The holotic structure of the ideas of unity, identity and finality

Abstract

In this paper, I touch on the holotic structure of the ideas of unity, identity and finality, using the word "holotic" to refer to a theory that includes both partonomic (or mereological) wholes and taxonomic (or diairological) wholes. In the second section, I expound on two classifications of wholes and two classifications of the types of parts I deem relevant to the ideas of unity, identity and finality. In the third and fourth sections, I discuss how these three ideas acquire different significance depending on the type of totalities and parts involved.

Key Words: mereology, whole, unity, identity finality

1. Introduction

Used frequently, the ideas of unity, identity and finality crop up in diverse contexts with a varied raft of meanings. At present, the use of the idea of identity has seen significant growth and extended into heterogeneous contexts. Illustrations include logic (identity principle), biology (specific identity, racial identity, genetic identity), chemistry (the identity of a substance or compound), ethics (personal identity), ontology (mind-body identity, transworld identity, the principle of the identity of indiscernibles, identity over time, the identity of the Christian trinity), sociology and anthropology (genus identity, group identity, cultural identity), politics (national identity, the identity of peoples), business (business identity, the identity of a brand or a product) and criminal justice and

forensics (the identity of the witness or the accused), among others. When used in scientific contexts, though, the idea of finality has been criticized from the outset of modern science, on the consideration that it should cease to hold a place in science once the idea of a creator god has been discarded. However, as I will show, finality is still commonly spoken of in specific scientific contexts. The idea of unity itself has been losing steam as the limits of certain unificationist projects have grown evident (the United Nations, the unification of science, unified field theories) and calls for diversity and plurality have gained ground. It remains present in psychology when speaking of the "unity of consciousness".

In dealing positively with the ideas of identity, unity and finality, it should be supposed that wholes and their unities, identities and finalities manifest themselves through things that actually exist in the world. As such, these ideas' references are neither metaphysical nor theological, and do not refer exclusively to the positive sciences (especially logic or linguistics) since there exist non-scientific wholes, identities, unities and finalities. However, epistemological references are not enough either, since wholes, identities, unities and finalities are not simply modes of knowledge, but rather ontological structures. Finally, the problem cannot be solved in exclusively psychological categories either, since the psychological concepts of similarity, contiguity and intent are but specific, subjective modulations of the more general ideas of identity, unity and finality, which are not just mental matters or processes.

In the next section, I posit two classifications of types of wholes and two types of parts. The third and subsequent section lays out the application of such

distinctions to the ideas of unity and identity so as to analyze the varying significance of such ideas, while underlining their differences and discussing their relationships. I will hold that, in many contexts, unity and identity require reference to the idea of finality. In the fourth section, I put this definition of finality based on this theory of wholes and parts to use to classify the types of finality. I end with concluding remarks that summarize the main positions taken.

2. Different types of wholes and parts

In this section, I put forward two classifications of the types of whole and two classifications of the types of parts. As for wholes, I first distinguish between mereological wholes and genera (wholes that I call “diairological”). Secondly, I distinguish configurational wholes from wholes that are processes unfurling in time. As regards parts, I first distinguish formal parts from material parts to then distinguish distinctive parts from non-distinctive parts.

2.1. Mereological and diairological wholes

In this section, I introduce the distinction between wholes that are genera made up of species, which I call “diairological wholes” (from the Greek *diaíresis,* meaning “division” or “distribution”), and wholes made up of contiguous parts, which I call "mereological wholes" (from the Greek *meros*, meaning “part" or "portion"). The parts of diairological or taxonomic totalities are independent of each other, and independent of the whole, such that they can be disconnected from each other but related through the whole, as genera composed of species.

The integral parts of mereological totalities are connected to each other, without the implication that they are inseparable or that the whole is indestructible.
An empirical whole such as a particular triangle can be analyzed as a mereological whole when it is divided into its component parts, such as when the triangle is divided into two adjacent triangles connected by one of the sides. Further, that triangle can also be seen as a taxonomic part of a diairological whole, of a genus (the triangle genus) wholly distributed in each of its species (equilateral, isosceles, scalene; obtuse, acute, right).

The first traces of the explicit distinction between a whole made up of parts connected to each other and a genus composed of independent species date back to Plato's *The Statesman*, when the stranger acknowledges that genera are totalities whose parts – the species – are independent of each other and related by similarity. However, the stranger reminds Socrates the Younger that not all totalities are genera since there is another type of whole made up of contiguous parts (Plato, *The Statesmen*, 263a-263c).
In his *Metaphysics,* Aristotle affirmed that the unity of the parts of a whole can be of two types: as a result of contiguity, such as a tied-up bundle of firewood, or as a result of similarity, as with the species together forming a genus. Thus, the genus of triangles has three species: equilateral, isosceles and scalene (Aristotle, *Metaphysics* V, 6 1016a-b). When Aristotle classifies the types of totalities, he notably distinguishes genus from the other types, especially when stating that genus cannot be divided by quantity (Aristotle, *Metaphysics* V, 25, 1023b 12-25: V, 26, 1023b 25-36).

In *Topics* (44 BC), the skeptic philosopher and Roman statesman Marcus Tullius Cicero distinguished between mereological wholes (*totus*) and diairological wholes (*omnis*). Translating from the Greek *merismos*, he called the division of the mereological whole "partition" (*partitio*); translating from the Greek *diaíresis*, he called the decomposition of a genus into its species "division" (*divisio*). Cicero made clear that, in diairological wholes, the genus is distributed entirely in each of the species that are themselves independent of each other: the genus is therefore a type of "distributive" whole.

In *On Division* (513-14, II.2), Boethius distinguished the partition of a whole into parts from the division of a genus into species, arguing that, in those wholes I have called mereological, the parts are not the same as the whole, and the whole entails reunion, while in the diairological whole, the species share the characteristics of the genus.

In medieval philosophy, mereological wholes were called collective wholes (*totum collectivum*) and heterogeneous wholes (*totum heterogeneum*), while diairological wholes were called distributive and homogeneous wholes (*totum distributivum*, *totum homogeneum*) (Henry 1991: 422).

In studying Franz Brentano's mereology, Wilhelm Baumgartner and Peter Simons concur that Brentano distinguished three types of parts in *Lectures on Metaphysics*: physical, logical and metaphysical. The first two roughly correspond to the distinction I am presenting in this section. The physical, connected by contiguity, relates to the mereological whole, while the logical parts are the species in relation to the genus or the individuals with respect to the species. Such logical parts (diairological, as I propose calling them) are

independent of each other and of the whole and relate to each other through the whole (Baumgartner and Simons 1994).

In the third of his *Logical Investigations* entitled “On the Theory of Wholes and Parts”, Edmund Husserl sought to differentiate concrete wholes whose parts are pieces (mereological wholes) from abstract wholes, as in the mathematical sets, which in his view are not proper wholes (Husserl 1901). His distinction is reminiscent of Brentano's distinction between physical and logical totalities.

As is known, Stanisław Leśniewski coined the term “mereology” in 1927, and his formal mereology refers exclusively to the wholes I have called mereological while neglecting wholes that are genera (Simons 1987).

In 1978, the Spanish philosopher Gustavo Bueno introduced the distinction between attributive wholes (which correspond to mereological wholes) and distributive wholes (which correspond to diairological wholes). Attribution entails material connections between the parts while distribution enables their independence and separation. Bueno later added a third group of mixed or isomeric totalities in which the parts are simultaneously attributive and distributive. He put forward the example of an organism’s cells which, belonging to the genus "cell", are the species of a genus, but, connected in a very precise manner within the organism, are parts in an attributive (mereological) sense (Bueno 1978: 28; 1990a; 1990b).

Morton E. Winston, Roger Chaffin and Douglas Herrman distinguished two types of parts. In sets, the members are types of the genus or kinds of the genus: roses are a kind or type of flower since they are similar to other different types of flowers. These are the wholes that they called taxonomies and I have labeled diairological. The other wholes they distinguished (integral wholes,

collections, masses and activities) are “partonomies” or mereological wholes since the parts (components, members, pieces and features) are materially interconnected (Winston et al. 1987).

In the field of cognitive psychology, Barbara Tversky distinguished between partonomies (such as body parts) and taxonomies (such as the taxonomy of the animal kingdom). Partonomies can in turn be given in perception (especially in visual perception) or constructed based on function. Partonomies relate to "the parts of the whole" while taxonomies refer to "kinds of" (Tversky 1989).

M. Preuβ and Daniel Cavegn held that humans process taxonomic (diairological) and partonomic (mereological) relationships differently: taxonomic wholes entail an evaluation of commonalities and differences between things while partonomic wholes involve a search for temporal or functional correlations between the parts of a whole (Preuβ and Cavegn 1990).

As can be deduced from this small sample, there is no reason why the philosophical theory of wholes (which I have called "holotic" theory) should be restricted to the study of mereological totalities. Diairological or taxonomic wholes are also totalities, although their logical structure is different than that of mereological wholes and, therefore, their unity and identity should be discussed. Furthermore, I contend that the two types of wholes are closely involved: in many contexts, discussing the identity of a mereological whole implies the diairological classification into genera and, conversely, taxonomic work requires a consideration of the mereological parts of the individuals of the species classified.

2.2. Configurational and processual wholes

Wholes are not static but rather subject to ongoing transformation, such that it would initially seem logical to suppose that every totality is processual since no configuration can be completely separated from time. Only the Aristotelian unmoved mover is static and not subject to change, generation or corruption, since, for Aristotle, change solely affects the hylomorphic substances in the sublunar world. The stars fall in an intermediate situation since they have local motion but are not subject to generation or corruption. Such Aristotelian principles are unsustainable in a philosophy of the present since any totality is subject to change.

However, time can be dissociated (abstracted) in specific contexts where it is not relevant, as in geometry and logic. For practical purposes, time is also abstracted when dealing with stable wholes, with totalities in dynamic or static equilibrium in which conservative processes and "identical transformations" maintain their unity and identity, as with the ship of Theseus. Repetitive and cyclical processes also allow time to be abstracted, such that they can be treated as if they were configurational wholes. Nevertheless, we must not lose sight of the abstract character of configurational wholes, which will always ultimately have to be inserted in their processual contexts, even if they are processes of conservation and stability.

The parts of certain wholes can be considered to be given simultaneously, as occurs with buildings, statues and objects; the parts of other wholes are successive, such in a musical melody, a month, a film or a speech act. I call the former configurational wholes and the latter processual wholes.

In their study of partonomies (the wholes I am calling mereological), Morton E. Winston, Roger Chaffin and Douglas Herrman distinguished a type of whole

developing in time which they called “activities”, and whose parts are stages, phases or features. They used the following illustrations: the act of paying as a part of the act of shopping, ovulation as a part of the menstrual cycle and bidding as a part of playing bridge (Winston et al. 1987).

In configurational wholes of an anthropic, ethological or biological nature, the unity and identity of a whole is commonly defined by reference to certain processual ends or functions. When we divide a configurational whole into its components and not any other randomly selected parts – such as when we state that a pedal is part of a bicycle (Winston et al. 1987) – it is because we are assuming the finality of the whole and the function of the part within the whole purpose.

Regarding diairological wholes, I have referred to genera whose parts are the species. Notwithstanding, the idea of genus derives from the idea of generation and, therefore, from genera understood as processual. Aristotle notably distinguished two different meanings when defining genus. On the one hand, he spoke of genus in a genealogical sense, understanding it as lineage or phylum, as "the uninterrupted generation of individuals of the same species" (*Metaphysics* V, 28). In this way, he called genus "the one from which they come", just as "Hellenes" come from Hellen, "Ionians" come from Ion and “Heracleides” come from Hercules (Aristotle *Metaphysics* X, 8 1058a 23).

Further, Aristotle also identified a second meaning of the word “genus” as the subject of differences and as the first component of definitions (*Metaphysics* IV, 2, 1005-a12; X, 8 1058-23). It should be recalled that, for Aristotle, the genera are irreducible and incommunicable with each other, as occurs in the sciences

understood as genera (such as physics vis-à-vis mathematics) and in the categories, which are the utmost genera.

The idea of processual genus draws back to the genealogical, genetic source to establish the connections between the genus's species. The distributive perspective is consequently lost since the species cease to be independent of each other. Notwithstanding, species within the phylogenetic genus necessarily present a certain discontinuity since the genus would otherwise be an undifferentiated mass.

The genera are diairological, taxonomic wholes when they are fixist and purely configurational, as in Porphyry and Linnaeus. When they become genealogical, phylogenetic and "Darwinian", they cease to be diairological wholes and take on a mereological structure whose parts are causally connected and temporally contiguous.

2.3. Formal versus material parts

Gustavo Bueno distinguished formal parts, which conserve the form of the whole that they constitute, from material parts, which do not. The illustration of formal parts given by Bueno is that of a vase broken into pieces in such a way that the vase can be rebuilt from the pieces. Conversely, if we grind the vase into kaolin grains, the shape of the vase will have been lost since the kaolin grains are the material parts of the vase and do not retain its shape (Bueno 1972: 329). This distinction is found in Aristotle's philosophy following formulation of the hylomorphic theory. In *Metaphysics*, Aristotle holds that bronze is a material part of a statue because it does not retain its shape, as a segment is a material part of a circle. By contrast, letters are formal parts of a

syllable (*Metaphysics* VII, 10, 1034b25; 1035a 10-15). From the whole, it is possible to return to the material parts (melting the statue yields an amorphous bronze nugget) but it is not possible to go back to the whole from such material parts because the form of the whole and its parts have been lost. In the same way, a biological organism cannot be rebuilt from electrons and protons, even though protons and electrons are material parts of it.

This distinction is exclusive: in reference to a specific whole, formal parts cannot at the same time be material parts. They either retain the form of the whole and the whole can be reconstructed from them or they do not retain the form of the whole and reconstruction is impossible. There is no intermediate situation. It seems evident that to understand the unity and identity of any whole and the finality of any process, reference must be made to the manner in which its formal parts are arranged, without prejudice to the existence of material parts (Aristotle, *Metaphysics* VII, 11, 1036a 25 et seq.).

Table 1 provides illustrations of formal and material parts in both configurational and processual mereological wholes. The parts of objects that Winston, Chaffin and Herrman label in their illustrations as "stuff" roughly correspond to my material parts (Winston et al. 1987).

Table 1. Illustrations of mereological wholes and parts

	Types of parts	Illustrations
Configurational wholes	Formal parts	the head is part of the statue (Aristotle, *Metaphysics* 1035 a 5)
		the pedal is part of the bike (Winston et al. 1987)
	Material parts	bronze is part of the statue (Aristotle, *Metaphysics* 1035 a 5)
		steel is part of the bike (Winston et al. 1987)
Processual wholes	Formal parts	letters are parts of syllables (Aristotle, *Metaphysics* 1034b 25)
		ovulation is part of the menstrual cycle (Winston et al. 1987)
	Material parts	a sound wave is part of the syllable
		carbon and oxygen are parts of the menstrual cycle

In diairological wholes such as taxonomic genera divided into species, species not only retain the form of the whole they constitute (the generic form) but are also a specification of the selfsame form. As such, a species as a material part of its genus does not make sense.

2.4. Distinctive versus non-distinctive parts

Of the formal parts of a whole, some can be distinctive, i.e. they serve to differentiate some such whole from others. The idea of distinctive parts entails the comparison of at least two different wholes. Comparing may result in a

verification that such wholes have both common and non-common parts or characteristics, with non-common parts making it possible to distinguish between them. Such distinctive parts determine the specific difference and may serve to establish the identity of certain wholes vis-à-vis others. In the *Topics*, Aristotle listed four predicables: genus, definition, property and accident (*Topics* I, 4,101b and ff). He made the supposition that, in the definition, the essential distinctive feature combines with the genus: humans are animals by genus, and the distinctive feature of being rational provides their definition; the circle is a flat figure by genus and its distinctive feature is to being surrounded by a line equidistant from the same point. In Aristotle's philosophy of definition, genus acts as the matter of the definition on which form, which is the difference, is applied. The essential definition is the specific form resulting from a difference, which then gives rise to a species. In the essential definition, genus and difference are necessarily linked (*Metaphysics* A28, 1024b4-6).

Platonizing Aristotle's theory, Porphyry understood genus and species in *Isagogé* as being prior to individual substances (*Isagogé* 17, 9-10), such that species is a predicable, unlike in Aristotle's theory where species is the subject of predication. In addition, he added a fifth predicable he called "difference", which is the distinctive characteristic of a given species compared to other species of the same genus (*Isagogé* 4, 9-14).

3. The ideas of unity and identity

Unity and identity cannot be related to the first substance defined in Aristotle's *Metaphysics* as "being for itself" (*kaz ’autó*) and not for others (*katà*

simbebekós). The only referent Aristotle gave of this substance without parts was purely metaphysical: the matterless God who is pure activity without potentiality, and the heavenly stars made of an incorruptible quintessence. In the positive referents of the substances provided by Aristotle, the hylomorphic compounds, unity comes from the form, which in living substances is the soul. This implies a metaphysical hypostasis in a manner that is incompatible with current ontology. In an eminently Aristotelian line, Descartes defined substance as "that which only needs itself to exist" (*Principles of Philosophy* I, 51), and Spinoza, at the beginning of *Ethics*, stated "omina quae sunt vel in se vel in alio sunt" (*Ethics* I, axiom 1). These definitions of substance as something existing by itself are metaphysical for there is nothing that can in absolute terms be said to exist by itself separated from all other configuration: existence is always co-existence.

Following Gustavo Bueno, I will assume that any totality is characterized by having contours, "contained space", and "enveloping space" (Bueno 1999). The relationships and connections in the enveloping space, in the contour, and in the contained space must be determined in each case. The unity of a whole can be determined by the manner in which its parts are related or connected, thus enabling us to differentiate the whole from the enveloping space and from other similar wholes. In such case, we talk about the internal unity of the whole. However, unity can also be induced from the outside when it is a result of the action of the enveloping space. Here, we would be defining unity from the outside, without having to refer to its parts. This is the positive, non-metaphysical manner of speaking of a whole without entering its mereological structure as if it were an unanalyzed totality. In diairological wholes, this unity

provided from the outside is achieved when the limits of the whole are established by means of negative features. When biologists define the organic individual by the homogeneity of its genome (Dawkins 1982; Santelices 1999) or by functional integration (Sober and Wilson 1994, 1998; Folse and Roughgarden 2010; Moreno and Mosio 2015), they are taking internal unity as a reference. When the biological organism is defined as a unit of selection, its interaction with the environment is being taken as reference (Lewontin 1970; Gould 2002; Clarke 2013). The theory of the different levels of selection entails an assumption of different units of selection acting at the same time (Godfrey-Smith 2009). When Desmond Morris defines man as a "naked ape", the trait of the absence of hair on certain parts of the body compared to other primates is purely negative (Morris 1967). Irrespective, the distinction between internal and external unity is not an exclusive disjunction since wholes are never isolated and their unity often simultaneously depends on internal and external factors, as in biology.

The unity of a whole acquires different significance depending on whether it relates to a mereological whole, whose parts are linked by contiguous physical connections, or a diairological whole, such as the unity of a genus, whose species are related by similarity. In the first case, it is possible to refer to the unity of the whole by describing these connections and leaving aside the problem of their identity. Nevertheless, discussing the unity of a diairological whole requires considering the relations between the whole and the species and determining the identity between these species and the whole.

Establishing a given identity always means that a multiplicity of wholes that are compared and whose unity is presupposed must be considered. Identity cannot

be defined reflexively, as advocated in the law of identity, whereby every entity is identical to itself (∀x, x = x) since reflexive relationships are never original relationships. Identity is not purely logical, analytical or tautological, since it requires reference to the parts of a whole that may appear connected or assembled, as in diairological wholes, or that may be considered interrelated, as in the distributive identity of genera and species. Furthermore, identity must always refer to a certain parameter since it must be synthetically constructed in a specific context; it will be a geometric, arithmetic, genetic, organic, logical, legal, economic, linguistic, cultural, psychological or other identity. There is no reason to consider that logical identity or identity provided in the lexical structure of a national language should take precedence over identities constructed in other contexts.

Unities and identities can be classified in different manners.

1. When circumscribed to the content lending identity and unity to the whole, the most relevant distinction is the difference between anthropic and ananthropic identities and unities.

When an anthropic goal provides identity and unity, we are dealing with pragmatic unities typical of techniques and technologies, both of *praxis* and *poiesis*. The diversity of anthropic purposeful goals means that the same unity, the same whole, may have different identities: as Plato pointed out, the same substance may be used as a medicine, drug or poison depending on the context and intended purpose (*Phaedrus* 274e). These anthropic identities and unities are contingent since they depend on the purposes of the subjects. In techniques and technologies, the entire process, with the connections between

its heterogeneous parts, is the mereological moment to which the unity relates, while the identity of the whole requires its diairological classification among other wholes. In both cases, the related purpose must be taken into account. Further, identity and unity can be provided by ananthropic contents, as in the theorems and principles of the natural and formal sciences, and in geometric, physical-chemical, geological and biological unities and identities, among others. These identities and unities initially appear as phenomenal, but the case may arise in which their necessity ends up being deterministic: the identity between the star setting at dusk and the star rising at dawn; the identity of the different conical curves in projective geometry; the identity between gravitational and inertial mass in relativistic mechanics; and genetic identity. Reciprocally, there are impossible identities and unities defined by the impossibility of composing certain parts among themselves: the regular decahedron, the perpetual motion machine or the disembodied living being. In different sciences, the same substantial unity can take on different essential identities depending on the field in which the specific whole is inserted. A cow is a set of atoms for the physicist, a system of cells for the biologist and a price object for the economist. The mereological whole "nose" is in principle a biological concept, but could be explained by means of a mathematical function, approximating the curve of the contour of a canonical nose by Fourier series.

The limit to this manner of understanding the issue is set by the existence of specific regions of reality in which totalities cannot be properly distinguished, and in which it is not possible to speak of purpose, of unity or of identity. In these regions, there are contingent, random transformations, and one could simply speak of the irrevocability of the results once they occur. Aristotle spoke

of chance in ananthropic contexts when there is no adequate purpose for the result that has occurred. In the random collision of two bodies, there is a causal determination of the movements of each body, but there is no purpose to the collision itself. In anthropic contexts, when this contingency occurs at the same time as the intentional purpose of the subjects, then Aristotle speaks of luck, as when we luckily encounter a friend who owes us money (Aristotle, *Physics* II.5, 197a6-7).

2. When circumscribed to the nature of the connections between the parts, unities and identities may be "aggregates", "structures" and "systems". Aggregate unities are endowed with a precarious unity since the connections among the parts are weak and contingent, and the parts can be composed in any proportion. Sometimes, the parts are homogeneous: in mathematics, aggregate is usually synonymous with addition and the sum assumes the homogeneity of the addends. This also happens in the economic concepts of aggregate supply and demand. In other cases, the parts are heterogeneous: in geology, an aggregate of minerals can give rise to a rock or a conglomerate. These heterogeneous aggregates are often described as amorphous to highlight the relatively indeterminate or random nature of their morphologies. Peter Gerstl and Simone Pribbenow's distinction between mass and complex is limited to considering different types of aggregates depending on whether their mereological parts are homogeneous or heterogeneous (Gerstl and Pribbenow 1995). In diairological wholes, the aggregates are genera endowed with a precarious unity; they are "laundry lists" with a minimal, contingent connection between their parts.

In the unity and identity of "structure", the parts are arranged, connected or related in a certain way. The structure of a building or a machine relates to the manner in which its parts are arranged and connected. The same is true of the structure of a work of art, a narration and an argument. Not all wholes are structures, since there can be totalities where the arrangement of the parts does not play a relevant role in the definition of the whole (unstructured wholes), as in the aforementioned aggregates. When applying the idea of structure to a whole, we are seeking to emphasize the importance of the arrangement of the parts and their connections. Meshes, nets, patterns and plexuses are types of structures. In algebra, it is common to define a group, ring, vector space and many other structures. In fractal structures, the parts have the same configuration as the whole. Like genera, diairological wholes can also have a structured unity and identity: structuralism, as a methodology in certain social sciences, promotes the study of many of these structured genera (the elementary structures of kinship, the lexical structures of linguistic paradigms, etc.).

The unities and identities of the "system" have a double holotic structure with parts (which I call "bases") and subparts, so that the relationships or connections between the parts occur through the parts of the bases. In technical and technological anthropic systems, the purpose of the system provides its unity. In my view, scientific laws coordinate the parts and subparts of specific ananthropic systems (the solar system, the system of regular polyhedra, the periodic system, etc.). The principles of a given science

coordinate the theorems of that science, thus forming a scientific field that is also a system (reference deleted for blind review). Plato's discussion of the differences between the whole consisting of gold grains and the face as a whole point to the difference between the aggregate (the pile of gold grains) and the structured or even systematized whole (the face) (Plato, *Protagoras* 329d).

Table 2. Examples of different kinds of unities and identities

	anthropic	ananthropic
aggregate	amalgam	geological conglomerate
structure	structured narration	snowflake
system	political State	solar system

4. The idea of finality and its four modulations

I start from the assumption that the idea of finality, understood as an analogy of proportionality, requires dealing with processes that entail the constitution of a totality endowed with multiple parts that receive their unity and their

organization from a specific configuration I call the end. This totality can be successive or simultaneous: the first corresponds to teleocliny and processual finality and the second to teleomorphism and configurational finality. It must be noted that, in principle, the finality takes the structure of a processual totality and that the configurational finalities that may eventually be taken into account are simply a moment in a process in which time has been abstracted, in the same way as time is abstracted in geometric theorems.

Constructing the idea of finality as an analogy of proportionality does not imply that there is an overall finality that applies to everything that exists or that there is a teleological structure that itself connects the different modulations of the general idea, since there is a disconnection between the different regional modulations of the idea of finality. In addition, it does not mean that all existing processes or configurations are teleological, or that the different, actually existing finalities are connected to each other. Therefore, any transcendental, metaphysical interpretation of finality is rejected, and finality is interpreted in a regional manner. Materialist atheism opposes any transcendent interpretation of finality and all manner of processionism.

As proposed by Gustavo Bueno, I distinguish four modulations of the idea of finality. First, I consider the specifically human purposive finality as found in anthropological and historical institutions, most typically in techniques and technologies. The construction and handling of any technical artifact (a hunting trap, a flint ax, a ceramic vase, etc.) imply a purposive finality, which can be represented by means of the human language of words and which orders the entire process. There is no need for any metaphysical or idealist interpretation of the future character of the pursued end since that end is but a memory (with

possible variants) of earlier processes (Bueno 1984: 17). As regards techniques and technologies giving rise to artifacts (Aristotelian *poiesis*, Latin *facere*) it is possible to disassociate (albeit not separate) the subjective moment from the objective moment of the finality. The construction process and use of the technique is the subjective, processual moment, while the artifact itself is the objective, configurational moment. Even if it is an automatic machine like a hunting trap, the artifact is unintelligible without reference to its anthropic purpose. In institutions that do not directly give rise to artifacts (many social, political, military, religious and other institutions, which Aristotle called *praxis*, or *agere* in Latin), the objectual aspect of finality is less evident. When interpreting human language as a technical system entailing “doing things with words”, we will always be able to discern objective issues in any practical knowledge; furthermore, anthropological institutions are ordered by norms that are suprasubjective.

Purposive finality can also be located in the behavior of non-human animals, such as hunting, stalking, courtship, feeding, exploration, rest, appeasement and many others. In these psycho-ethological contexts, the absence of a human-like word-based language does not preclude the existence of behaviors that, in exercise, are endowed with intent and organized in view of a purpose. With all the limitations described by ethologists, the use of tools by many animals (anthropomorphic, birds, fish, etc.) and the presence of other forms of objective culture (nests, dikes, etc.) point to an objective moment, close to the configurational finality, although in this psycho-ethological platform the finality is fundamentally subjective and processual.

Biology offers us a multitude of illustrations of teleomorphism (configurational purpose) and teleocliny (processual purpose) that, based on materialist and rationalist assumptions that reject intelligent design, can be interpreted as a non-purposive modality of finality (which E. Mayr called teleonomy: Mayr 1965). Although this organic finality is immanent and simply the result of blind evolutionary processes, it is worth acknowledging certain structures partially analogous to those existing in anthropological and psycho-ethological platforms, since there is a totality endowed with multiple parts that receives its unity and its organization from a certain configuration that is now identified with a specific biological function. This is the case of organisms adjusted to each other by symbiosis, of the multiple adaptations of organisms to the organic and inorganic environment and of the functions of different organs in the same organism. Cell division, embryonic development, death, apoptosis, metabolism and myriad other biological processes show this vector-oriented structure towards ends or functions. Understanding the morphologies of many organisms and their organs also requires dealing with the ends or functions in which they are involved, such as the fitness between a predator's organs and a prey's configuration or between reproduction organs of sexually dimorphic organisms. Problems arise when attempting to distinguish mechanical replication (such as in the formation of a NaCl crystal) from biological reproduction.

Finally, in the realm of the inorganic and in mathematics, it is also possible to find complex totalities that seem to be ordered based on a non-purposive end internal to its own structure. The decay of radioactive elements, the trajectory of inertial motion and the tendency toward thermodynamic equilibrium may serve as illustrations of inorganic teleocliny. As a structure seeking to minimize the

surface area for a given volume, the "soap bubble" configuration could be provided as an illustration of the configurational moment of inorganic teleology. In geometry, attractors (points, curves, fractals) appear proportionally analogous in certain features to other non-purposive teleological structures and processes. Insofar as the time variable is not an internally mathematical variable, the processual and configurational moments are difficult to distinguish in these sciences.

Table 3. Illustration of the modulations of the idea of finality

modulations of the idea of finality	**purposive finality**		**non-purposive finality**	
	normative teleology	**behavioral teleology**	**organic teleology**	**inorganic teleology**
configurational finality	artifacts	objects intentionally made by animals	teleomorphism goal-adapted anatomic structures	limit of a mathematical series
processual finality	historical and anthropological institutions	animal behavior: hunting, courtship, appeasement	teleocliny metabolism reproduction death apoptosis	free fall thermodynamic equilibrium

The four modulations of the idea of finality can be classified into two large groups. On the one hand, the anthropic contexts of doing and making include the Aristotelian *praxis* and *poiesis* (corresponding to the Latin *agere* and *facere*), the distinction between practical and productive activities. In these contexts, the purposive ends provide unity and identity to the processes and configurations. On the other are the categories of being, studied by the strict sciences, which give rise to ananthropic wholes where a non-purposive finality can exist and in which unity and identity are regulated by scientific principles and theorems (reference deleted for blind review). The behavioral finality characteristic of non-human animals should be placed in the middle ground.

Lastly, processual ends can be classified based on the type of process considered, depending on whether they seek the constitution of a new unity and identity, its preservation or its disappearance. In Table 2, I provide some illustrations of each of these types of ends, both in processes regulated by a non-purposive finality, as in the strict sciences, and in anthropic, purposive processes, as in techniques and technologies.

Table 4: The varieties of processual finality

Type of process	Constitutive	Conservative	Consumptive
Non-purposive finality (without demiurge)	mitosis speciation self-organizing chemical system	homeostasis homeoresis enantiostasis allostasis dynamic equilibrium	apoptosis extinction corruption dissipation
Sciences	Hayek's cattalaxy		disgregation
Purposive finality (with demiurge)	"evolutionary" computation	steam engine governor servomechanisms of self-steering aircraft	traps weapon system
Techniques Technologies	making of a technical or technological artifact		political parties promoting secession

Concluding remarks

1. The unity of a whole takes on a different significance depending on the type of whole taken into account:

a. In mereological wholes, unity entails a consideration of the connections between the internal and external parts, and the whole is defined by its spatial and temporal contiguity.

b. In diairological wholes, the unity of the whole is constructed through the relationships of similarity and difference between the species that occur through the genus.
The parts taken into account to evaluate the unity of the whole (either mereological or diairological) are both mereological and diairological.

2. Determining the identity of a whole requires:
a. Taking into account the connection of the parts of the mereological whole and the connections of that whole with the environment.
b. A distributive comparison of the species in the diairological whole with other species to determine their relationships of similarity and difference.
In anthropic and ethological wholes, such distinctive parts are the goals, in biological wholes they are the functions and in physical wholes they are scientific theorems and principles.

3. In mereological wholes (either processual or configurational), the parts that are taken into account to discuss their unity and identity are always formal parts. In diairological wholes, the species are formal parts with respect to the genus, and the species parts considered must be distinctive, formal parts.

4. The unity and identity of a whole can be that of an “aggregate”, “structure” or “system”.

5. Finality refers to processual wholes and their formal parts. The ends act as distinctive formal parts. The exclusive configurational finality is an extreme,

abstract case. In the processual finality, I distinguish constitutive, conservative and consumptive ends.

The idea of purpose is an analogous idea of proportionality that has four internal modulations: anthropological, behavioral, organic and inorganic.

6. Unity, identity and finality acquire different specific contents depending on the anthropic or ananthropic nature of the whole taken as reference.

a. Anthropic wholes deal with practical purposes and are linked to the operations of the subjects, as in techniques and technologies.

b. The laws and principles of the strict sciences define the ananthropic wholes.

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