Entities and Their Genera:
Slicing up the World the Medieval Way–And Does it Matter to Formal Ontology?

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Abstract

Genera, typically hand-in-hand with their branching *species*, are essential elements of vocabulary-based information constructs, in particular scientific taxonomies. Should they also feature in formal ontologies, the highest of such constructs? I argue in this article that the answer is "Yes" and that the question posed in its title also has a Yes-answer: The way medieval ontologists sliced up the world into genera does matter to formal ontology. More specifically, the way Dietrich of Freiberg, a Latin scholastic, conceived and applied strictly generic criteria to slice up the world into its entities can provide some guidelines to the field of formal ontology with respect to not only its contents, but also its scope. In particular, Dietrich's *information criterion* plays here a central role.

Key words: Ontology & Information; Formal ontology; Scholastic ontology & Albertism; Genera & Species; Dietrich of Freiberg

1 Introduction

Broadly conceived, ontology doing is a basic cognitive skill for dealing with concepts and the *relations* among them. Take a domestic cat: One does not need to be a zoologist to know that a cat *is an* animal, and that animals and plants, differently from, say, rocks and bikes *are* animate beings; likewise for one's knowing that tabbies, Siamese cats, and Persian cats *are* all just domestic cats, no matter how diverse they might

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look.[1] As a matter of fact, a 3-year-old child is likely to know all the above, perhaps with the exception of the latter finer-grained distinctions (e.g., Hills et al., 2009). Despite the believed innateness of this skill that reflects itself in the constitution of what we since the late 1960s have called semantic memory (see, e.g., Collins & Quillian, 1969, 1972; Rosch, 1973, 1978; Rosch et al., 1976), concepts are shared within communities–or even cultures–by means of the largely unconscious action of both the *Volksgeist* and the *Zeitgeist* (Augusto, 2021; 2022).

Commonsense ontology appears to be a good coinage for this basic cognitive skill that, when conscious, becomes a philosophical effort that we can refer to as *mainstream ontology*.[2] When additionally this sharing becomes strategical and instrumental, we speak of *formal ontology*, and of an *ontological commitment* rather than just *commonsense*. One of the main aspects of an ontological commitment is the way one chooses to "slice up" the world with a view to coming up with its most basic, or foundational, entities in the case of a *foundational ontology*, or with a complete and exclusive account of one of its domains–say, animal phenotypes–in a *domain/application ontology*.[3] The domestic cat can figure in the latter up to its distinction into tabby, Siamese, Persian, etc.; this distinction might indeed be relevant in a veterinary context restricted to felines or even just pets. However, the domestic cat will not feature in a foundational ontology; nor will "animal," for that matter, as this is already too fine-grained an element of the world. Instead, we might find "*genus*" and "*species*" as the very coarse-grained entities to which animals and domestic cats respectively belong.

But in today's formal ontology genera do not typically feature explicitly among the basic categories that go on to constitute foundational ontologies, even if they feature prominently in scientific taxonomies; nor do they feature implicitly. One reason for this is that ontology engineers proceed to slice up the world by trying to capture the "things" that compose it neglecting the fact that this is a cognitive task of a special type: *Ontology engineering* is first and foremost an information-based/driven activity (e.g., Smith, 2021); it aims at both capturing the world as *veridical classification* of its constituents (categories; entities; classes and relations; etc.) and promoting

[1] I am finished with a different font (this) for classes and italics for relations (henceforth, I resume the typical use of italics).

[2] There is still no consensual label for what I call here commonsense ontologies; they feature in the literature as *naïve ontologies* (e.g., Dahlgren et al., 1989; Gupta et al., 2010; Moltmann, 2021, where they are also called *ordinary*), *everyday ontologies* (e.g., Brey, 2003; Jubien, 1993; Sattig, 2012; Sider, 2000), *ordinary ontologies* (e.g., Moltmann, 2021; Sadegh-Zadeh, 2012; Sider, 2009), or–my choice label–*commonsense ontologies* (i.e. Dölling, 1993; Dragoni et al., 2018; Hirsch, 2008; Kriegel, 2011; Nickles et al., 2007; Singh, 2002). Despite these seemingly pejurative labels, these ontologies are crucial in many and diverse ways, from providing clues to the creation of learning strategies (e.g., Gupta et al., 2010) and marketing products (e.g., Dragoni et al., 2018) to being a spontaneous exercise in (pre-)philosophical ontology (e.g., Casati, 2003; Chalmers, 2009; Heidegger, 1975/1982). What brings these ontologies together under the same label is the fact that they reflect our naïve realism, which is mirrored in our natural-language use, i.e. we see our commonsense perceptions of the world and our ways of speaking about them as identifying real (classes of) entities and relations in the world. Another way to put it is to say that they reflect our *commonsense knowledge* as expressed semantically by means of semantic items and their relations, with an abstract structure that is believed to correspond to semantic networks. The label "commonsense ontologies" is actually a misnomer, as these can be extremely complex constructs that often require strictly formal means when under analysis (e.g., Saba, 2010; 2020).

[3] *Slicing up the world* is thus defined as a technical concept and I henceforth dispense with the inverted commas.

the–largely computer-based–use of this *information* for scientific and corporate ends.[4]

This provides a broad definition of formal ontology as synonymous with ontology engineering. I argue in this article that the question posed in its title has a Yes-answer: The way medieval "ontologists" sliced up the world into genera does matter to formal ontology precisely because it was founded on the effort to distinguish clearly between universals and particulars, a topic that was as central in medieval ontology as it is today (e.g., Guarino, 1998b; Guizzardi et al., 2004; Neuhaus et al., 2004). For some authors, this was an informational perspective, where the term "informational" has to be contextualized. More specifically, I aim to show that the way Dietrich of Freiberg, a late medieval philosopher working in the general context of what might be called Latin Scholasticism, did slice up the world into genera based on the medieval concept *informatio* can, despite the centuries that separate this from our contemporary understanding of *information*, throw light in many issues today pertaining to the field of formal ontology that in turn implicate not only epistemology and science, but also ethics.

This article is the third, following Augusto (2021, 2022), in a project of bridging mainstream and formal ontology. Each of these articles is, and the subsequent ones will also be, centered on one of the five parts of Dietrich's text *On the origin of the categories* (Dietrich von Freiberg, sd/1983), abbreviated as *De origine*. The main topic is introduced in Section 2; in Section 4, I elaborate on Dietrich's analysis of genera as an ontological commitment based both on his context and his text *De origine* III (Section 3).

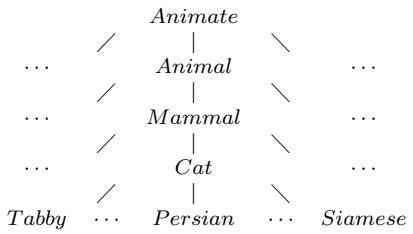
2 Genera in Ontology: A Matter of Information

2.1 Universals in Ontology, or how Porphyry's Tree Is Still Alive and Kicking

It is not impossible that a 3-year-old child, if asked to, comes up with a correct hierarchy for the concepts given in the first paragraph of the Introduction;[5] as said there, this is believed to be a cognitive phenomenon that is fairly distributed in humans to the point that we actually share it. However, not many adults get a domain or

[4]By "veridical classification," I mean sentences such as "X is Y" or "X is a part of Z" that have a model in some adequate logic. See Augusto (2020b).

[5]In the language of set theory, we have the (strict) containment relation $AnimateEntities \supset Animals \supset Mammals \supset Cats \supseteq \{tabbies, Siamese, ..., Persians\}$ that can be depicted as a down-growing tree:



This tree can be interpreted as a hierarchical structure from the most general (the root) to the most specific (the leaves), with more or less general/specific constituents in between (the nodes). Note that here "general" and "specific" should be taken literally, i.e. as referring directly to genera and species.

application ontology–let alone a foundational one–right, either alone or working in groups. One reason for this is the ignorance with respect to the fact that this ability implicitly contained in a human semantic memory is both perceptual and conceptual (Hills et al., 2009), and these two only tango well when guided by logical reasoning (Augusto, 2014). For instance, a child's semantic memory is well-structured when in it the class of objects that have wheels (a perceptual property) is largely equivalent to that of objects that are used for transportation (a conceptual property). In other words, an ontological commitment is essentially (and not only formally) a question of logic, namely of semantics (e.g., Guarino, 1998a; Guarino et al., 1994; Smith, 2004).[6] Semantics, in turn, can be seen as a question of turning information into knowledge via veridical interpretation, a process that can–and should–coincide with epistemic justification (Augusto, 2020b).

While every ontological commitment is largely a product of a strategic effort that tries to abstract from the *Volksgeist* and the *Zeitgeist* by replacing them by a restricted group and a specific context, those factors remain implicit in the framework of such a production.[7] This holds also for the Middle Ages, even if the coinage "ontology" dates only from the early 17th century (Smith, 2022): The problem of universals was the restricted context in which much of medieval ontology was conceived (e.g., de Libera, 1996; Pinzani, 2018), so it is not surprising that in medieval authorities such as Boethius, Aquinas, and Albertus Magnus the terms "*genus*"and "*species*" together with–but perhaps more frequently than–"*differentia*," "*proprium*," and "*accidens*" feature prominently. Each one of these authorities and the likes of them had their own views on the ontological status of these five elements a.k.a. *universals*, but it indeed appeared that they were necessary to slice up the world into its most basic constituents. In effect, they all set out from Porphyry's Tree (Fig. 1) as the authoritative construct that guided the intellectual effort of slicing up the world.

Looking at Figure 1, one sees an *ontological* diagram in which every one of the ontological components, with substance at the head (or root), is a successive binary branching from the coarsest- to the finest-grained, a distinction that is reflected in the loss of generality vs. gain of specificity obtained in the branching of each *genus* into its corresponding main *species*. Substance is so to say the coarsest-grained, or the most general genus, in the sense that everything that (there) is is first and foremost

[6] I would add that it is a question of *fuzzy logic* and hence of *fuzzy semantics*. For instance, in this example we cannot speak of bivalent–or crisp–equivalence, as there are objects used for transportation that do not have wheels (e.g., boats) and objects with wheels that are not used for transportation (e.g., windmills). Let T and W be the respective sets of these objects; then we do *not* have $T \sqsubseteq W$ and $W \sqsubseteq T$ (i.e. $\neg\left((T \sqsubseteq W) \sqcap (W \sqsubseteq T)\right)$, to use the notation of standard basic description logic), and hence $\neg (W \equiv T)$. However, we might have $T' \sqsubseteq_\varepsilon W$ and $W' \sqsubseteq_\eta T$, where T' and W' are proper subsets of T and W, respectively, and $\varepsilon, \eta \in (0, 1]$ are degrees of inclusion, so that we have $W \equiv_\kappa T$ where $k = \min\{\varepsilon, \eta\}$, by applying the identity $\prod_{i=1}^{n} \varepsilon_i = \min\{\varepsilon_i\}_{i=1}^{n}$. We then say that the sets W and T are equivalent to degree k, and we may specify this equivalence only whenever $k \geq 0.5$ (for instance; more restrictive notions of logical equivalence may be applied up to the crisp equivalence $k = 1$). See Augusto (2020a) for the essentials of fuzzy logic from the perspective of matrix semantics and for the standard literature.

[7] For instance, the design of the Human Phenotype Ontology (HPO; [1]) required the work of a group of experts in the restricted context of high precision medicine, which is however a product of contemporary "Western" attitudes towards medicine associated with recent technological developments. HPO itself is a product of the recent relevance of ontology for (computer-based) information science that so to say resuscitated what in other periods of history was an active field of research largely without practical applications in view.

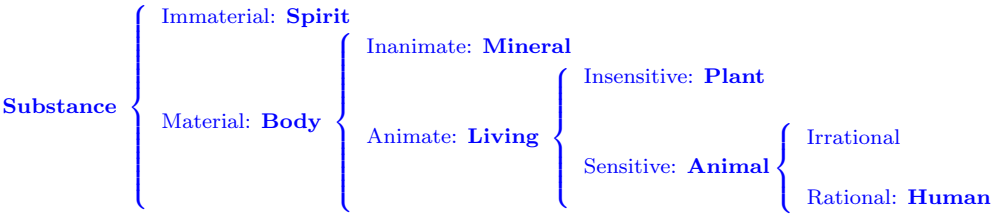


Figure 1: Porphyry's Tree depicted as an ontological diagram.

substance; this is so general that in fact it equates to not saying much–if anything at all–precisely because we have not yet started to differentiate it. When we do so, substance is distinguished into two genera, to wit, immaterial and material, the latter of which in turn can be seen as branching into two distinct species of body, animate and inanimate, respectively; these can then be taken as genera for the next binary splitting into species, and so on up to the terminal species. All the binary distinctions are implicitly (in this diagram) based on the *difference*, which in turn has to do with what in each genus/species is *proper* or *accidental*. The branching ends with the human species as a subdivision of the genus animal by means of the rational-irrational difference, it being the case that rationality is believed to be proper to humans (while, say, being tall or short, black or white, sitting or standing, etc., are accidental and can be equally said of a horse or some other animal). What follows after "human" as an animal species are *particulars*, or the individual humans like Hipatia, Alan Turing, John, Mary, me, you, etc., about each of which there would be a lot to say, so much indeed that there might be an informational overload and high entropy as a consequence (cf. Augusto, 2020b).

So, besides logic, an ontological construct is also–or perhaps first and foremost–a matter of information. If the informational and the logical (i.e. formal semantic) viewpoints coincide, as they should in an ontological commitment, the distinction between the ontological and the informational-logical perspectives can be further clarified as follows: In the diagram above that depicts what was typically represented in a tree-like manner (see Fig. 2), all the nodes are labeled by *concepts*, but it is the universals what structures them into an ontological construct. And if we move from this foundational ontology that is Porphyry's Tree to a domain ontology for, say, domestic cats, then what we have are particulars. Taken from the viewpoint of a scientific ontology, particulars are here not so fine-grained as to be individuals (say, Garfield), but rather breeds like Siamese cat, Persian cat, etc. This is, after all, what we know as (natural) science based on rigorous formal definitions and foundational relations that go on to constitute well-founded–i.e. philosophical-like–formal ontologies (e.g., Smith, 2004). But the problem of how to *individuate, or particularize, successively the universals* is a philosophical one through and through, even if–or especially when–taken from an informational viewpoint.[8]

I clarify this statement. Porphyry's Tree (see Figures 1 and 2) is in fact (also) an *informational* diagram, and this in two senses: Firstly, it is informational in the

[8]Henceforth, I often write "informational" to mean "informational-logical." This is not the case when discussing Dietrich's views, as he clearly separated information and logic (see below).

sense that it conveys the intended information on how genera branch into species and successively on; this is so both for the medieval and the modern reader alike, and it also entails that from the universal to the particular the informational content grows (e.g., there is more to say about the horse Freddie than about the species "horse," than about the genus "animal," and so on up to "substance"). But for the late medieval scholar Porphyry's Tree was an informational construct in the narrow ontological sense of information, or the "introduction of a form" that can be general or specific, so general indeed as to allow for the classification of a whole genus (say, animal), or so specific as to define a species (horse, say). This latter sense, largely lost to the modern reader, is dependent on one of the core concepts of medieval metaphysics, to wit, the *form*.[9]

2.2 Genera and Information in Formal Ontology

Ever since C. Linnaeus first published his *The system of nature* (Linnaeus, 1735) that genera and species have been foundational concepts in scientific taxonomies, namely in biology. This relevance appears to be wholly informational in the narrowest sense, a feature that is to be attributed to the very conception of a taxonomy (e.g., Ereshefsky, 2001). This conception favored a perspective on taxonomies as educational constructs, a feature shared with ontological diagrams since the very identification of ontology as a separate subject within metaphysics (Smith, 2022). With the recent development of information systems in the computational sense, especially in relation with the Semantic Web, this purely educational perspective has become almost obsolete or is now largely neglected in contrast to ever-growing industrial and corporate objectives (e.g., Feilmayr & Wöß, 2016; Obrst et al., 2003): Information and ontology have become so intertwined that we can both speak of *ontology-driven information systems* (e.g., Guarino, 1998a) and *information-driven ontology* (my coinage). In both cases, ontology is essentially software engineering (e.g., De Nicola et al., 2009).

This "informational turn" is instrumentally founded on mathematics and–instead of genera and species–*classes* and the *relations* among the members of classes play the central role today in ontology, being conveniently visualizable by means of mostly graphs and trees (e.g., Fu et al., 2013; Landgrebe, 2022). This is believed to be a satisfactory means of representing knowledge, and knowledge-representation languages that closely reflect this class-relation visualization have been conceived, some of them now as developed as to be recommended for web use (e.g., Grimm et al., 2007). From the metaontological viewpoint, classes can be seen as universals and their members as particulars, in a conception that often falls into the *type-token* stereotype. Among many other insufficiencies, this format is incapable of accounting for the persistence–technically better: endurance–of universals in face of the changes that particulars may undergo throughout their existence. For instance, a horse begins its individual existence as an embryo and ends as a carcass. Are the embryo and the

[9]Briefly–but see below for an elaboration–, the form accounts for one of the well-known four Aristotelian causes, and together with the other three (material, final, and efficient causes) the formal cause allows for knowledge of any given entity: If you know what an entity is made of, what it is for, what its form is, and who or what made it that way, then you cannot fail to know this entity. It is precisely when taken in the literal sense of *in-form-ation* in Latin Scholasticism that the form becomes the determinating criterion–what I below call the *information criterion*–for identifying the different genera and their respective species.

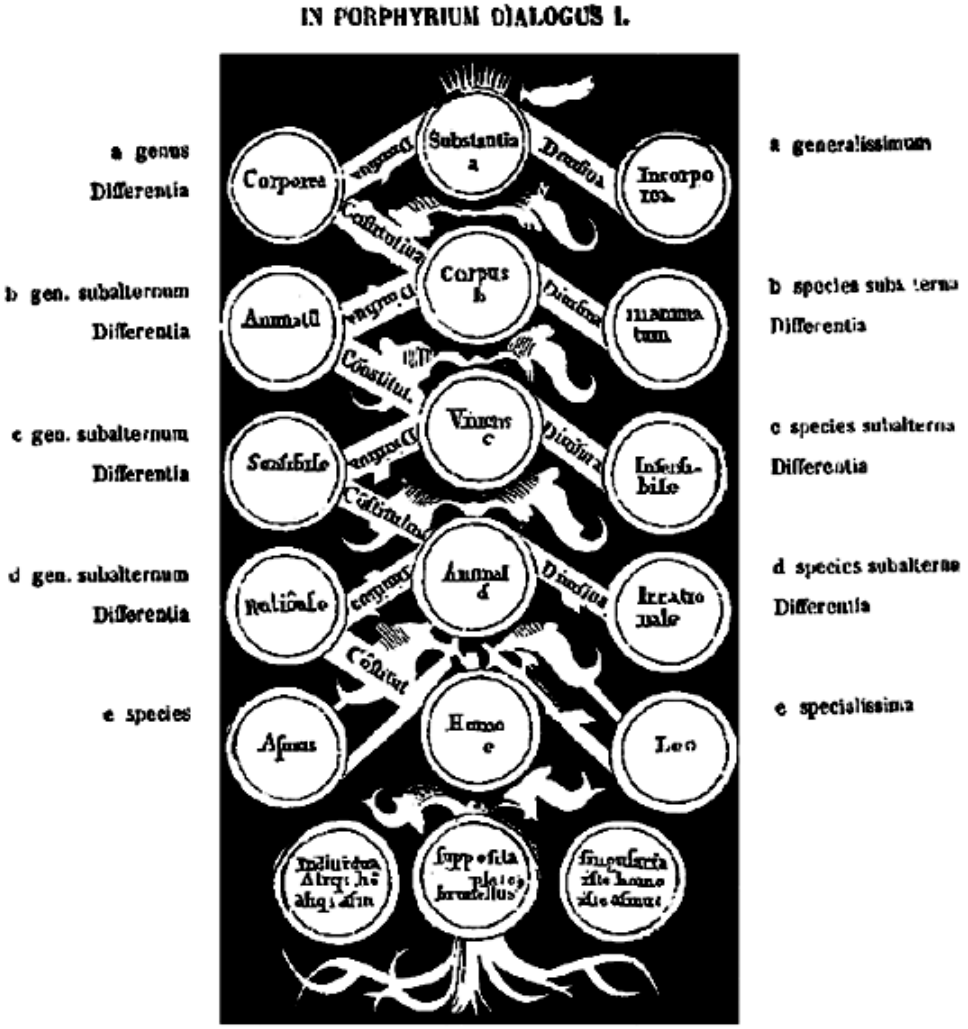


Figure 2: Porphyry's Tree in a medieval tree-based depiction. (Image in the public domain.)

carcass also tokens of the type "horse" or are they tokens of some other type? And, as a matter of fact, are they also tokens of "animal"? Formal ontology tries partly to solve this informational problem rooting in change by distinguishing so-called *3D-* and *4D-entities*, or *endurants* (also: *continuants*) and *perdurants* (also: *occurrents*), respectively, a distinction with philosophical roots (e.g., Lewis, 1986), but this has also proven to be problematic: For instance, in the statement "My feet are warmer now than they were during the time I was outdoors walking in the snow," my feet are both a 3D-entity (first occurrence) and a 4D-entity (second, anaphoric occurrence). One might argue that these entities may coincide: From the perspective of presence, an entity may be taken both as being wholly present in every instantiation (e.g., my feet) and as being only partly present at any one instantiation (e.g., my feet during the time I was outdoors walking in the snow). But in fact this distinction, based as it is on a concept of *instantiation* that often confuses time (an *instant*) and space (an *instance*), namely in the case of material entities, leads (back[10]) to a long-standing contention with respect to the very ur-elements of an ontology: Are these *spacetime*, taken as single ur-entity, or are they *space* and *time*, mutually independent ur-entities?

These issues, however, show how central a role the universal-particular dichotomy still plays in today's ontological constructs. What of the medieval universals above? Genera and species are not wholly absent from the prolific constructions of formal ontology. A few examples can be given:

- Placing the emphasis on an ontological account of species, Schulz et al. (2008) aim to "demonstrate how hidden ambiguities of the species concept can be dealt with and existing controversies can be overcome" in medical ontologies. (See [2] for the associated ontology.)
- Walls et al. (2019) go farther and use the "Aristotelian or *genus-differentia* format" to define terms. In this format, to wit, "An A is a B which Cs" (Arp et al., 2015; Rosse & Mejino, 2003), "the genus term B represents the more general group of entities of which the term of interest A represents a subgroup. The *differentiae* C are those characteristics that set apart the members of this more specific subgroup A from the wider group B." The authors actually provide examples of the *differentiae* as used to define plant structure development stages. (See [3]).
- Also based on the *genus-differentia* format is the Ontology of Microbial Phenotypes (OMP), which was created to standardize the capture and storage of phenotypic information for microbes (Chibucos et al., 2014; [4]).
- Neuhaus et al. (2004) take the universals in the sense of genera, namely seen as higher-level universals (the lower-level universals are the species), and they go as far as to provide a complete formalization, which includes a first-order logic axiomatization, of the relation *GenusOf* as, according to the authors, "a rigorous rendering of the neo-Aristotelian perspective on the distinctions between substances and qualities and between universals and particulars."
- The Human Cell Atlas (HCA) Data Portal [5] considers a *species ontology*, in which genera apparently play their typical taxonomical role.

[10] As far back as to theoretical physics. See, for example, Dieks (2006; 2008) and Petkov (2005; 2010).

These works do indeed deserve attention as being some of the few honorable exceptions to the neglect of genera in formal ontology, but they are very much restricted to scientific ontologies, so much so that it is difficult in some of them to distinguish (an) ontology from (a) taxonomy. As early as in 1951, however, J. B. Gittler already analyzed the concept "genus" in the context of sociological investigations and constructs, namely in the format of what he called "social ontology" (Gittler, 1951). More recently, Searle (2008) sees the task of exploring the nature of political power in its relation to language as "Aristotelian, in that we are seeking progressively more refined *differentia*, to get from the *genus* of social facts to progressively more refined specifications, that will give us the *species* of political reality." We thus have it that the concept "genus" and its associated concepts "species" and "*differentia*," taken (with caveats) in their original Aristotelian sense, are being used in ontological constructs that go well beyond the strict scientific, taxonomy-like, applications above and aim at promoting social and political awareness and action. In other words, the slicing up of reality into its genera produces here information taken in the broader perspective of both a prompt and a support for agency (Augusto, 2020).

Agency is often a non-trivial matter and it is never less trivial than when ethical issues are involved, frequently so because we lack clear conceptualizations; contemporary (meta-)ethics would have by now realized this informational power of ontologies, one should think. The relations between ontology and ethics are very actively investigated–indeed debated–in mainstream approaches (e.g., Long, 2004; Putnam, 2004; Taylor, 2003), but this heat has not been transferred to the cooler field of formal ontology. To be sure, there are some worthy exceptions: For instance, Koepsel et al. (2009) clearly see the descriptive–their term–or informational–my choice–power of ontologies and accordingly propose a Biomedical Ethics Ontology (BMEO) that, by interacting with the already existing Ontology for Biomedical Investigations (OBI; [6]), "would benefit members of ethics committees who deal with protocols and consent forms spanning numerous fields of inquiry." Interestingly, and partly belying the failure of the first law of thermodynamics hinted at above, DuBois (2009) sees this project of a biomedical ethics ontology critically and redirects it instead to a social ontology, writing:

> A BMEO would need to address two main kinds of entities, regulatory definitions and ethical concepts, and is ill-suited to both. Regulatory definitions are fiats and ought to be adopted verbatim to ensure compliance, but in such cases we do not need the assistance of ontologists, and their modes of working (constant revision within open wiki-based communities) might even be counterproductive. Ethical concepts within pluralistic societies are social constructs, not *a priori* concepts or biological natural kinds, and the prospects of generating intuitive definitions that enjoy broad acceptance across cultures and institutional settings are slim.

Could the (Aristotelian) genera and their associated "lower-level universals," to wit, the species and the *differentiae*, serve as the basis for the generation of such intuitive definitions, namely with a view to supporting or facilitating ethical agency? Take, for instance, the problem of how humans handle other animals for our own ends (work, nourishment, leisure, research, etc.; see, e.g., Beauchamp & Frey, 2011); if taken from the viewpoint of the genus that we all share, "animal," which in turn is

a species of animated bodies differentiated by being endowed with sensation, these ends might appear under a different light. This awareness was already to be seen in Porphyry's Tree, which, nevertheless, needs revision in face of our contemporary concept of animal cognition and intelligence that strongly suggests that the *differentia* rational vs. irrational is not as clear cut as *generally* supposed (e.g., Bekoff et al., 2002; Lurz, 2009). A genus-species perspective might throw light also on issues to do with how human agents handle embryos of ours and other animal species, in both scientific and circumstantial contexts (e.g., Francis, 2017; Rivron et al., 2018); in these cases, attaining a clear conceptualization of what a "complete" entity is from the viewpoint of genera and species might guide us in securing (more) ethical agency. Etc.

3 Genera in Scholastic Ontology: A 13th-Century Informational Perspective

3.1 The Context: Dominican Scholasticism and Albertism

As briefly remarked above–but see Augusto (2021; 2022) for a development–an ontological commitment depends to a great extent on a group of experts responsible for, and on the context of, the design of an ontology. Even in philosophical investigations, in which it is typically the case that a single individual takes upon themselves the task of slicing up the world into its ur-constituents, a group is present in the sense of influences or constraints, which in turn are more or less explicitly dependent on the *Zeitgeist* and the *Volksgeist* (in the sense above). Taken broadly, these aspects characterize the late medieval European practice of argumentative philosophy as essentially concept analysis in which grammar and logic were greatly confounded; Latin was the *lingua franca* of this practice, which explains the coinage "Latin Scholasticism" for 13th-century and early 14th-century European philosophy.

Despite the highly technical nature of this argumentation Latin Scholasticism was in large measure a matter of conspicuously taking sides with respect to two influential religious orders, to wit, the Dominicans and the Franciscans.[11] Ca. 1286–as dated by Flasch (2007)–Dietrich of Freiberg, a member of the Dominican order, wrote a text entitled *Treatise on the origin of the categories* (translating the Latin title *Tractatus de origine rerum praedicamentalium*, here abbreviated as *De origine*). As its title indicates, in it this German scholastic philosopher proposed to investigate into the origin of the ontological categories, or the ur-elements from which the whole of reality can be derived. An exceedingly difficult task, as he owns in the beginning of this treatise (cf. Augusto, 2021), that recruits all the branches of knowledge available to the Latin scholastic, to wit, grammar and logic, which together with rhetoric constituted the compulsory disciplines known as the *trivium*, and natural philosophy and metaphysics–to give a very rough division of Latin-based university studies in philosophy at the time. This old curriculum was inherited from the 12th century, by the end of which it had been "refreshed" by a revival of Aristotelian philosophy due to both the recent availability of his esoteric works in (new) translations into Latin

[11] See Marenbon (1998) for details on this context.

and a large body of Arabic commentaries thereupon–also translated into Latin–that were highly influenced by Neoplatonism.

At the head of the reception of this extensive corpus on the side of the Dominicans was Albertus Magnus, a man who–despite his clerical status–clearly separated theology and philosophy (e.g., de Libera, 1990). This allowed a new focus on noetics, the study of the "mind" or intellect (*noûs*, in Greek), which ended up contributing to a strong intellectualism that characterized what can be called Dominican Scholasticism and that set off the constitution of a late medieval form of idealism in some of its members, namely Dietrich of Freiberg and Eckhart of Hochheim (see Augusto, 2009).[12] As a matter of fact, the role of Albertus Magnus–also known as Albert the Great or Albert of Cologne–was so central in this new direction of Dominican scholasticism that we can even speak of *Albertism*, borrowing Hoenen's (2011) term and expanding its scope to include Albert's direct disciples, among which Dietrich of Freiberg was not only included but also prominent.[13]

But Albertism fostered more than just a direct confrontation between Dominicans ("intellectualists") and Franciscans ("voluntarists"), both originally strictly religious mendicant orders or communities: It actually built itself up so strong a philosophical "movement" as to oppose and argue against *auctoritates* as influential as Thomas Aquinas, a Dominican himself, and William Ockham and John Duns Scotus, two prominent Franciscans. In the third part of Dietrich's *De origine*, besides the ubiquitous presence of Aristotle and Averroes Albertism is to be found in further aspects:[14]

(I) Criticism of nominalism, the stance inaugurated by William Ockham according to which the universals have solely a mental existence and as such pertain only to the realm of logic. In the philosophical jargon of Latin Scholasticism, universals were said to be concepts of concepts, and as such mere entities of reason (*entia rationis*), or things of second intention (*res secundae intentionis*). Directly in connection with this, logic was seen as essentially a theoretical science.

(II) Universality roots in form alone, whereas individuation requires matter. This is in direct opposition to the perspectives of both Thomists and Scotists–or the followers of Thomas Aquinas and John Duns Scotus, respectively–according to which individuation is founded on a formal principle (quantity for the former, the individual *differentia* for the latter).

(III) Against the real distinction between being and essence postulated by Thomism, an entity's being or existence (*esse*) is entirely determined by its substantial form, or essence (*essentia*). However, this is not the only source of existence, being only the cause of formal existence; besides the substantial form an agent–the

[12] More precisely, we can speak of an epistemological idealism, which actually roots in Aristotle himself rather than–as might have been expected–in Plato. See Augusto (2005, 2006a-b).

[13] This prominence is however not reflected in his fame: Dietrich of Freiberg remains largely an unknown philosopher, with only a few texts dedicated to him and his work. I refer the reader to Führer (2019) for an overview with literature and Flasch (2007) for a comprehensive study.

[14] With the *Zeit-* and *Volksgeist* in mind, I call the reader's attention to the fact that this presence, both implicit and–less frequently–explicit, goes against the prohibitions in 1277 aiming at a restriction of the influence of Aristotelianism in the Parisian university. These prohibitions, now known as the Condemnations of 1277, in explicitly defending faith against reason further widened the gap that separated Franciscans and Dominicans.

> efficient principle–is required to "bring out" an entity into existence. This, believed to be the correct reading of Aristotle, is a major point of discord opposing Dietrich to Aquinas.

I next analyze these aspects from the viewpoint of Albertism, namely of Dietrich of Freiberg. These aspects are very tightly intertwined and I shall frequently make cross-references.

3.1.1 Universals: Realism versus Nominalism

With respect to the first aspect, which falls precisely in the already mentioned (cf. Section 2.1) problem of universals in which nominalists and realists were the main contenders, Dietrich defends a realist position: The universals have a real existence; they are real things. But in fact it can be said that Dietrich's stance is ultra-realist in the sense that he sees them as things of first intention, whereas even for Albertus Magnus they were things of second intention–in conformity with the Arab interpretation of Aristotle based on intentionality. This requires a brief elaboration (see Augusto, 2022, for further details).[15] When discussing substance in his *Categories*, Aristotle clearly distinguished the first and second substances as the individual thing (e.g., the individual man; the individual horse) and the genera (animal) and species (human; horse), respectively. Looking at this distinction from the purely logical side, one can say that the individual thing corresponds to a concept in the mind, which makes it so that the genera and the species are concepts of concepts. If, as did the Arabic philosophers, one speaks of intentions (*intentiones*) instead of mind (*intellectus* in Latin, translating the Greek *noûs*), as Aristotle had done, the highly complex theory of intentions appears relatively simplified as depicted in Figure 3 and the division of tasks between the metaphysician, who investigates the first substances, and the logician, who studies the second substances (with respect to the first ones), appears well founded; the second intentions are thus the universals, i.e. what can be attributed to an individual thing (a particular) by abstraction as opposed to what really is in that individual thing (see, e.g., Amerini, 2011).

This is how Albertus Magnus receives, and ad$^{o}_{a}$pts, the Arabic interpretation of Aristotle, and henceforth the first and second intentions become part of the Scholastic jargon and the philosophical community largely follows this dichotomy. Except Dietrich of Freiberg. For him, and firstly, that a thing has its causal origin in the mind alone does not make it a mere thing of reason *tout court*; and secondly, in fact the second substances are not things of second intention, being instead things of first intention. His reasoning appears to be as follows: The notion of entity, the first and most formal of the intentions, is that which first separates a thing from nothingness or non-being, but it is the genus that distinguishes this from (all the other notions of) the other entities (cf. *De or.* III, 8); because that which individuates a thing is matter, which in turn is distinguished according to the different forms (see aspect III above), then it is necessary to find in all the forms an intention that accounts for the unity of matter, which is the genus (cf. *ibid.*, 11); this cannot be a mere thing of reason, because this unity of matter has either to correspond to a natural thing or to entail a natural thing, and thus the things of second intention are excluded not only

[15] See also Augusto (2006b, 2009), where standard literature is cited.

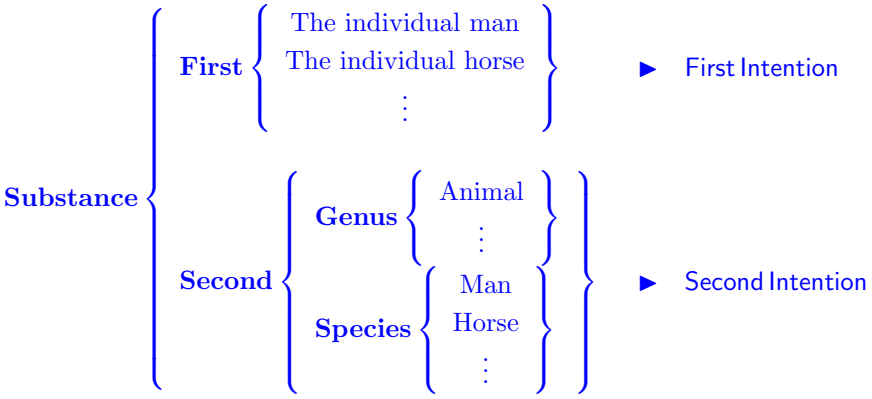


Figure 3: Aristotle's two substances (in Roman font) and the two Arabic intentions (in this font).

as the intention behind this unity, but also from the class of genera altogether (cf. *ibid.*, 14).

This removes logic as an appropriate approach to the problem at hand (*ibid.*, 12): The logician, or *philosophus rationalis*, slices up the world according to criteria that fail to produce a correct classification of its constituents into genera. In his explanation of this logical–or actually linguistic–perspective, Dietrich uses the terms "proportionality" (*proportionalitas*, in Latin) and "probability" (*probabilitas*) in a way that needs to be distinguished from their use in contemporary mathematical jargon. In the case at hand, proportionality is to be taken rather in the sense of putting two things (belonging to a class) into relation by means of an analogy with two other things (from another class) standing in a similar relation, a technique inherited directly from Aristotle.[16] But proportionality easily leads into error, as when the logician sees substance as constituting a single genus by considering the notion of *substanding*, when in fact the noun "substance" is originally conceived–imposed, in Scholastic lingo–from the notion of *subsisting*.[17] All in all, by applying proportionality genera are wrongfully conceived according to erroneous notions of commonality (e.g., "all bodies are delimited by their dimensions in the same way," so they all are seen as belonging to a single genus). As for probability, this is to be taken in the sense of verisimilitude, or logical truth, but this actually amounts to prevailing ways of speaking (*famositas*) rather than to ontological principles, an aspect that is inherited from the Aristotelian *Categories* (cf. Augusto, 2022).[18]

[16] In his *Posterior Analytics* II, 14, 98a20-23, Aristotle makes an analogy by proportionality employing animals and their central bone(-like) structure: The sepion is to the squid, as the spine is to the fish, as the backbone is to land animals.

[17] This distinction subsisting vs. substanding is particularly important for Dietrich, who bases his ur-separation between adherents and inherents on it (see Augusto, 2022). The Arabic-stemming theory of the first and second *intentions* is tightly connected to the Scholastic grammatical theory of the first and second *impositions* in many and complex ways that cannot be discussed here, but see, for example, Knudsen (1982).

[18] In effect, medieval logic focused largely on language–and is thus difficult to separate from gram-

3.1.2 Individuation: Not a Matter of Matter Alone

Aspect I is where the problem of universals is seen from the perspective of the ontological status of universals: Are they mere beings of reason, as for nominalism, or are they real entities, as argued by the realists? In aspect II we are confronted with the problem of what in fact determines universality and individuation, an ontological problem that impacts on cognitive and epistemological matters in the sense that it is asked whether humans can know individual things directly, or need the intermediation of the universals. If matter is that which accounts for individuation, as argued for by Albert and his followers, then the senses must be given some sort of cognitive/epistemic status, but they cannot be the principle of perfect and certain cognition, i.e. knowledge (cf. Augusto, 2009). How is this contradiction to be solved then?

Dietrich proposes to solve it by turning the genera, by means of which the entities are firstly individuated (to be then further individuated into species), into that which reflects nature's own ur-distinctions when producing generable and perishable things, such as the animals: These are founded on matter, or on "something having the character and manner of matter," as a *principle* (*De or.* III, 11). As a matter of fact, this is the very "first and radical principle" (*ibid.*), in the sense that it corresponds to the notion of, say, an animal "taken according to the nature of the animal essentially and absolutely" (*ibid.*), where the notion (*ratio*, in Latin) is here the same as the essence. But according to Aristotle the term "genus" has to do with the form rather than with matter, so there is the need to conciliate this vision of matter as the "fundamental and original principle" (*ibid.*) in the constitution of genera with the authority of the Philosopher, and Dietrich has again a solution up his sleeve:[19] Matter is distinguished on account of different forms–in other words, matter is *formed*–, so that in every form it is necessary to find an intention corresponding to the unity of matter, or of a material principle. This entails that entities as differently formed (rather than just different) as the perishable and imperishable things, or as the continuous and the discrete things, do not belong to a single genus–as would be the case if the form (or, more precisely, the formal act) did not work as a cognitive/epistemic *complement* to matter taken as a *uni*form principle in the natural things.

Indeed, if matter is not individuated by the formal act, then one can conclude that, say, food, which *taken generally* can be seen to be matter in potency to become animal flesh in act, belongs to the same genus of the animal to which it serves as nourishment. This might appear as an obvious absurdity, but what about *incomplete* entities, i.e. entities in the process of being generated (e.g., embryos of land plants–a.k.a. seeds or spores–or of animals) or corrupted (e.g., a dead animal, or wine turning into vinegar)? Are they to be placed in the same genera of the corresponding complete entities? In the specific case in which there are entities in potency with regard to entities in act, one may say that matter *participates* to some extent in the act and in the notion of the final form of the animal or the plant, so that already in the process of generation

mar–rather than on reasoning proper, a state of affairs that tended gradually to change with, again, the reception of Arabic logic as founded on the commentaries on Aristotle's logical texts.

[19] To a great extent, the problem here is that in medieval metaphysics the Latin term "*forma*" ends up translating both the Platonic "*idea*," a wholly abstract concept, and the Aristotelian "*morphê*," a concept largely inseparable from matter, so that the *forma* of an entity is both its essence and its material organization.

matter is the individuating factor *under a specif form*. The same reasoning applies in the case of entities in the process of material corruption, like carcasses or wine turning into vinegar: Indeed, if taken as *primary* the matter of a carcass, though it be in the process of decomposition, remains the same that it was in the living animal, just like the matter of vinegar can be said to be the same as that of the wine; primary matter is here *accidentally* receiving the form of the dead or of the vinegar, so that what can be called "primary" matter does persist under the *changing form* (cf. *De or.* III, 31-2). One way to understand this relation between individuating matter and universalizing form is to see generation and corruption as first and foremost processes of *formal*–rather than material–*privation*. Generation is the process in which a chunk of matter is still deprived of the final form it will have, and in corruption it is deprived of the final form it had. Thus, privation is but what in a *subject* undergoing radical change (e.g., death for an animal; a seed turning into a plant) accidentally replaces or anticipates its final form (e.g., and respectively, an animal or a plant). This creates an ontological tension between individuated matter and the different forms it may take during the existence of a material entity that requires an adequate conception of change.

3.1.3 Change, Forms, and Causes of Being

In the same way that there is a single individuated matter, the primary matter, that persists in change there is a single unique or final form that universalizes a substance and thus keeps it unaffected by change. Aristotle had considered two main types of change in material entities: (*a*) Generation and corruption, or *substantial change*, and (*b*) taking degrees of more (growth; increase) or less (decrease; diminution), which, together with alteration, accounts for *accidental change*.[20] The latter is the case when change is limited to qualities and/or quantities, and Dietrich briefly addresses it in paragraphs (18)-(19), in which he argues that an entity that admits of degrees of more or less belongs to a genus according to its specific act, i.e. the act that befits its species, regardless of whether it has (already) attained the final act of its own species or not. His examples are the white and the hot, as these admit of degrees of more or less: There are many shades of white and many degrees of hot. The idea of accidentality is here obvious. In the first case, change is restricted to the substantial form, or the form of a substance at specific stages of its existence, while primary matter remains unchanged, and it is more difficult to see why this change is substantial.

The Aristotelian doctrine of change–or *motus*, in Latin–was an endless source of debate for the Latin scholastics, but undoubtedly (*a*), in which the substantial form (*forma substantialis*) was center-stage, originated the most heated discussions. And indeed, Dietrich considers it at length in *De origine* III from paragraph (20) onward and nearly until the end of the text. Aristotle had argued that the substantial form, and it alone, gives to an entity its being or existence (*esse*), so it was justified to assume–as did Albertus Magnus–that every entity has a single, or unique, substantial form. According to Albertism, it is this unique substantial form in act that gives an entity its formal being, or its essence (*essentia*); on the other hand, without the essence an entity could not exist or have being, so that there is no distinction between

[20] Aristotle also considers local change as accidental change, but this is not considered relevant by Dietrich to the task at hand of slicing up the world into genera.

essence and being. As said above in the discussion of aspect II, matter is what persists in substantial change, as when an animal, say a horse, dies: In this case, the privation replaces the substantial form of a horse qua living animal, but the dead horse remains an animal through and through, not being placed in another genus and species, let alone in the genus of the inanimate bodies (cf. *De or.* III, 35). Dietrich's "motto" is "the deprived is the same that was the formed" (*ibid.*, 33). This means that confounded with, but separable from, the substantial form–the substantial form*s* of the embryo, of the horse, and of the carcass–there is a final form that determines the genus (here: horse). Thus, Dietrich's "motto" can be rephrased, for the sake of clarification, as "the deprived, which has its own substantial form (say, as a dead horse), is the same that was the finally formed (say, a horse)." We can extend this reasoning to the entity in potency with relation to its being in act as "the potential, which has its own substantial form (say, an embryo), is the same that will be the actual under the final form (say, a horse)." The substantial form*s* and the final form, however, coincide under the genus and the species, so that it is not incorrect to speak only of either the substantial or the final form.

But what is it that firstly *causes* an entity and its being or existence? By this, I mean that which brings an entity from non-being into being, or *brings it out (into being)*, translating the Latin verb form *elicit*. One may assume that for an entity to be brought out two aspects must concur: It must be brought out *from* something and *by* some agent. Drawing on the Aristotelian doctrine of the four causes, matter and the (substantial) form is that from which a material entity is brought out (*elicitus*, in Latin); as these causes are *intrinsic* to the brought-out entity, one may–as did Dietrich–speak of *principles*, or–as I do (Augusto, 2021; 2022)–*IN-causes*. But entities are brought out *also* with an end in view, namely by some agent, so that one must also speak–as Dietrich did–of *extrinsic causes*, or, to eliminate ambiguity, *OUT-causes*. Even if the end is intrinsic to an entity–one speaks here of its proper operation or "inner end"–, it is an end *intended* by an agent extrinsic to the entity. This, in the natural world, just is nature itself, which thus determines the proper operations of the diverse entities either as complete beings (e.g., a horse or an oak) or as instruments in the process of attaining that completion, namely by causing the beginning of generation proper (e.g., the embryo and the acorn). This is "raw" Albertism, compactly expressed in paragraph (24) of *De origine* III.

3.1.4 Genera and the Informational Problem

The above are the aspects that must be taken into consideration when slicing up the world into the genera of its entities, so does Dietrich think. The task at hand is thus daunting, not only because of the complexity it entails,[21] but also because what is at stake is our knowledge of reality. As seen above, matter is that which primarily individuates an entity as such, so that we can speak of a unity of matter; this is none other than the genus when conceived as an intention, but a second intention is ruled out, because the unity of matter either is a natural thing or entails a natural thing. The conclusion follows: Genera are first intentions.

In a first analysis, this is thus a natural intention–or an intention of nature–, which

[21] A complexity that is actually combinatorial, in the sense that the diverse aspects to be taken into consideration must be so in combination.

in fact determines "chunks" of matter to specific genera, an "assignment" task–the *dispositio*, or determination of an entity to be what it is intended by nature–that is definitive and irreversible: The embryo of a horse is in potency both an animal and a horse (in act), just like the carcass of a horse is the privation of (the habit of) both the animal and the horse; in either case, *formed matter*, i.e. matter that has been assigned a form, is that which allows us to identify this given "chunk" generically as an animal and specifically as a horse, despite the substantial change in generation and corruption.

So, one can say that the genera are out there, in nature, as real entities or as entailing real entities. This solves the problem posed by Albertus Magnus of the unreliable character of the senses: We know that a natural thing is an animal, say a horse, or a plant, like an oak, or a rock or whatnot, not directly from our perception of its primary matter, but from our apprehension of its genus, firstly, via its generically formed matter, or matter with a *generic form*, and its species, secondly, via its matter with a *specific form*, and finally as a first substance, i.e. "this horse," or "this man," or "that oak" via the *individual form* that, however, only adds in the subject accidents to what is proper of its, to wit, the generic and the specific forms.

But one way to think of formed matter just is as matter in which a form has been introduced, reason why we can equally speak of *informed matter*. This is thus a conception of information *ad litteram*, in which this term means exactly the introducing of a form by nature (the agent) in a chunk of matter.[22] The *informational problem* now is whether one can say of a dead animal "this horse" or of a piece of wood "this oak," or of an embryo "this horse" or of an acorn "this oak." By "the informational problem," I mean the cognitive problem that originates in the ontological successions–that I shall denote by ">"–of the kind "the entity in potency becomes in act" (e.g., **embryo > horse**) or "the *habitus* gives place to the privation" (e.g., **horse > carcass**).[23] This problem arises from the fact that the natural entities exist, or have an "habitual" being, in act under different forms at different times according to the *dispositio* and duration assigned to them by nature; for instance, a given chunk of animated matter can undergo the succession of formed entities **embryo > horse > carcass**, before and after which this matter is elemental, or not individuated.

From the material perspective, what we have is primary matter coming into being, changing, and ceasing to be *in the informative sense*. But this is always *positive information*, the opposite of (an act or a state of) privation in the ontological sequence **privation$_1$ > substantial form > privation$_2$**, where privation$_1$ respects what an entity is determined to be in act and privation$_2$ what it "habitually" was in act before.[24] From the informational viewpoint, this poses the problem of what genera and species an entity belongs to in this ontological succession where information, or the introduction of the substantial form, intermediates between states of privation

[22]This is, I argue, the use of the Latin noun "*informatio*" and of some of its morphological variations (*informative*, *informans*, and *informativus*) in Dietrich's *De origine*. In it, Dietrich uses seven times in total members of this word family.

[23]Importantly, *privation* should not be read as *negation*, because in late medieval thought these are generally distinct concepts.

[24]Another way to put this is to see privation$_2$ as non-being in act and privation$_1$ as being in potency. The concept of *privation$_1$* can thus give a new meaning to the notion of *potency*, i.e. being in potency is lacking a form that an entity is determined to have in a later stage of its existence or being. This said, although in paragraph (31) he makes an analogy between these two concepts Dietrich does not appear to see potency as a form of privation.

Table 1: Ontological successions, substantial forms, and species and genus assignment in the case of a horse: The informational problem. (The symbol "‡" denotes absence of an informational problem.)

		Privation$_1$ (*Generation*)	Complete Entity	Privation$_2$ (*Corruption*)
	Formed Entity	**Embryo**	**Horse**	**Carcass**
Informational Problem	Generic Form	Already- or Not-yet-Animal?	Animal (‡)	Still- or No-longer-Animal?
	Specific Form	Already- or Not-yet-Horse?	Horse (‡)	Still- or No-longer-Horse?

(cf. Table 1). On the one hand, it seems reasonable to see an embryo of horse as both a horse and an animal, just as it appears justified to see the carcass of a horse as both a horse and an animal, but is this the information operated by nature that gives clearly distinct forms to the entities **embryo** > **horse** > **carcass** in the ontological succession "– > **embryo** > **horse** > **carcass** > –", where "–" denotes not-individuated, or elemental, matter? In effect, an embryo, too, has its substantial form as such or per se in the succession "**sperm & menses** > **embryo** > **horse**," even if it is determined by nature to be a horse, and a similar reasoning can be applied to the succession "**horse** > **carcass** > **elemental matter**". It thus looks like the solution to this problem has to be found via a thorough analysis of the genera, namely as far as their causes are concerned. In particular, the intention of the *informative agent*, or the agent that carries out the introduction in chunks of matter of the different substantial forms in the ontological succession **privation**$_1$ > **substantial form** > **privation**$_2$, needs to be clarified. This is for Dietrich the central generic problem and he proposed to address it, too, in the text that follows in my translation from the Latin into English.

3.2 The Text: *Treatise on the origin of the categories*, Translation of Part III from the Latin into English[25]

In which the common notion of the entities that are classable in a genus and for what reason some are removed from the allotment of genera are shown[26]

(1) Now we must consider the notion of the entities that can be classed in some genus and for what reason some are excluded from a genus class according to what the metaphysician[27] considers the genera of entities to be.

[25]The references for explicit/implicit sources are those provided by L. Sturlese in Dietrich von Freiberg (sd/1983). I refer the reader to this text for the complete bibliographical data of these sources.

[26]"Allotment" translates here "*coordinatio*," an unusual translation, to convey the idea that the classification–a more conventional translation–into genera, or genus classes, is an allotment process carried out by nature and/or the intellect.

[27]*Realis philosophus*. Compare below–paragraph (12)–with *rationalis philosophus*.

(2) There are three aspects that ought to concur in any entity so that it may be found by itself and originally in some genus class.

(3) Firstly, it is necessary that it be some natural thing, or that it entail some natural thing: In effect, the entities that are in a genus according to the already mentioned consideration are in themselves and participate in a class by themselves, which only befits natural things.

(4) But these entities entail some natural thing either in the way of that which subsists by itself, the way proper of a substance, or in the way of that which formally determines or modifies a substance in terms of some natural operation, and this either actively or passively.[28] Which in fact occurs in a threefold way.

(5) In one way, inasmuch as these are determinations of a certain nature and are principles of such operations or motions essentially with respect to that which is principally signified by a term[29]; and these are natural quantities and qualities of things.

(6) In another way, inasmuch as some behave in a causal-like[30] way with respect to the aforementioned motions of entities or to their principles and are brought out from these by the agent reason; which makes that both in reality and in the intellect they bring along with themselves the aforementioned natures with respect to a substance by determining it. To this kind belong the relations and certain other entities of which it was said above that they are found in the genus of quantity and certain others in the genus of quality.

(7) In the third way are those entities that are related to the aforesaid motions or natural operations of things or their principles, more precisely with respect to the very substance, in terms of natural determinations of these things as in a circumstantial way. Hence it occurs that, both in real-

[28]I consistently translate the noun "*dispositio*" as "determination." The *ontological* idea conveyed by this noun, as well as by the forms of the related verbs "*disponere*" (to determine) and "*disponi*" (to be determined), is that every natural thing is determined by nature, or has a natural determination, to be a specific entity in act. This can be taken in the sense of being disposed–i.e. having its parts arranged in a certain way–, so that one can also opt for "disposition" and "dispose" when translating these terms, but this sense of "*dispositio*" holds only for the corporeal things, as the simple essences and the intelligences (cf. paragraph (37) below), albeit (quasi-)natural, are partless entities. One can argue that "disposition" is the adequate translation when considering (the) accidents, but these have for Dietrich an ontological status akin to that of the substances, namely via analogies (see Augusto, 2022). On the other hand, when translating "*dispositio*" in texts of *moral* or *ethical* content–*prima facie* not the case of *De origine*–, then "disposition (to act in a certain way)" is the translation of choice, namely with the problem of free-will in mind.

[29]That is, by the noun of a certain substance. The theory of the signification of terms in the 13th century, or terminism, a contextualized component of the more encompassing supposition theory, is a highly complex body of argumentation (Kretzmann et al., 1982, contains some pieces on this topic), but a brief illustration may help the reader to grasp its gist. For example, the noun "horse" signifies a substance–a horse–that is naturally determined with respect to specific operations or changes. Some of these operations are, say, running (versus flying) or being a herbivore (versus being a carnivore). These operations are thus related with *specific* qualities (being a runner or a herbivore) and quantities (a horse has four legs) that are natural in the sense that they are intended by nature. As for the natural changes that an animal can undergo while remaining *specifically* the same, Dietrich will have a lot to say below.

[30]Translating "*quasi consecutive*." Taken from a causal perspective, "*consecutive*" conveys mostly the final cause; to this, Dietrich adds explicitly the efficient cause, to wit, the agent reason.

ity and in the intellect, in determining a substance they bring along with them the aforementioned natures, but it is the intellect that introduces in them the entity[31] that is principally and formally signified by a term and thanks to which they are classed in determinate and proper genera according to their proper notions. And these are the six genera of things that the author of *The Six Principles*[32] calls forms happening extrinsically; of which Boethius says in the book *On the Trinity*[33] that they do not signify things, but rather circumstances of things.

(8) The second aspect that is considered in an entity classable in a genus according to a direct allotment of genera is that it be a complete entity once its perfection, which befits it according to its proper notion and the manner of its essence, namely in having its own species, is attained. The cause of which is that the notion of entity, which is distinguished according to the different genera, is the first and the most formal of all intentions, as was said, thanks to which a thing firstly differs formally from nothingness; which is not the case except according to the complete act of its quiddity and essence, as it will be shown below. The notion of whose complement and perfection in any such entity is that it is simply and by itself an entity; such an entity is what is intended simply and by itself by nature, and such entities are those of which each has its entity[34] and complement according to a species absolutely and in themselves, and not by accident.[35]

(9) In the third place we have to consider that, in order for some entities to belong to the same genus it is necessary that they participate in the common notion of that genus; they would not belong to a single class except according to something common to them.

(10) This common notion can be taken in two ways: In one way according to the nature of a thing taken absolutely, and in another way in terms of some analogy.

(11) The first way is that in which the notion of an animal is taken according to the nature of the animal essentially and absolutely. Which is not the case except when in those entities belonging to a single class according to that genus something is found, existing of a single notion and nature, which is the principle of that whole genus. And this first and radical principle in the generable and perishable things is matter, and in general in all entities that belong to a single class by genus it is necessary that such a principle be matter, or something having the character and manner of matter. Indeed, the simple act in different entities is not distinguished except according to an absolute and complete difference that divides outside a genus, given that the simple act differs from the altogether simple. But because a thing is not determined to some genus nor is it placed in a genus on account of matter, but in terms of some formal

[31] Here: *entitas*.
[32] *L. sex princ.* I, 14; ed. Minio Paluello – Dod, 38.
[33] Boethius, *De Trin.* IV; ed. Steward-Rand, 22.
[34] *Entitas*.
[35] "Complement" means here that which complements, or completes, an entity. This use of this term should be distinguished from its use below in the framework of set theory.

act–as the Philosopher says in Book VIII of the *Metaphysics*[36] that the word "genus" signifies the form rather than the matter–, hence, because the notion of a genus is taken in a completive way from the fact that the same fundamental and original principle of a genus, to wit, matter, is distinguished on account of different forms, it is necessary to find in all forms an intention corresponding to the unity of matter or of a material principle. Which makes it that all such entities share a single notion and thus consequently belong to a single class by genus. And following this the notion of a genus is truly and properly conceived by the metaphysician, according to which the Philosopher says in Book X of the *Metaphysics*[37] that the perishable and the imperishable entities do not belong to a single genus, nor do the discrete and the continuous entities, and the like.

(12) In another way, the common notion of a genus is taken not according to the nature of a thing in itself, as was said, but in terms of some analogy, which is called proportionality. And thus most of the time the logician[38] constitutes the unity of a genus according to probability.[39] For instance, he takes the notion of this genus that is the substance in the incorporeal as well as in the corporeal entities from the notion of substanding, though the noun "substance" is imposed from the notion of subsisting:[40] This noun comes from the manner of substanding that is to be found proportionally in these things; just as these things substand with respect to their own manners and properties or even accidents, so those things do in relation to theirs. And he likewise claims that the nature of the body, which belongs to the genus of the substance, is one in all bodies for the reason that all bodies are delimited by their dimensions in the same way, and according to this he says that all bodies belong to a single genus; in the same way he conceives a common nature in the continuous and in the discrete entities; likewise in other entities. And concerning this second manner entities are seen to be distinguished and classed logically and according to the prevailing ways of speaking[41], as the Commentator says in *Super V Metaphysicae*[42] and in *Super III Physicorum*[43], only in ten genera, which we call categories; and the Philosopher indicates this in the *Categories*,[44] where he says he had enumerated the manners of the quality "that were habitually spoken of." According to the first of these manners, to wit, by considering things according to their proper natures, they do not have to be forced to this number of genera, but those things that belong to a genus for a logical reason according to truth do not belong to a single genus, as it is perfectly evident on both sides concerning the body, which belongs to the genus of the substance, and concerning many

[36] Aristotle, *Met.* VIII, 3, 1043a36-7.
[37] Aristotle, *Met.* X, 10, 1058b28-9; 1059a9-10.
[38] Translating "*rationalis philosophus*."
[39] See Sections 3.1.1 above and 4.2.1 below for a clarification of analogy by proportionality (*analogia per proportionalitatem*) and probability (*probabilitas*).
[40] Note here the medieval theory of the *impositio* at play.
[41] "Prevailing ways of speaking" translates here the Latin noun "*famositas*."
[42] Averroes, *In Aristotelis Met. V*, comm. 18; ed. Ponzalli, 161.
[43] Averroes, *In Aristotelis Phys. III*, comm. 4; Venetiis 1562, 87rD-E.
[44] Aristotle, *Cat.* 8, 10a25-6.

other things.

(13) After these considerations, it is evident why some entities are not said to belong to some genus directly, while certain others, though not primarily and by themselves found in some class of genus, can nonetheless participate in this class by means of a reduction.

(14) In view of the first of these three conditions that were mentioned, to wit, that the entity which is classable in a genus entails some natural thing, the things of reason, which are things of second intention, do not belong to a genus: In fact, they do not entail any nature of an entity.

(15) For the same reason, those that are called the post-predicaments[45] are also excluded from the allotment of the genera: To be sure, no natural determination has existence in something from the fact that it is simultaneous with something else in time or in space, anterior either in dignity or in time, except perhaps accidentally; and if some of them entail any nature in a substance, or with respect to a substance, for this reason they are not excluded from the class or nature of some genus. But these are determinate and distinct according to the prevailing ways of speaking and probability rather than according to truth. If these post-predicaments are something for the metaphysician, then they are but certain accidents in general, or entities having the common manner of accidents of the natural things classable in a genus, which are entities proper.

(16) For the same reason the properties of entities are excluded from a genus class, too, though they belong to the same genus together with the subject-things according to the notion by which they are properties of those entities and accidents in themselves. I mean to say those things that exist in other things in terms of their own quiddity and essence, as was said above.[46]

(17) In view of the second of the aforementioned conditions, where the complement of an entity classable in a genus was discussed, the intrinsic principles of the genera do not belong to a genus except by means of some reduction as long as something of the notion of the complete entities is found in them as a certain beginning and origin. In fact, they do not entail a complete entity according to the specific act that is necessary so that something be simply and by itself classable in a genus by the aforementioned notion.

(18) And nothing prevents it, in case someone objects, that some entities that actually belong to a genus may nevertheless take degrees of more or less, as the white, the hot, and the like, reason why they do not seem to be complete entities, according to which they are classable in a genus.

(19) But one must know that there are two ways in which entities are said to take degrees of more or less. In one way, according to the degree and progress towards the final act by virtue of which a thing has its own species; and according to this, as some say, certain substances indeed take degrees of more or less, and thus nothing is simply and actually in a

[45] Aristotle, *Cat.* 10-15, 11b15ff.

[46] Cf. *De or.* II, 2. These are the properties–Type-1 **B**-entities in Augusto (2022)–, and Dietrich elaborates on them in paragraphs (8) through (17) of *De or.* II.

genus, unless it be in its final act, thanks to which it has a specific being. In another way, some are said to take degrees of more or less according to the intensification and decrease of an already established species; and thus some entities can rightly be classed in a genus according to their specific act, which they have, though they do not have the final degree of perfection with respect to the intensity of the established species. And the objection concerning the white, the hot, and the like things makes its case according to this.

(20) Similarly as it was said of the principles of entities, so it is true of certain incomplete entities, as are the embryos and the like, which are in the process of generation. They belong* to the same genus together with the complete entities not thanks to the substantial form that they then have–given that this does not constitute a complete entity in nature, nor is it intended by itself by nature–, but according to the fact that matter participates to some extent in the act and in the notion of the final form, which is the end of generation.[47] And because according to this participation the final form is not yet but under the potential being, which cannot reveal itself in nature without the whole act, that is why nature manifests the form of an embryo, under which in the meanwhile stands matter, until it be in its final determination that is the necessity that it be simply by the act of the intended form, disappearing then the form of an embryo.

(21) But this raises a question: If some entities belong* to the same genus due to the fact that they are in that relation that is in terms of potency and act, because in the generable and perishable entities everything is in potency anything whatsoever, though in a different degree of more or less proximate potency, it appears that the generable and perishable entities do not belong to any determinate genera and species, and that each and every one of them may belong* to any genus whatsoever.

(22) If one actually answers that, of the number of those that are entities in potency, only those that are in a certain reciprocal relation in terms of the natural progress from the less perfect to the more perfect can belong* to the same class of genus and species, then one ends up in absurdity. Indeed, according to this, given that the elements are with a view to the compound entity and the compound entities are with a view to the animated entities, and that likewise according to the natural progress and order the nutriment of animals is composed of elements, out of the nutriment becomes blood, out of the blood flesh, all these appear to be of a single class by genus and species. Which is obviously false: These are differentiated in terms of the species by their proper substantial forms. The same appears to be true concerning the embryo and the animal, which is generated out of the same according to some determinate species.

(23) But we must understand that, given that what is in potency has its definitive notion not only by virtue of matter, if it has any, but also from the act to which it is determined, it is necessary that the potency

[47] I write "belong*" (where Dietrich writes "*reducitur*" or "*reducuntur*," and also "*reducibilis esse*") to convey the idea that an entity belongs to a genus by reduction.

and the act belong as such to a single class by genus. But it happens in the case of certain entities that that which is in potency and that which is in act are in proper and different genera and species according to the proper notion of their substantial forms; however, in certain entities it is the case that, though they stand under proper and distinct substantial forms, they do belong to the same genus and species simply.

(24) In order to make this clear one must see that, as said, an entity classable in a genus simply and by itself is a complete entity according to the species, an entity whose notion of completion consists in that it is an entity by itself thanks to having its substantial form from an agent by itself in relation to the end intended by itself by nature. I mean now the "end" that is an inner end, which is the proper operation of a thing, which operation is sometimes found in nature with a view to the perfection of the operator, as in the complete entities, as in the animals and in the like, but sometimes the proper operation of a thing is determined by nature solely in view of something else, and these are instruments of nature, such as the seeds and the like. As thus these entities that have been mentioned are found in the elements, which are parts of the world, and in the compound things, in the same way both in the animated entities and perhaps in all generable and perishable entities, it is obvious that these are determined to proper genera and species.

(25) Regarding the objection concerning the potency and the act that anything can be made out of anything, we must say that though anything can be made out of anything, nevertheless not everything is in potency to no matter what, unless it be in such an affinity that by means of an agent it can be realized in act, as the Philosopher says in Book IX of the *Metaphysics*.[48]

(26) However, we must know that, as is held by the Philosopher in Book VIII of the *Metaphysics*[49] and from Book VIII of *Physics*[50], in the generable things the unity of each and every entity, as well as the very entity itself, is by virtue of an agent cause in which both the entity and the unity are found in a more formal and more perfect way. Therefore an entity in potency in that manner that was mentioned, to wit, that by an agent it can be realized in act, is found in nature in a threefold way.

(27) In one way in which that entity is taken to that degree of potency by some common or universal agent that is capable of taking that potency to the complete act; the agent of this kind is a celestial faculty or certain elementary faculties, as when fire generates coal out of wood and out of the coal ashes, or some agent generates air out of water and fire out of air, such entities, I say, in spite of being individual entities in potency to become individual entities, do not however necessarily belong to a single class according to the species. Because they lack the same determinate agent they lack the determinate unity of the potency to the act that is necessary for the unity according to the species.

[48] Aristotle, *Met.* IX, 7, 1049a1-18.
[49] Aristotle, *Met.* VIII, 6, 1045a30-31.
[50] Aristotle, *Phys.* VIII, 5, 247b9-10.

(28) In another way an entity in potency is found as that entity that is taken to that degree of potency by some determinate agent different from the determinate agent that takes that potency to the complete act, as for instance the menses, which are in potency an animal, are taken to this degree of potency by means of an active faculty different from the formative one that out of the menses makes an animal, and which formative faculty is in sperm in an instrumental way. And those that are entities in potency in this way do not necessarily belong to the same species of the entities in act in relation to which they are in potency: Indeed, there lacks the unity of the potency to the act due to the lack of unity in the different agents. From whence bread, blood, flesh, and the like of which we treat do not belong* to the same class according to the species, even if their individual entities are related to individual entities by that affinity of the potency, as was said.

(29) In another way an entity in potency in the aforementioned degree of potency is found, but by the same determinate and proper agent that accomplishes the complete act, as it happens in the case of embryos; and such an agent does not act except from a determinate potential principle towards a determinate end through a determinate medium that is not to be found outside this class. And in this way, from the unity of the agent that unity of the potency with respect to the act that is necessary for the unity not only of the genus but also of the species is somehow found; and on account of this these entities belong to a single class according to both the genus and the species, as was said.

(30) If however there is an entity in active potency whose action is found in nature only in view of something else, such as are the instruments of nature, like sperm and the like, though this entity is not in view of itself, nor does its operation according to this belong to its perfection by itself according to the intention of nature, nevertheless it is not necessary that it belong* to the same species together with the entity that acts by itself, because sometimes that formal unity of such active and passive entities that is necessary for the unity of the species is missing, as is evident with sperm and the animal. It can nevertheless be said to belong in some way to the same species, not as existing within a class of genus or species, but extrinsically, thanks to the notion of its operation that is determined to such a species by nature.

(31) Similarly as was said about the entities in potency so do the deprived entities, such as the dead animal and the like, belong to the same genus together with the entities whose privations they entail, originally, indeed, from the nature and notion of the subject, but formally and in a completive way from the notion of privation. The privation has the notion from the form and the habit, whose privation it is, and therefore it is necessary that they belong to a single class: The privation replaces in the subject the substantial form. Hence in these entities, to wit, deprived entities, so that they may belong to a genus the privation is in the place of the substantial form. They do not belong* to a genus by virtue of the substantial form that then inheres in them, given that they are deprived

entities, like the dead animal by virtue of the form of the body or of the flesh that then inheres in it[51]: This form is indeed accidentally created and intended by nature, because it is not the principle of any operation intended by itself by nature, but solely the form by means of which an entity is in the process of decomposition so that the principles of nature may be attained, the end by means of which the corruption of one entity may be the generation of another. Thanks to this, therefore, these entities can belong* to the genus class according to which they previously are related to the form by virtue of which an entity by itself and simply is in a genus. This is the privation by means of which the deprived entities are firstly related to a form in the same way that an entity in potency is firstly related to the act of the form by means of which it is in potency; and according to this it can belong* to the same genus.

(32) When I say "the form accidentally intended by nature," I call nature not only the first principle of all entities, but in particular the determinate and proper duration of each and every entity in which the existence of each and every generable thing is confined, because just as in generating an entity essentially intended by nature it intends the existence and the completion of a thing according to the act of the form, so in corrupting it firstly intends the corruption or the privation of the form, not the form to be introduced under which is the deprived entity to which by itself it does not befit to have a duration in nature, just as it is not an entity by itself in nature, as was said.[52] And the Philosopher means this in Book VIII of the *Metaphysics*[53], where he says that the living is not the matter of the dead nor the wine that of the vinegar, nor does matter receive the form of the dead or of the vinegar essentially, but accidentally, according to the process of the corruption of the animal and of the wine.

(33) But if in the deprived entities one considers the notion and the nature of the subject in which firstly and essentially the privation takes the place of the substantial form, then they belong not only to the same genus together with the entities whose privations they entail, but to a unity according to the species, being even in a certain way reducible to a numerical identity.[54] By a privative notion of opposites, they are opposites according to the form with respect to the subject both in reality and by reason: Indeed the deprived is the same that was the formed. As thus in the deprived entity as such the subject and the privation are essentially,

[51] Translating "*inesse*" as "inhere." In effect, this is a matter of accidentality (see below in this paragraph and also paragraph (32)).

[52] A complex passage that can be clarified as follows: In the case of a deprived entity, the form it has on account of the privation$_2$ (see Section 3.1.4)–i.e. the form of a deprived entity–is accidental, as a deprived entity is not by itself a complete entity in nature, not having any determined natural duration. In informational terms, with respect to privation$_2$ one can say that the form of a deprived entity merely conveys the information of the termination of what it was before, so that its belonging(*) to, or membership(*) in, a genus and species is solely so to say residual. Below in this paragraph, Dietrich explains this by means of the examples of a dead animal and vinegar: These are privations$_2$ of a living animal and of wine, respectively, entities whose information is essential.

[53] Aristotle, *Met.* VIII, 5, 1044b34-1045a2.

[54] That is, they are one and the same entity. For the crucial role of the subject in Dietrich's ontology, see Augusto (2022).

just as in the formed entity the subject and the form, the form and the privation having been removed from a common subject that which remains with respect to that which is essentially is one, though accidentally it may differ, namely by virtue of the substantial form that is accidentally found in the deprived entity, as was said. But whether according to that same accidental entity or according to that substantial form that is accidentally constituted by nature in the deprived entity, this entity is classed together with the formed entity not only due to the notion of the relation thanks to which this form replaces that one, but for the reason that everything accidental is reducible to that which is by itself, whether in the question at issue that which is by itself is understood to be the form of the formed entity, the common subject, or even the very privation: These are all by themselves, though each in its own way.

(34) However, from what was said, i.e. that the privation is by itself, it must not be understood that the privation is an entity, but instead that inasmuch as privation it is the conclusion of the corruption of the form, which corruption is by itself, just as the form is the conclusion of the generation, which is by itself. But the corruption of the form is by itself inasmuch as it is by itself in the subject by virtue of an essential agent cause according to the nature of its own principles, as was said.

(35) According to the previous considerations it is evident how much more conveniently and correctly one concedes that the body of the dead animal is the same as that of the living animal, though according to the philosophers one can concede and it might be true that dead flesh is not flesh but only equivocally, nor is it the same that it was before. This is indeed true if the substantial form of the dead flesh is considered by itself and not in terms of the aforementioned reduction that is conceived from the intention of nature when constituting these entities. The same analogy regarding the identity and the distance by equivocation with respect to the difference is considered in functional members such as in the eye, the hand, and the like, inasmuch as they are constituted in their functions in the living body and are deprived of them in the dead body according to the Philosopher.[55] Hence, the dead animal does not belong in the genus of the inanimate body, as some imagine[56], belonging on the contrary to the genus of animal, as Augustine shows in a general way about all the deprived entities in Book V of *On the Trinity*[57]. Indeed, one thing is the notion of the inanimate and of the privation entailed by it, according to which it shares together with the animated entity this genus that is that of the body[58], but yet another thing is the notion of the dead animal and

[55]Aristotle, *Met.* VII, 11, 1036b30-32; *Meteor.* IV, 12, 389b31-390a1, 390a10-13. This means that matter is not only determined by the form, but also by a "function," in the case of the living organisms. This is indeed in accord with Aristotle's kinetic and organizational philosophy, a feature that, in turn, characterizes his hylemorphism.

[56]E.g.: Mathew of Aquasparta, *Quaest. disp. de fide* VI ad 10; ed. Quaracchi 1957, 160; *Quaest. de an.* VI q. 2 ad 13; ed. Gondras, 261.

[57]Augustine, *De Trin.* V, 7, n. 8; PL 42/915-6.

[58]That is, the genus of the body is divided into two subgenera, those of the animated and of the inanimate bodies.

of the privation entailed by it: In fact, one does not consider the privation and the form–according to which differences divide a given genus–by their succession one after the other in some subject according to nature, but only by the fact that a certain entity, to be distinguished among many, by nature firstly belongs to a first division by which entities are distinguished from each other; but the privation that the dead animal entails and the opposite form do not belong to this manner, as is evident.

(36) In view of the third of the aforementioned conditions in the beginning of this section, the first principle of all entities is not determined to any genus. It is thus necessary, as it was said there, that those entities that belong to a class by genus be as such of a single notion. None of those entities that belong to a single order by a single notion can be the principle of that whole order for the reason that each and every one of those that belong to that order has the notion of the part and of the existent in potency with respect to the whole. But the first principle is the principle and the cause of the whole order of nature. Therefore, it is necessary that it be outside the whole order of nature and thus not be determined to any genus. Because it is an extrinsic principle with relation to the whole order, that is why it is necessary that it lack that which is the intrinsic principle thanks to which all the entities that participate in it have a single notion, and thus a single class by genus, as was said above.

(37) Similarly, according to this, if there are any entities simple in their essences, as the philosophers thought regarding the intelligences, these, because they share no natural principle, according to this they will not belong to any genus, though they necessarily belong to the whole order of being, as it is shown in the *Treatise on the Causes*[59].

4 In or Out? Dietrich's Generic Criteria

As announced by Dietrich of Freiberg, the topic of the third part of *De origine* is membership in, or exclusion from, a genus class with respect to entities from the viewpoint of metaphysics. This viewpoint is a crucial aspect, as the objective is here that of slicing up the world in such a way that *all*, and *only*, the entities that constitute it are considered. Seen from today's perspective, Dietrich's is proposed to be a foundational ontology: This utmost generality sought by the metaphysician is at odds with both the restriction of the world to a subset of its entities–e.g., animals, plants, or minerals–as carried out by the man of science and its consideration from a purely logical perspective. These utmost general entities are for Dietrich not only the Aristotelian categories, to which he adds what he calls properties, considered with respect to natural entities, but also the complete entities and the(ir) common notions.

For the sake of formal analysis, I consider a set $\mathcal{E}$ of entities with their own genera such that for any entity ϵ we have either $\epsilon \in \mathcal{E}$ or $\epsilon \in \overline{\mathcal{E}}$, where $\overline{\mathcal{E}}$ denotes the complement of $\mathcal{E}$. A look at Figure 4 suffices to show that all the Aristotelian categories (in bold font) belong to $\mathcal{E}$. It is indeed the case here that $\mathcal{E} \cup \overline{\mathcal{E}} = \mathscr{U}$, where $\mathscr{U}$ is the universe, or all the entities that constitute the world, but the key word to

[59]Not found.

bear in mind is "directly": As we shall see, $\overline{\mathcal{E}}$ is more complex a set than its simple set-theoretic conception as a complement suggests. For instance, the properties, the entities by means of which Dietrich extends the Aristotelian ur-partition of reality, are considered to be firstly members of $\overline{\mathcal{E}}$, but they end up as members of $\mathcal{E}$ by *reduction*.

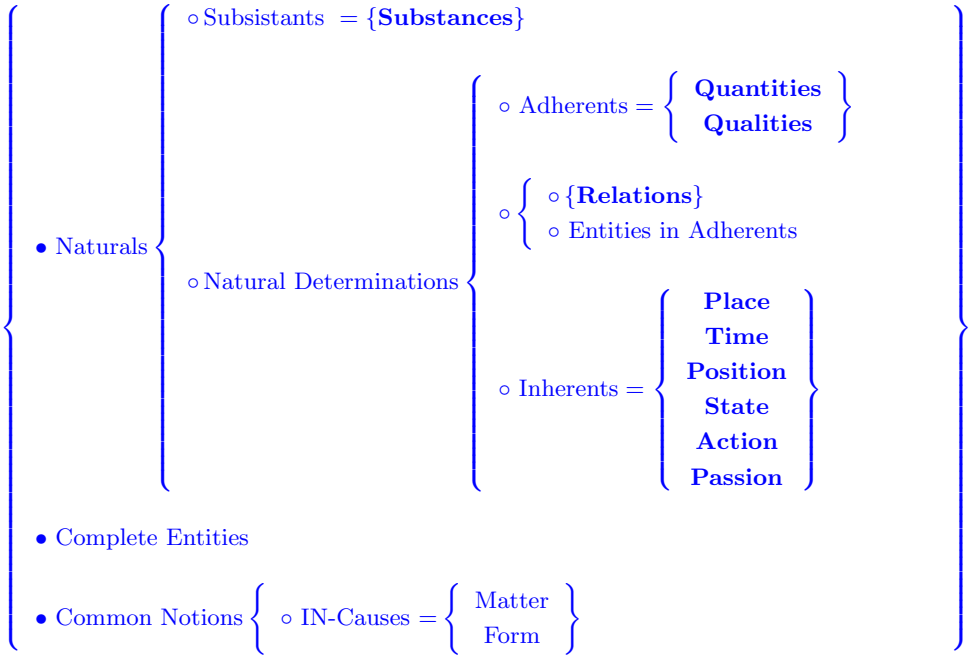


Figure 4: The set $\mathcal{E}$: Ur-allotment of genera, or entities found by themselves and originally in a genus class.

4.1 Direct Generic Membership: Three Conditions

In *De or.* III, 2-12, Dietrich establishes three conditions that an entity must meet in order to "be found by itself and originally"–i.e. *directly*–in some genus class:

1. It must either (α) be a natural thing, or (β) entail a natural thing either ($\beta.1$) in the way of that subsisting by itself (a *subsistant*, for brevity sake) or ($\beta.2$) as a *natural determination* of a substance, which can occur in a threefold way, to wit, ($\beta.2.a$) as a *principle* of natural operations and motions for which a substance is naturally determined, ($\beta.2.b$) as a *cause* with respect to ($\beta.2.a$), or ($\beta.2.c$) as a *circumstance*, also with respect to ($\beta.2.a$).
2. It must be a *complete entity in* (terms of its) *act* (vs. accidentally).
3. And it must share a *common notion* with the other members of a genus.

Type (α) of condition 1, or "natural thing," is the coarsest ur-element in this tripartition. Very likely Dietrich refers here to both the composite, or sensitive, entities,

and the simple, or intelligible ones, which comprise the intelligences and the simple essences (see Augusto, 2021, Fig. 8). But these are included in the substances, the entities of type (β.1), so the disjunction between (α) and (β) does not appear to be an exclusive one and I shall use the *ad-hoc* term "naturals" to refer to unspecified entities in this inclusive disjunction.[60]

Besides the substances, type (β) comprises yet another type–(β.2)–that is also presented as a threefold distinction: The entities of type (β.2.a) are what I call adherents, to wit, quantities and qualities, those of type (β.2.b) are either the relations or entities in adherents, and those of type (β.2.c) are the six remaining Aristotelian categories that I see as inherents and to which Dietrich refers as "forms happening extrinsically."[61] With respect to types (β.2.b) and (β.2.c), Dietrich remarks that these determine a natural thing both in reality and in the intellect, it being the case that the former are actually brought out by an agent reason. Common to all these three (β.2)-types is the fact that they are all considered with respect to the form, or formally, as stated by Dietrich in paragraph (4); in other words (mine), these natural determinations–an abbreviation for the expression "that which determines or modifies a substance in terms of some natural operation ... either actively or passively" (*De or.* III, 4)[62]–are to be taken in the informational sense (see Section 3.1 above). Additionally, we must not forget that Dietrich's perspective on the genera is causal, and he classifies type (β.2.a) as principles, or IN-causes, and type (β.2.b) as causes proper, or OUT-causes; the causal status of type (β.2.c) is rather more complex, as seen in Augusto (2021; 2022).[63]

To these naturals, Dietrich adds the *complete entities* (condition 2), the things that are entities simply and by themselves, or are complete once attained the perfection of their proper notion and the manner of their essence, which completeness is reflected in their having their own species (*De or.* III, 8). In this paragraph (8), Dietrich concisely settles the relation between the notion of an entity and the genus to which it is allotted, a relation that formally distinguishes it from nothingness or non-being, as a first intention, but clarifies that an entity only attains this perfection and completeness "of its quiddity and essence" when it is "what is intended simply and by itself by nature," which intention is fulfilled in its having "its entity and complement according to a species absolutely and by itself, and not by accident." Consider, say, a horse; this first substance is an animal (the genus), and it is by being allotted to this genus by nature that it is firstly and formally distinguished from nothingness; however, the natural intention with relation to an entity is that it be *specified*, i.e. that it belong unequivocally to a species (horse, in this example), once its *entitas* is so to say full-blown according to the intention of nature.

Finally, set $\mathcal{E}$ is extended with the *common notions* (condition 3), or that which makes it so that some entities belong to a single genus class. So, this must be something in common to all of them (*De or.* III, 9), and this can be in two ways, as

[60] Note, however, that the intelligences will be summarily excluded from set $\mathcal{E}$ at the very end of *De origine* III. Interestingly, the discussion in this third part is largely limited to the material entities, in particular those that undergo substantial change (see Section 3.1.3 above).

[61] See Augusto (2022) for a clarification of this expression, as well as of the terms "adherent" and "inherent."

[62] See footnote to this paragraph for an account of my use of the term "determination" translating "*dispositio*."

[63] See Section 3.1.3 above for a brief terminological explanation.

succinctly stated in paragraph (10): Either according to the nature of a thing taken absolutely or in terms of some analogy. In paragraph (11), Dietrich appears to abandon the viewpoint of utmost generality to address the specific case of animals under the perspective of the first of these two ways: This is firstly matter. But in fact he extends this–which is Aristotle's material cause, or a principle in his own case–to all the generable and perishable things, and apparently to all natural things by means of something that has the character and manner of matter, i.e. something that works as a material cause. This said, matter is not what in fact determines the genus of a natural: Form is, namely as that which gives to the matter of a concrete natural its different form. In other words, the form is that which in a natural determines its belonging to a genus by means of what the medieval metaphysicians called the *differentia*; for instance, quantity can be either continuous or discrete in terms of the form, thus belonging to two distinct "sub-genera." Thus, the material naturals sharing the same form are *united* in a same genus under what is in fact a material principle.[64] As for the second way of the common notions, this is the way of analogy, but Dietrich is rather critical with respect to this logical common notion, reason why I leave its discussion for Section 4.2.1 below.

The above (excluding analogy) are thus the entities that belong to $\mathcal{E}$. Figure 4 shows this ur-set.

4.2 Membership*, or the Generic Vicissitudes of Many an Entity

As said above, belonging to the complement of $\mathcal{E}$ is not a matter of a simple set-theoretic operation such that $\overline{\mathcal{E}} = \mathscr{U} - \mathcal{E}$ and $\mathcal{E} \cap \overline{\mathcal{E}} = \emptyset$. In effect, although some entities are firstly seen by Dietrich as belonging to $\overline{\mathcal{E}}$, he conceives special cases in which they may attain membership in $\mathcal{E}$; this special membership, that I shall denote by "membership*," is what I call *belonging**, or the fact that some entity firstly placed in $\overline{\mathcal{E}}$ *belongs to* $\mathcal{E}$ *by reduction*. In his analysis of the conditions for membership in $\mathcal{E}$, condition 2 has center-stage, as it poses the most difficult problems with respect to membership in genera and species. Reflecting this prominence, I approach firstly conditions 1 and 3, and reserve the remaining of this Section to the critical issue of ontological (in)completeness.

4.2.1 Not Naturals *et alia*

Some entities are summarily placed in $\overline{\mathcal{E}}$, because they do not satisfy condition 1: These are for Dietrich the things of reason, or things of second intention (cf. *De or.* III, 14), the Aristotelian post-predicaments, to wit, contrary, priority and posteriority, simultaneity, change, and having (*ibid.*, 15),[65] and the properties (*ibid.*, 16). With respect to the first, Dietrich does not elaborate on them as it was received knowledge at the time he wrote this treatise that the things of reason, or things of second intention, were but concepts of concepts (see above). The post-predicaments may belong to the

[64] See the elaboration on Albertism in Section 3.1 above. In effect, paragraph (11) of *De origine* III concisely contains all the main elements of this "stance."

[65] Against Aristotle's own view, according to which some of the post-predicaments belong directly to a genus (for instance, the contraries white and black belong both to the genus color) or are even genera themselves (e.g., good and bad).

genus of a substance if they entail some nature in it or with respect to it, but again this is a linguistic rather than a metaphysical perspective, according to which they are excluded from $\mathcal{E}$ as being, or as having the manner of, mere accidents of natural things. As for the properties, by means of which Dietrich extends the Aristotelian categories, they are first and foremost members of $\overline{\mathcal{E}}$, though taken as accidents by themselves they belong to the genus of the subject-thing whose properties they are.

As a matter of fact, the first entities to be excluded from $\mathcal{E}$ are precisely the common notions by analogy mentioned in condition 3. Dietrich appears to throw doubt on the logical common notion, i.e. analogy, as belonging in $\mathcal{E}$, as this is based on proportionality and verisimilitude, or probability, rather than on the nature of a thing taken in itself, so that matter is replaced by these as the unity of a genus (*De or.* III, 12). But the very realization that logicians take the notion of the substance as a genus from the notion of substanding when the noun "substance" is in fact imposed from the notion of subsisting appears to him misguided. This, in turn, motivates other ill-founded considerations of common notions that lead to erroneous genera allotments, such as placing all bodies in a single genus by the common notion of delimitation based on a body's dimensions and thus not differentiating between discrete and continuous entities, etc. Dietrich concludes that these genera allotments reflect prevailing ways of speaking, a feature he refers to as *famositas*, rather than what is metaphysically the case, but he is well aware of the source of this common notion, to wit, Aristotle's *Categories*. The authority of the Philosopher, which he struggles not to oppose directly, leaves him in an ambiguous position, namely expressing doubt whether the number of ten corresponds in fact to the genera of the entities that constitute the world; certainly, by considering things according to their proper natures, the number of the Aristotelian categories appears arbitrary. All in all, Dietrich concludes that analogy as a common notion does not belong to $\mathcal{E}$ without further ado. In paragraph (36) Dietrich retakes condition 3, now by considering the first principle (*principium primum*): As the principle and cause of all things, it must be outside the order of nature and thus not determined to any genus. Additionally, the intelligences–if such simple entities do in fact exist–are also excluded from $\mathcal{E}$, the reason being that while they do belong to the whole order of being they do not share any natural principle (*De or.* III, 37).

4.2.2 Ontological (In)Completeness and the Information Criterion

The topic of ontological completeness (condition 2), or what it means for some material thing to be a complete entity, is undoubtedly the core of Dietrich's discussion on the genera allotment, occupying paragraphs (17) through (35) and recruiting the most abstruse ontological concepts, such as potency and act, substantial form, and privation. These paragraphs constitute in fact a highly condensed exposition of Albertism as this was discussed in Section 3.1. In them, we are faced with a complex discussion on the criteria for ontological completeness that has to tackle mostly the core metaphysical concept of change, as this poses the most acute problems with respect to the ontological completeness status of an entity, in the sense that what appears to be a single individuated entity can take widely distinct forms during its natural lifespan. As it will be seen, the form, via the *(in)formative agent*, is the decisive aspect in his generic allotment, and I accordingly call this Dietrich's *information criterion*.

Summarily excluded from $\mathcal{E}$ are the intrinsic principles, or IN-causes, of the very genera, precisely because they do not entail a complete entity, though they may contain in themselves something of the notion of complete entities, namely with respect to their origin and beginning, which allows for their membership* in a proper genus (cf. *De or*, III, 17).

Aristotle's notions of increase and decrease are the basis for the elaboration in paragraphs (18)-(19), in which Dietrich discusses the objection that may be posed with regard to the entities that take degrees of more or less–for example, the white and the hot–as not being complete entities. In fact, entities take degrees of more or less in two distinct ways, either as a necessary means to attain their final act according to which they are specific entities, i.e. they have their own species, or as intensification or decrease of an already established species, as is the case with the white and the hot. In this second case, these entities may be seen as being complete, though they might not have the final degree of perfection with respect to the intensity of their established species. In other words, the more or less white is white (the species) and thus belongs to a determinate genus (color), just like the more or less hot is hot, etc. Those of the first kind are indeed incomplete entities; one might here suppose that it is possible for them to belong* to the genera of the corresponding complete entities, but Dietrich appears to reject this, stating that "nothing is simply and actually in a genus, unless it be in its final act, thanks to which it has a specific being" (*De or.* III, 19).

Likewise incomplete are the entities that are in the process of being generated, like animal embryos and plant seeds. But, just as in the case of the principles, these can nevertheless belong* to the genera of animal and plant inasmuch as their matter participates to some extent in the act and in the notion of the final form of the corresponding complete entity taken in its IN-causes. It is easy here to see that a horse embryo belongs* to the genus of animal and an acorn belongs* to that of plant, though neither the horse embryo or the acorn are an animal or a plant proper. Importantly, in paragraph (20) the substantial form is rejected as that which accounts for this membership*, as it neither constitutes a complete entity by nature nor is intended in itself by nature.

Has Dietrich been too generous with this notion of membership* that allows for the ontologically interesting fact that an entity first and foremost belonging to $\overline{\mathcal{E}}$ may end up belonging* to $\mathcal{E}$? In paragraph (8), we are told that completeness for an entity is a matter both of its *generalizing* form, or the form that firstly gives it its own genus, and secondly its *specification*, a dual process in which nature plays the role of the efficient agent. According to this, we expect a horse to be allotted directly to a genus (animal), so that it unequivocally belongs to $\mathcal{E}$. But what about the embryo of a horse? Or the carcass of a horse? Are these, too, complete entities according to the genus? Indeed, one may extend this ontological reductionism, or membership*, to any natural entity whatsoever, because any entity that is generable and perishable is always in potency with relation to some entity in act, as Dietrich is well aware of (cf. *De or.* III, 21). If one argues that only the entities in potency can belong to the same genus and species that are in a certain reciprocal relation of the natural progress from the less to the more perfect, then one ends up in the absurdity of claiming that the nutrients in animal food, the blood that is formed out of those nutrients, and the flesh that is constituted out of the blood all belong to the same genus and species if

one sees it that the elements are with a view to the compound entities and these in turn with a view to the animated entities; likewise for the embryo and the animal. In effect, Dietrich argues in paragraph (22) that the food, the blood, and the flesh of an animal all have their own species according to their own substantial forms, so that they cannot belong simply to the same species of, say, a horse; in fact, the nutriment of a horse, which belongs to the genus of animal, belongs to the genus of plant, so that the claim that both the horse and its nutriment belong to the same genus by appealing to the belief that the grass is in potency a horse is manifestly false. If in this paragraph Dietrich maintains the same line of reasoning, then an embryo does not belong directly to the genus of animal, though it can be said to be in the process of generation with a view to some determinate animal species.

In other words, an embryo is both formally and materially *in potency* a specific animal *in act*, so it might not appear clear why it is not directly assigned to the genus of animal. This calls for an elaboration on the tension between potency and act, namely with respect to the substantial form–and its association with matter by means of a function, or operation, as according to the Aristotelian hylemorphism largely accepted by the Dominican scholastics.[66] In (23), Dietrich states that in the case of certain entities "that which is in potency and that which is in act are in proper and different genera and species according to the proper notion of their substantial forms," but in other cases both belong to the same genus and species despite having distinct substantial forms. To clarify this apparent incongruity, Dietrich appeals to the notion of *(proper) operation* as the intrinsic end of an entity: While in a complete entity such as an animal its proper operation is in view of its own perfection, the proper operation of an instrument of nature, such as sperm or a plant germ, is in view of not only something else (an animal or a plant) but something specific (a horse or an oak), reason why they are determined to proper genera and species (*De or.* III, 24).

But this determination in the generable and perishable things, albeit an inner end, requires an agent that takes an entity in potency to *its* act, an Aristotelian postulation that in fact indicates an agent cause containing in itself both the entity and its generic unity (*ibid.*, 25-6). This determines three distinct ways in which an entity in potency can be found in nature with respect to this *formative agency*:[67]

(A) The agent is a common or universal agent that (*i*) firstly takes an entity to a "specific" degree of potency and then (*ii*) takes this potency to the complete act. This agent is a celestial faculty or an elementary faculty, such as fire, which out of wood makes coal and out of this ashes, or an agent capable of turning water into air and this into fire. Although these–wood and coal; water and air–are individual entities in potency to become individual entities in act–ashes and fire, respectively–, they do not necessarily belong to the same species, because "they lack the determinate unity of the potency to the act that is necessary for the unity according to the species" on account of the fact that they lack the same determinate agent (*De or.* III, 27).

(B) The agent of (*i*) is different from that of (*ii*); for instance, the (*i*)_agent (sperm)

[66] See footnote to paragraph (35) in the translation of *De or.* III.

[67] Dietrich speaks of "*virtus formativa*," but this should be understood as an *informative* faculty in the sense discussed above (see Section 3.1).

that takes the menses (an animal in potency) to this degree of potency is distinct from the (*ii*)_agent that out of the menses makes an animal. Just as in (A), these entities do not necessarily belong* to the same species of the complete entities in relation to which they are in potency. For example, the menses of a mare do not necessarily belong to the species "horse" when taken as an entity; again, they lack the unity of the potency to the act, because they lack the unity of agency in the sense that they alone, without the instrumental contribution of sperm, would not be able to "make an animal." Obvious examples of such entities are bread, blood, flesh, etc., though they all can become an animal in act (cf. *De or.* III, 28).

(C) The agents of (*i*) and (*ii*) coincide, i.e. there is a unity of agency. This is the case of the embryos, whose agent takes them to the degree of potency with a view already to the complete act. This is, so to say, a closed agency over a determinate genus and species, with no information being shared with other classes. In effect, everything–the potential principle, the end, the medium, and the agent–is here *determinate*. This unity of agency makes it so that these entities belong to a single class by both the genus and the species, namely because this unity equates with the unity of the potency to the act that is required for the unity of both the genus and the species (*De or.* III, 29).

From the above, one can conclude that the unity, or coincidence, of the (*i*)_ and (*ii*)_agent does suffice for the unity of genus and species, but in fact the *formal unity* also has a role to play in the genera allotment (*De or.* III, 30). For instance, sperm (an animal in potency) and the animal (the entity in act) lack formal unity and thus do not necessarily belong(*) to the same species, unless we consider that the proper operation of sperm is determined by nature to an animal species; but this "membership" is extrinsic with respect to sperm.

Finally, in paragraphs (31) through (35) Dietrich addresses the also critical problem of the deprived entities, or the entities in the process of corruption. Although he appears to consider privation only in the sense of what I above call privation_2, he concedes that the relation of a deprived entity with respect to its previous form and that of an entity in potency with respect to what it will be in act (what may be called privation_1) is similar, so that in fact in these paragraphs he continues to address the ontological problem of the incomplete entities from the informational perspective sketched above in Section 3.1.4. According to Dietrich, two notions are crucial to grasp the ontological status of a deprived entity, to wit, the subject and the privation itself. The former is a very complex notion in medieval ontology, especially so in Dietrich of Freiberg (see Augusto, 2022), and here I shall just sketch it as an entity taken in the sense of that which underlies, or supports, something else–privation, in the case at hand.

Dietrich begins by focusing on the privation itself, as this is what respects the form and the completion of the entities under scrutiny. His first "maxim" is: "The privation replaces in the subject the substantial form" (*De or.* III, 31). Hence, the deprived entity–e.g., a dead animal–just follows *formally* the positively informed entity (the living animal), and as such it appears justified to place it in the same genus of the latter. But Dietrich sees this membership as belonging*, in the sense that just as an entity in potency can be related to a form it will have in act, so is a deprived

entity related to a form it no longer has but had before; in both cases, privation$_1$ and privation$_2$ respectively, the substantial form is accidental. Just as an embryo is not essentially as such if seen from this viewpoint, a dead horse is not essentially as such; they are mere accidental stages of a horse, namely and respectively the stages of generation and corruption. As seen above in Section 3.1.4, this entails that in the ontological succession "**embryo > horse > carcass**" only the horse belongs properly to a genus (animal) and a species (horse). Dietrich's account is that of the natural philosopher: Only the horse has a duration, or an interval of time, assigned to it by nature. In other words, Dietrich appears to claim that a natural material entity belongs directly to a genus and species only if it exists as such during a period of time that can be said to be its natural longevity (cf. *De or.*, 32). Thus, neither the embryo nor the carcass belong directly to the genus "animal," and hence also not to the species "horse."

But if one considers the notion and the nature of the subject, as Dietrich does in paragraph (33), "in which firstly and essentially the privation takes the place of the substantial form," then a horse and the carcass of a horse not only belong to the same genus, but are in fact one and the same entity. Dietrich's second "maxim" is now: "The deprived is the same that was the formed," both in reality and by reason. The explanation given for this "maxim" is that it is equally in an essential way that the subject and the form are to be found in the formed entity and the subject and the privation are so in the deprived entity, so that if we remove both the form and the privation what remains is one and the same *subject*. This reasoning might appear quite impressive, namely as far as the notion of subject as that which remains in the process of substantial change is concerned, but in fact Dietrich aims at a higher ontological account: The form of the formed entity, the common subject, or the very privation are all essentially or by themselves, for the reason that everything that is accidental(ly) *is reducible* to that which is by itself, or essentially (*De or.* III, 33). However, and to complete this reasoning on the ontological status of the deprived entities with respect to their belonging(*) to the set $\mathcal{E}$, Dietrich clarifies the notion of privation with relation to the form: The privation–which despite being by itself is not an entity (*ibid.*, 34)–just is the conclusion of the corruption of the form, in the same way that the form is the conclusion of the generation, so that we have the ontological succession

$$\underbrace{\overbrace{\textbf{Privation}_1}^{\text{Accidental Form}}}_{Generation} \geq \textbf{Final Form} \geq \underbrace{\overbrace{\textbf{Privation}_2}^{\text{Accidental Form}}}_{Corruption}$$

$$SUBJECT$$

where "$\geq$" denotes "is terminally followed by" (cf. Table 1). In these extremes, the generation, or privation$_1$, and the corruption, or privation$_2$, an entity lacks a *final* form either because it still does not have it or has already lost it, it being the case that these not-yet-having-the-form-of and no-longer-having-the-form-of are by an essential agent cause that acts according to the nature of its own principles upon the subject. In paragraph (35), Dietrich completes his reasoning by arguing that according to this elaboration the body of the dead animal and that of the living animal are one and the

same entity, a conclusion that one necessarily draws if one considers this issue from the perspective of the reduction operated by nature in its intention with respect to the corruption–and the generation–of the animated entities. To be sure, one can consider the privation from other perspectives (e.g., the functions of the living animal, or its status as a material body), but if one focuses on the above ontological succession in which the subject remains unchanged, then one is assured to get things right with respect to the genera allotment.

5 Conclusion

As discussed above, universals and particulars are foundational aspects of formal ontology, but they more frequently than not fall into the type-token stereotype. One of the many shortcomings of this stereotype is its inability to account for the persistence, namely endurance, of types in face of the different forms taken by tokens in the ontological succession that goes from their beginning as a particular to their ceasing to be as an entity (e.g., **embryo > horse > carcass**). To be sure, formal ontology is not unaware of this, many efforts having been made to account for apparent insufficiencies in the type-token format when confronted with change; in particular, the distinction between so-called 3D- and 4D-entities has been the subject of abundant elaboration. This distinction, in turn requires an ontological commitment to be based on spacetime or space and time as ur-elements at the very top or leftmost node of an ontological tree or diagram, respectively, but this constitutes yet another ongoing controversy. In the meantime, human agents are constantly called upon to act, often in non-trivial ways, but formal ontology is frequently of little help.

Universalization and particularization are as important for formal ontology as they were for medieval ontology. In part III of *De origine*, Dietrich of Freiberg goes deep into the topic of genera allotment, or how the world can be sliced up into genera and species via differences, an ontological practice–*universalization*–that goes back to Aristotle and was central in medieval philosophy. His threefold central question is: When does an entity (i) belong directly, (ii) belong* (or belong by reduction), or (iii) not belong to a genus class? His is a broad scope, including from common notions to natural determinations of entities, traditionally called accidents, but his focus falls on the problem of ontological completeness, an exceedingly hard problem that mixes central aspects of Aristotelian metaphysics and natural philosophy and developments of these aspects that can be classified as Albertists. This problem is hard, because there is the need to account for the persistence of genera and species in face of the *substantial change* that some natural entities undergo through their separate existence as *particulars*. In order to solve this ontological problem, Dietrich applies what I call the *information criterion*, according to which a material entity belongs(*) to a genus and species in agreement with the form that is introduced by nature in a given chunk of matter, that which first individuates a material particular as such.

As said, formal ontology cannot help us in non-trivial agency for the lack of shared conceptualizations in certain given cases, like those involving animal embryos or dead animals, in which in the face of change generic and specific identity appears to persist. Perhaps an exploration of Dietrich's way of slicing up the world into genera, and in particular his information criterion, in the context of formal ontology can throw light on these, as well as on other, "lighter," cases. This, in the belief that formal ontology

is currently the best shareable means we have to conceptualize reality in a strategical and instrumental–versus, but perhaps equally important, artistic or purely philosophical–way. Is formal ontology up to the challenge? A matter for meta-ontology.

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Online Resources

[1] https://hpo.jax.org/app/

[2] http://biotopontology.github.io/

[3] https://www.ebi.ac.uk/ols/ontologies/po

[4] https://www.ebi.ac.uk/ols/ontologies/omp

[5] https://data.humancellatlas.org/metadata/dictionary/ontology/species_ontology

[6] http://obi-ontology.org/

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[a]Of the author's translation of *De origine* from the Latin into English