische Universum selbst ist "poly-kontextural", und wir begegnen diesem Phänomen an jedem Tag unseres Lebens, ohne dass wir uns der logischen Konsequenzen der diesbezüglichen Erfahrungen bewusst werden." (G. Gunther, p.8)

http://vordenker.de/ggphilosophy/gg_theorie-mehrwert-logik.pdf

Whatever terminology we might choose, the essential characteristics has to be the in-corporation of discontextuality into the (deconstructed) world (universe). This phenomenon of total distinctness, abyss or rupture between contextures is not known in other theories about this topic of many-foldness.

Interesting work, elaborated at "Ersatz-Pluriverse":

"The principle of generation is one of the seven postulates, specifically, the principle of recombination:

(6e) The totality of universes is closed under a principle of recombination.

Roughly: for any collection of objects from any number of universes, there is a single universe containing any number of duplicates of each, provided there is a spacetime large enough to hold them."

http://tedsider.org/papers/ersatz_pluriverse.pdf

Teubner:

There is a generous use of polycontextuality without abyss: Teubners polycontextural law systems. In fact, the term "polycontextuality" is used as a replacement for "pluricentrism".

Tegmark writes that "abstract mathematics is so general that any Theory Of Everything (TOE) that is definable in purely formal terms (independent of vague human terminology) is also a mathematical structure."

All kind of -verses are celebrated in some songs, polycontextuality seems to be too radical to tune a strophe in a popular song. The unspeakable kenograms of Gunther's kenogramatics got a celebration by "*Queen zero*" with Romy Haag (1986).

<http://www.mathematical-semiotics.com/pdf/Geometrie%20der%20Kontexturen%20I.pdf>

3.2 The polyverse approach to polycontextuality

The very term "universe" or even "Universe" has a highly prominent appearance in Gunther's work, they come in hunderts.

Terms like "multiverse", "pluriverse" or "polyverse" don't show up.

Possibly, the term "pluriversum" or "multiversum" in the context with Gunther's polycontextuality theory appeared first in a paper in the magazine TAZ in Berlin.

http://www.vordenker.de/ggphilosophy/taz_e_meyer.pdf

There are polyversa without polycontextuality and polycontextuality without any of the poly-, pluri-, meta-, omni- or multi-versa.

The other point, suggested by our use of language, is the difference of uniqueness or singularity and plurality or manifoldness. Are universes unique? What's about polyverses? Does it make sense to speak about a unique polyverse?

If each contexture which is defining a universe contains a genuine full-fledged arithmetic and logic, how can we speak of a unique polycontextural polyverse? It seems to be a contradiction in adjecto. Even if we stop to accept classical logic as the judge in this debate, there seems to be no need to belief in uniqueness and unity only because of the weakness of our (philosophical) use of language.

Personally, I never got it that polycontexturality is considered as being "universal", and therefore unique.

http://www.thinkartlab.com/pkl/media/SUSHIS_LOGICS.pdf

The situation of talking about polyversity might be *dramatized* by a theological and religion-historic drama where a monotheist god and his polytheist group of gods as contrahents are debating about the "sole ruler problem". Aristotle didn't solve anything, he simply declared authoritatively:

'The rule of many is not good; one ruler let there be.'

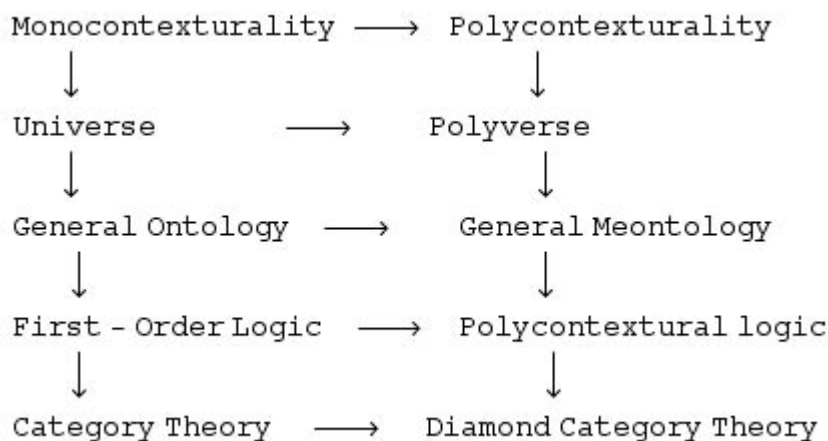
Aristotle, *Metaphysics*, Book 12, 1076a.

Hence, we get two possibilities to use the term "universe": classically, "*the Universe is, logically speaking, "mono-contextural"*", and trans-classically, "*if we consider the Universe as a compound-contexture*" (Gunther).

Therefore, the term "universe" lost its strictness as being unique.

I think, Gunther's use of "universe" instead of terms like "multiverse" or "polyverse" has no specific reason in his philosophy.

Mediation is the solution. A plurality of contextures mediated to a polycontexturality is not again a new singularity but a mediated complexity where the linguistic singular of the mediation is just a relict from a unitarian monophonic parlance.



4 Contextures and the kenomic matrix

4.1 Contextures in proto-structures

Gunther classified and organized contextures by mapping them on kenogrammatic structures, first proto-structures, then partly on deutero-structures but not yet on trito-structures. Furthermore, contextures had been organized within polycontextural logics as far as each contexture deserves its own 2-valued logic.

This allows interesting mappings, e.g. different mappings of the Platonic pyramid onto the proto-structure.

4.2 Interactionality of contextures

Gunther's mappings are following more or less a linear structure of the accretive and iterative developments of kenograms of the proto-structure.

A very different approach to organize contextures is given with a mapping onto the 'kenomic matrix', which is realizing a tabular organization of contextures. Tabularity enables different kinds of interaction between contextures. In contrast to the linear order and its mediation of contextures, tabularity opens up additional features unknown to the classical linear order of proto-, deutero- and trito-structures of kenogramatics.

How is interactivity, reflectionality or even interventionality understood in a kenomic context? The kenomic matrix as introduced in "ConTeXtures" might offer some initial answer.

4.3 Ontologies, Worlds, Concepts and Contextures

4.3.1 Modern formal ontology

According to Heinrich Herre:

"Ontology is based on a particular view at the world: ontology asks what an entity is, what the essence of it is, and which mode of existence it has. We use the term "entity" for everything that exists where existence is understood in the broadest sense."

Such an approach is obviously a kind of realism:

"We hold a realist view at the world and assume the existence of a real world which is independent from the subject. Appearances of this world are considered as actual realizations of the world's dispositions within a subject."

<http://www.onto-med.de/publications/2010/gfo-basic-principles.pdf>

A formal specification is given by:

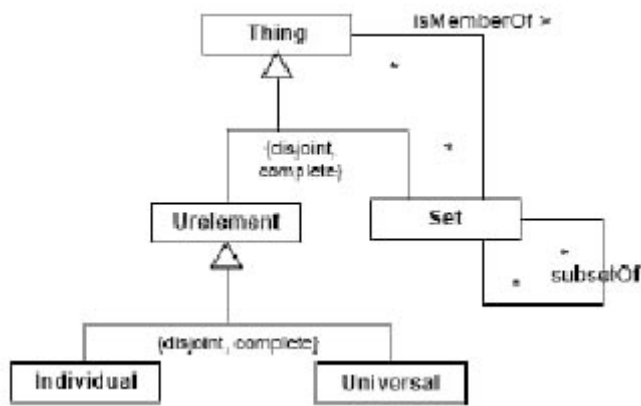
"We assume the existence of both urelements and sets in the world and presuppose that both the impure sets and the pure sets constructed over the urelements belong to the world. This implies, in particular, that the world is *closed* under all set-theoretical constructions.

"A fundamental distinction in this ontology is between the categories of the so-called *urelements* and *sets*. Urelements are entities that are not sets. They form an ultimate layer of entities without any set-theoretical structure in their build-up, i.e., neither the membership (\in) relation nor the setinclusion (\subseteq) relation can unfold the internal structure of urelements.

Urelements are classified into two main categories: individuals and universals. A urelement has to be either an individual or a universal, but not both. This can be expressed by the following axioms:

- (1). $\forall x (Ur(x) \leftrightarrow Ind(x) \vee Univ(x))$
- (2). $\neg \exists x (Ind(x) \wedge Univ(x))$

Guizzardi, p. 209/210



Conceptual graph of the basic triple (Entity, Urelement, Set) and its uniqueness 1.

"Uniqueness means that there is one and only one ontology defined in terms of Ur-element, Set and Entity. This also means, there is only one World, and at the end it means, there is only one WWW, too. But this is homogenizing complexity and diversity, and is simply a monstrous nominalisation. In other words, it is one and only one way of thematizing the world, the mono-contextural one.

"In a conceptual diagram, I represents the absolute. The notation
institution --> I

expresses that the institution notion is absolute, for it tells us the the institution notion varies as the absolute varies - which is not at all." (J. Cartmell, LNCS 240, 1885, p. 488)

All these axioms of the formal general ontology GOL are not only defining a (probably) consistent framework for all possible applicative, core ontologies, but are also asking a hard price for it: there is no dynamics in this framework of ontology. Everything is what it is, e.g. Urelement or Set. Any dynamics is secondary and localized in "chronoids", "topoids", etc. which are special cases of Individuals. In other words, no Urelement can become a set and vice versa, simply because this ontology is mono-contextural, lacking any fundamental perspectivism and interactivity with diversity." <http://www.thinkartlab.com/pkl/media/Dynamic%20Semantic%20Web.pdf>

Contextures, therefore, might be considered as closures, envelops or (Huellen) of formal ontologies. Because there is one and only one formal ontology considered, this contextural label might be, as usual, omitted.

A plurality of general formal ontologies, then obviously needs some identifiers. Here, contextuality theory enters the game.

Contextures, in a polycontextural constellation, are the mechanism of the dissemination of general formal ontologies (GOLs).

5 Mereotopology and multiple crossbar systems

Topological questions arise automatically in the context of multiple crossbar systems and their regions.

Mereotopology might be classified as a branch of general and 'regional' formal ontology. On the other hand, mereotopology declares to be a general theory for general ontology.

With the advent of semantic studies for machine-readable interactions, like for the Semantic Web, formal ontology, introduced by Edmund Husserl, got a lively renaissance.

The work of John F. Sowa, Barry Smith, Nicola Guarino (OntoClean) and the highly elaborated studies of Heinrich Herre and his school are well known.

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ONTOLOGICAL FOUNDATIONS FOR STRUCTURAL CONCEPTUAL MODELS

http://doc.utwente.nl/50826/1/thesis_Guizzardi.pdf